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# **Review Report of the CRIES/SIEDRA Project in the Dominican Republic**

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**June 1979**

**Office of Agriculture  
Development Support Bureau  
Agency for International Development**

**Review report of the CRIES/SIEDRA  
project in the Dominican Republic**

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**Principal Acronyms Used in this Report**

**CRIES: Comprehensive Resource Inventory and Evaluation System**

**SIEDRA: Sistema de Inventario y Evaluacion de los Recursos Agropecuarios**

### Summary and Recommendations

The review team was asked by AID/Washington to assess progress towards the following outputs of the CRIES/SIEDRA project:

1. A data management and evaluation system capable of estimating the resource/production potential of a developing country, applied specifically to the land and water resource data of the Dominican Republic.
2. A data bank including information on land and water resources, production levels and costs, technology options and institutional restraints.
3. Selected analyses of resource constraints, production potentials, resource development programs, etc.
4. In-country capability to construct, refine and utilize this system as an integrated component of sector planning activities.

Systematic examination of SIEDRA's output and relations with other agencies in the public and private sector yielded the following conclusions:

1. Substantial progress has been made towards achieving outputs number one and two, particularly in the area of soils classification. However, data on the country's land and water resources, land use, production inputs, expected outputs, production costs, technology options and institutional constraints are neither complete or authoritative. SIEDRA has produced an integrated data set, and for the time being, this may be considered the best available data set, but continued work in this area is required.
2. Substantial progress is being made towards output number three, i.e., in selected analyses of resource constraints, production potentials, resource development programs, etc. SIEDRA's multidisciplinary team

is relatively weak in terms of economic and system analytical capability. This weakness will become exacerbated once the major thrust of the SIEDRA team will switch from data collection and integration to agricultural policy analysis.

3. Output number four, i.e., in-country capability to construct, refine and utilize this system as an integrated component of sector planning activities is not currently feasible for the following reasons:

3.1 Sector planning is not now the institutional responsibility of SIEDRA.

3.2 The State Subsecretariat of Agricultural Planning (SEAPLAN) has de-emphasized its institutional responsibility in the area of comprehensive quantitative sector planning.

3.3 The strength of SIEDRA is not in planning, it is not in modelling, nor is it in agricultural economics. SIEDRA's current comparative advantage is in the meaningful inventorying of natural resources, problem related evaluation of these resources and in the development of an information system of general usefulness to the several agencies of the Secretariat of Agriculture.

Above conclusions reflect SIEDRA's actual accomplishments as of May 1979.

They do not reflect SIEDRA's potential. The SIEDRA project effectively started operations in November 1978. Within that short a period of time, its accomplishments have been impressive. In fact, SIEDRA, as of May 1979, has achieved institutional viability.

It is this criterion that has guided the evaluation of the review team. It feels that the three-year life span of the project needs to be reconsidered.

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It feels that the output goals for the CRIES/SIEDRA project have been too closely linked to the ANSE/SEAPLAN sector analysis effort. Accomplishments of CRIES/SIEDRA must be seen as separable from the adverse circumstances which have beset the sector analysis project. Institutional viability of SIEDRA is reflected by the following indications:

1. CRIES management has successfully internalized its concepts, methodologies and objectives via the SIEDRA project.
2. SIEDRA is making substantial progress in internalizing its CRIES-shared concepts, methodologies and objectives vis a vis the Secretariat of Agriculture and institutions with similar interests outside the SEA.
3. The Secretary of Agriculture and the Sub-Secretary of Natural Resources assign a high priority to the SIEDRA project as reflected by the following indicators:
  - 3.1 The assignment of "departmental" status to the SIEDRA project in the Sub-Secretariat of Natural Resources even though its small size would not normally warrant this procedure.
  - 3.2 The incorporation of the SIEDRA project in the regular annual programming-budgeting cycle.
  - 3.3 SIEDRA's current budget of 130,000 D.R. pesos.
4. There is direct communication between SIEDRA and D.R. policymakers.
5. There are strong functional linkages between agencies that must provide SIEDRA with inputs and agencies that utilize SIEDRA's outputs.
6. SIEDRA can have a key role in developing and supervising in the proposed USAID/DR natural resources management loan.

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7. SIEDRA has many internal communication channels with agencies outside the SEA that determine basic sector policies and international technical assistance.
8. SIEDRA has able and committed leadership.
9. SIEDRA has a capable multidisciplinary staff

### Recommendations as to the CRIES-SIEDRA project in the Dominican Republic

The review report contains numerous tactical recommendations. The justification of these recommendations is best understood in the context of the main part of this report. Only the strategic recommendations are summarized below.

1. USAID/Washington should support the CRIES/SIEDRA for another two years.
2. USAID/DR should assign SIEDRA the primary responsibility in developing the natural resources management loan.
3. USAID should finance a training program for current and future SIEDRA staff in
  - 3.1 agricultural economics with special emphasis on policy analysis,
  - 3.2 the management of natural resources (soils, water, forestry) at the micro and macro level,
  - 3.3 information collection and interpretation techniques for the purposes of agricultural planning.
4. In the short run, an attempt should be made to
  - 4.1 to retain a resident advisor with a strong agricultural policy orientation for at least two additional years,
  - 4.2 expand the SIEDRA staff with one or two DR nationals with a M.Sc. or Ph.D. in economics or systems analysis.

4.3 provide for CRIES managed TDY assistance complementary with outputs number three and four of the SIEDRA project. Putman's memorandum, "Technical assistance for SIEDRA in fiscal year 1980," provides the necessary details.

#### CRIES Projects in Other Countries

1. CRIES-developed concepts, methodologies and objectives are sufficiently simple, such that a group of host-country nationals with limited professional specialization can adopt and apply above things to local problems related to resource use and management. CRIES should maintain this approach in similar projects in other countries.
2. Great attention should be paid to the choice of country project leaders if the CRIES success in the Dominican Republic is to be repeated in other countries.
3. Wherever possible CRIES projects should search for a tie-in with ongoing AID technical assistance or lending activities.
4. CRIES country projects will typically need 3-5 years to achieve a reasonable set of output goals. Permanent resident advisory assistance is critical. The choice of resident advisor is more important yet. TDY assistance should be concentrated in the first year of the project with intermittent TDY assistance the following 3-4 years.
5. The internalization strategy followed by CRIES in the Dominican Republic should be used as a model for subsequent efforts.

## Background

The 1976 TA/AGR/ESP project paper, "A Proposal For a Comprehensive Land and Water Inventory and Evaluation System for Agricultural Planning with Applications in the Dominican Republic and a Second Latin American Country," specified a review to take place three years into the project, i.e., about June 1979. Joint discussions between the USDA, Michigan State University and AID led to an earlier evaluation held in Michigan during January 1978.<sup>1/</sup> That evaluation focused primarily on study design and methodology. However, technical and institutional arrangements, administrative considerations, and long-range implications and possible contributions of CRIES were also reviewed. Continuous in-country assistance in the first country (i.e. the Dominican Republic) started in October 1977. The Michigan review, therefore, by necessity focused on methodology abstracted from the host-country institutional setting. All parties involved in that evaluation agreed that a systematic review in the Dominican Republic was needed. Consequently, this review complements the earlier evaluation. Specifically, the review team was asked by AID/Washington to assess progress towards the following outputs specified on page 6 of the original project paper:<sup>2/</sup>

1. A data management and evaluation system capable of estimating the resource/production potential of a developing country, applied specifically to the land and water resource data of the Dominican Republic.

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<sup>1/</sup> Trevor G. Arscott, Ernest E. Hardy, Gerald W. Olson and John P. Timmons (Chairperson), Comprehensive Resource Inventory and Evaluation System (CRIES): an Evaluation, Office of Agriculture, Development Support Bureau, Agency for International Development, Washington, March 1978.

<sup>2/</sup> The original project paper anticipated a review of the CRIES project in two countries, i.e., the Dominican Republic and Guatemala. The CRIES project in Guatemala is currently inactive and not included in this review.

2. A data bank including information on land and water resources, production levels and costs, technology options and institutional restraints.
3. Selected analyses of resource constraints, production potentials, resource development programs, etc.
4. In-country capability to construct, refine and utilize this system as an integrated component of sector planning activities.

Achievement of above outputs in the Dominican Republic was visualized as a sequential process. The first phase involved the U.S.-based development of concepts, methodologies and objectives of the proposed Comprehensive Resource Inventory and Evaluation System. CRIES special reports No.1 [10] and No.2 [11] provide a convenient and concise summary of the above-mentioned aspects. The second step involved the initiation of the CRIES project in July 1976 in the Dominican Republic. The detailed outline of study work elements can be found in "U.S.D.A. Plan of Study for Agricultural Production Studies in the Dominican Republic: Country II, August, 1976". The purposes were:

- "1. To select and apply techniques for collecting, classifying, collating and documenting data on a country's land and water resource: land use, production inputs, and expected outputs, production costs, technology options and institutional constraints.
2. To establish a system, using existing data management techniques and analytical processes, for evaluating these data.
3. To demonstrate the analytical capabilities of this system and test reliability and usefulness of the results.
4. To develop procedures for linking the resource data and analytical system into a sector analysis.

5. To internalize utilization of the techniques developed as part of the project and integrate the system with sector analysis activities in country."

This phase of the CRIES project produced a resource classification scheme, resource inventory, geographic information system, analytical model, and "first generation" data set which were transferred and installed on the agricultural secretariat computers in the fall of 1977. The methodology and data are documented in the following reports:

1. "Land Resource Base Report," CRIES #77-1. [3]
2. "Visual Interpretation of LANDSAT Imagery for Land Cover and Land Use of Selected Test Sites in the Dominican Republic," CRIES #77-2. [4]
3. "Geographic Data File for the Dominican Republic Mapping System," CRIES #77-3. [5]
4. "User's Guide to the CRIES Analytical Model for the Dominican Republic," CRIES #77-4. [6]
5. "Comprehensive Resource Inventory and Evaluation System," CRIES #77-5. [8]

The CRIES staff incorporated available data on soils and climate combined with limited field work to develop a national, 1:250,000 scale map of Resource Production Units (RPU's). The RPU map units were considered to be sufficiently homogeneous for national agricultural planning purposes. Drawing solely upon available sources, land uses by crop production method (irrigated or non-irrigated) were judgementally allocated to seven SEA regions and RPU. Estimates of yields and production costs were made for each RPU-crop-technique combination. These data, together with crop production requirements, were structured into a cost minimizing linear programming model. The model was run to check the internal consistency of the data set.

The review held in Michigan during January 1978 covered above two phases of the CRIES project.

The third phase of the CRIES project involved the internalization of basic concepts, methodologies, data refinement and integration with the agricultural policy decisionmaking system of the Dominican Republic. This review is primarily concerned with this third phase.

### Evaluation methodology

The primary purpose of this review was to assess the institutional and technical viability of the CRIES/SIEDRA project<sup>1/</sup> in the Dominican Republic relative to the four project outputs listed above. To this end, the review team systematically examined the relationships between SIEDRA and those organizations who could benefit from or whose contributions would be essential to SIEDRA's program of activities.

The linkages between any pair of organizations consist of an exchange of services and doctrine. Services exchanged refer to technical expertise, organizational and administrative support. All of these are observable. The exchange of doctrine is not easily observable, but therefore, not less important. It reflects the weight given to the opinions, priorities, norms and values of SIEDRA in the decisionmaking process by the clients classified under enabling, functional and normative linkages. The review team was interested in knowing as to whether those with authority over or cooperating with SIEDRA adopted policy recommendations made by SIEDRA.

Similarly, it was important to establish as to whether organizations who must provide essential inputs to SIEDRA were responsive to the needs of SIEDRA in terms of the adequacy, quality and timeliness of the inputs needed. On the other hand, it was also important to establish as to whether SIEDRA was responsive to the needs of the clients it has to serve.

Systematic examination of SIEDRA's relations with its sister organizations, therefore, provided a convenient diagnostic device. The resulting observations and conclusions form the basis for the recommendations in this report.

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<sup>1/</sup> CRIES is the acronym for Comprehensive Resource Inventory and Evaluation System; SIEDRA is the acronym for Sistema de Inventario y Evaluacion de los Recursos Agropecuarios.

### SIEDRA - Diffused linkages

Following Esman [13] there are four classes of interinstitutional linkages to be considered: enabling linkages, functional linkages, normative linkages and diffused linkages.

Diffused linkages are with elements in society which cannot clearly be identified by membership in formal organization. The ultimate beneficiaries of the SIEDRA/CRIES project are farmers and consumers. The SIEDRA project has no formal interaction with either of these groups. This lack of immediate contact with farmers has created certain difficulties for the USAID/DR Mission to reconcile the purpose of the SIEDRA/CRIES project with the congressional mandate of emphasizing USAID programs that directly benefit the rural poor. However, SIEDRA's projected role in the development and guidance of a natural resources management loan should change this.

### SIEDRA - Enabling linkages

Enabling linkages are the linkages of SIEDRA with organizations and decisionmakers which control the allocation of authority and resources needed by the institution to function. In the creation stage of a new institution they are the prime target of institution builders. We, therefore, examined the relationship between the SIEDRA leadership and the leadership of the State Sub-Secretariat of Natural Resources [SURENA] and the leadership of the State Secretariat of Agriculture, especially with the Secretary of Agriculture.

When the CRIES resident advisor arrived in October 1977, the SIEDRA project consisted of one Dominican advisor. The project was considered semi-formally as a subcomponent of the on-going AID/Washington centrally-funded Sector Analysis Project in the Sub-Secretariat for Agricultural Sector Analysis (SEAPLAN).

The administrative hierarchical level of the SIEDRA project was initially not well defined. SEAPLAN did not effectively support the SIEDRA project. Nor did SIEDRA find support at the level of the Secretary of Agriculture or from the AID/Dominican Republic Mission.

The major obstacle to progress in the first six months of the SIEDRA project was the paralysis of the Secretariat of Agriculture during the preparatory period for the national elections. Funds and vehicles were diverted to other uses. Those with authority in the Secretariat of Agriculture were not willing to initiate new projects.

Failure to support the SIEDRA project within the Secretariat of Agriculture (SEAPLAN) went beyond the election period and led the then two-man staff of SIEDRA to negotiate, delicately, a project transfer to the newly emphasized Sub-Secretariat of Natural Resources (SURENA).

Prior to the elections, Dr. Cesar Lopez and Ing<sup>o</sup> Agron. Abel Hernandez had the foresight of explaining the concepts, methodologies and objectives of SIEDRA to key persons of the subsequently elected Guzman administration. The persons contacted included the current Secretary of Agriculture, Agronomo R. Hipolito Mejia D. and the current Sub-Secretary of Natural Resources, Agrometeorologo Angel Feliz Deño. Above persons assigned high priority to the SIEDRA project.

Figure 1 shows the number of SIEDRA staff members over time. From a staff of two persons before the new government assumed its responsibilities in August 1978, the SIEDRA staff increased to a current staff of 10 professionals.

In our meetings with the Secretary of Agriculture and the Sub-Secretary of Natural Resources at the inauguration of new office facilities for the SIEDRA project, both of these officials privately and publicly conveyed to us their continued commitment to the SIEDRA project.

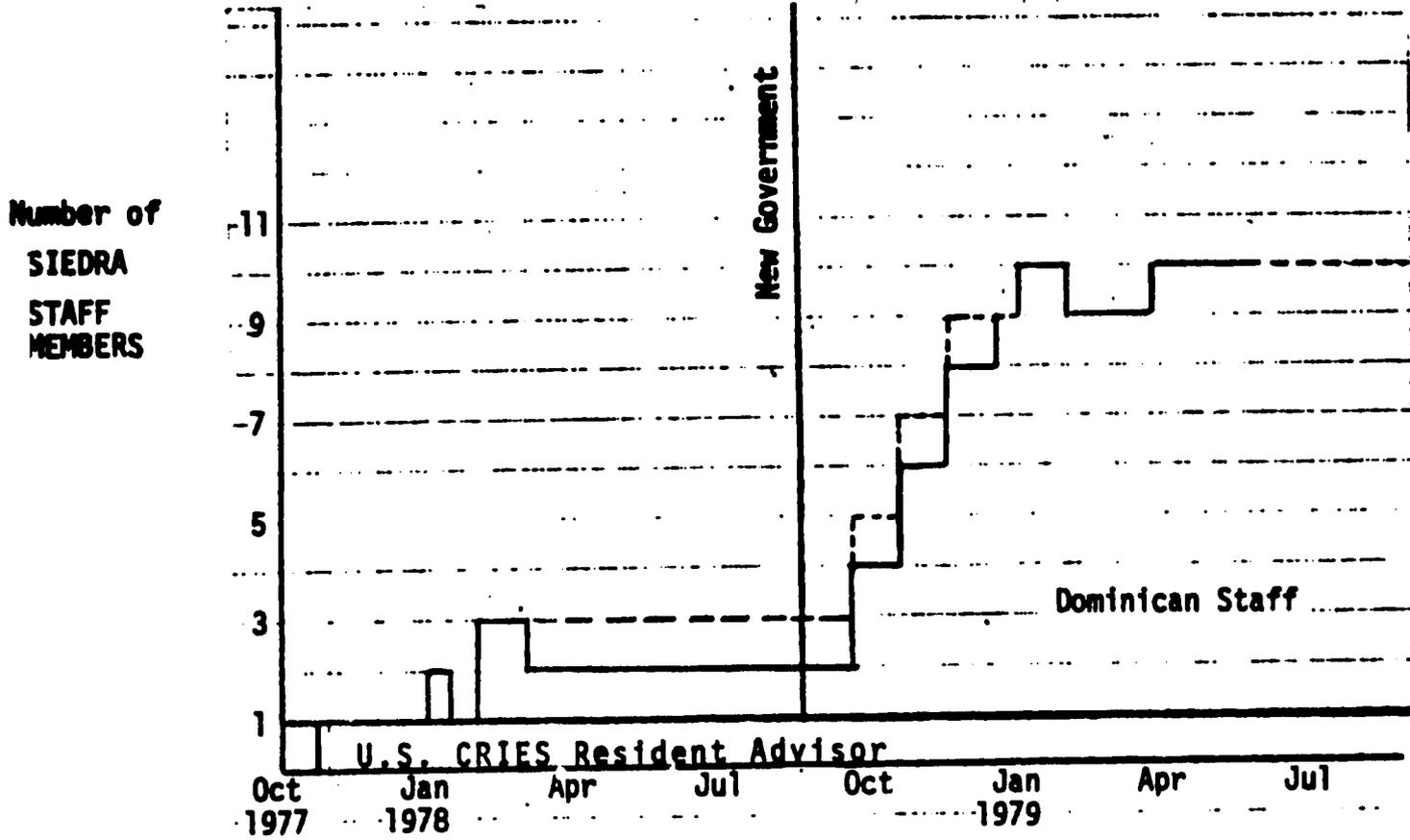


Figure 1. -- Number of SIEDRA staff members over time.

This commitment is reflected by the following indicators:

1. The assignment of "departmental" status to the SIEDRA project in the Sub-Secretariat of Natural Resources even though its small size would not normally warrant this procedure.
2. The incorporation of the SIEDRA project in the regular annual programming-budgeting cycle.
3. SIEDRA's current budget of 130,000 Dominican pesos.<sup>1/</sup>

There is direct communication between SIEDRA and DR policymakers, and the resulting communication linkages among the policymakers themselves which is used to keep SIEDRA abreast of policy issues and to create and maintain support for SIEDRA/CRIES work.

Future support cannot be guaranteed indefinitely unless SIEDRA, after this initially very favorable period, can begin to produce outputs which are appreciated by either the Secretary or Sub-Secretary. For this purpose, SIEDRA needs to stress its policy advisory capability in the land resource use and management area.

#### SIEDRA - Functional linkages

Functional linkages are SIEDRA's relationships with those organizations whose activities are complementary in a production sense with SIEDRA's activities. Other organizations must generate and provide many of the inputs to be used by SIEDRA. In turn, SIEDRA's output must serve as an input into the decisionmaking process of other organizations.

SIEDRA's initial thrust was to establish relationships with agencies that had to provide the required data for the multidisciplinary CRIES perspective. The procedure used was one of individual meetings and seminars to

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<sup>1/</sup> One Dominican peso equals one U.S. dollar.

obtain primary data. Such data were examined for consistency and occasionally returned to the originators with questions and critiques.

The principal difficulty encountered was that of data concept coordination and standardization. To the extent that SIEDRA is a secondary user of primary data, above objectives are difficult to achieve. SIEDRA initiated four major data coordinating efforts as related to (1) national crop production and area statistics, (2) soils classification, (3) 1979 Farm Survey and (4) aerial photography acquisition.

#### National crop production and area statistics

In July 1977, two CRIES staff members met with representatives of 15 DR agricultural statistics agencies to discuss inconsistencies among agencies in methodologies and resulting estimates. The current director of the SEA Data Bank, Ing<sup>o</sup> Nuñez, is implementing a program to require a single consensus set of sectoral estimates for major production statistics. It, however, does not guarantee an increase in the reliability of these statistics.

The ANSE area segment sample survey could provide reliable estimates provided nonsampling errors can be controlled and provided that the cadastral survey of the DR be completed, but neither of these objectives has been reached.

SIEDRA's resources are too limited to develop comprehensive land use statistics parallel to above estimates. SIEDRA could, however, make an important contribution in establishing the 1979 agriculturally active area. It could use for this purpose LANDSAT digitized interpretation or aerial photography interpretation.

LANDSAT digitized interpretation would require an upgrading of SIEDRA's current systems analytical and program writing capability. Digitized interpretation is also fairly expensive and not as accurate as photographic

interpretation. SIEDRA has personnel trained in the latter, but the required linkage or sub-contract with the Cadastral Survey had not been developed as of May 1979.

### 1979 Farm Survey

Early in 1977, the CRIES staff began analyzing the results of the 1979 Farm Survey of the SEA-Agricultural Economics Department for possible incorporation in the CRIES information system. Yield data were used to ordinally rank RPU's in the first generation MADRE<sup>1/</sup> program. It was determined that the data were of questionable quality.<sup>2/</sup>

CRIES/SIEDRA personnel worked with survey personnel to make the survey results useful to SIEDRA/CRIES without adversely affecting their usefulness to others. The proposed questionnaire modification will be implemented during the 1979 Farm Survey.

Questionnaire design in itself does not guarantee improved estimates about yields. Often it is easier to infer yields from production and area harvested. However, SIEDRA's main interest is not in accurate estimates of production or yields as such. Its interest is to obtain a reliable estimate of the technological and cost profiles associated with a given yield. This problem is not likely to be solved through the improved 1979 Survey.

SIEDRA, therefore, in 1978, began its own investigations in the central Santo Domingo region. The results are summarized in SIEDRA document No.4, "Metodologia para la recoleccion de datos agroeconomicos mediante entrevistas regionales". The data so collected were critically evaluated in SIEDRA document No.5, "Confiabilidad de los datos agroeconomicos del uso actual de la

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<sup>1/</sup> MADRE is the acronym for Modelo de Analisis de Recursos, i.e. a linear programming model.

<sup>2/</sup> See also the comments of Timmons (et. al.) p. 29.

tierra: region central." The 1979-80 work plan calls for expanding above work to the remaining six regions of the D.R.

The cost and land use estimates so collected reflect the judgement of Secretariat specialists in the central and other regions. They also allow for deliberately introduced questions as to technological and cost profiles for different yields. The first attempt, however, has been to establish typical profiles. Technologically advanced profiles are to be estimated later.

The estimates are related to dominant soil associations within RPUs. They, therefore, are an alternative to the initial data set derived from the 1976 Farm Survey. The data as collected contain all the required details from the CRIES perspective.

There remains the drawback that the technological and cost profiles do not correspond to actual (sample) observations. Typically, one would prefer the latter source of observations unless questionnaire design is very different and sampling and non-sampling errors make the data next to worthless.

SIEDRA has had a material input into the design of the 1979 Farm Survey questionnaire, but not in as much detail as would be desirable from the CRIES perspective. SIEDRA also cannot control the quality of the data collected.

As to whether the 1979 Farm Survey data are to be preferred to the 1979 SIEDRA judgement estimates remains to be seen. One of the difficulties in comparing data sets is that of a statistically meaningful discrimination criterion. SIEDRA publication No.5 does not establish such a criterion.

### Soils classification

The third major effort by SIEDRA in data coordination and standardization relates to soils classification. In February 1978, with the assistance of CRIES TDY assistance, an embryonic National Soils Commission was formed under SIEDRA

egis. The purpose of the commission is to keep abreast of soil classification activities and to improve interagency methodological inconsistencies. Substantial progress was made in the nearly unanimous adoption of U.S. Soil Taxonomy and U.S. Soil Survey Methods. This provides for rapid comparison of resource data in mapped areas of the D.R. as well as for compatibility with the SIEDRA/CRIES data bank.

Within the relatively short period of time devoted to internalization of the CRIES/SIEDRA project within the Dominican Republic, some good modifications of the original concepts have been made to improve upon the ability to collect and use data pertaining to soils.

Originally, Resource Production Units (RPU) were formulated using the general soil maps and plant life zones. The RPU was defined as a land unit with components sufficiently homogeneous with respect to agronomic factors of soil, climate and water resources to be depicted by one or a few unique estimates of agricultural factors such as crop adaptability and input-output coefficients. Naturally, as was expected, each RPU possesses a set of related soils, which may or may not be highly contrasting in nature and consequently in production potential and use.

This heterogeneity of soil resources within a given RPU was encountered early in the data collection process by the SIEDRA staff. It is to their credit that, not only was this limitation recognized, but also that they were able to modify the original concept through the formulation of the GDSS units (i.e. grouping of the dominant subgroups of soils) which are based on easily seen features of slope and drainage. Such features do not require a trained soil scientist to estimate their occurrence or prevalence.

The change of the term Resource Production Unit to Resource Planning Unit is desirable from an agronomic standpoint in that as originally conceived, it implied a homogeneous production from each unit. Although they are really

evaluation units and not planning units, it is understood that because of the ingrained terminology, RPU by necessity must remain.

Ultimately, the usefulness of the soils data will be contingent upon the amount of information available that pertains to crop production. This will necessitate classification to the family and series levels of detail. Some such information is presently being generated in the Dominican Republic and will continue to be an on-going function. Meanwhile, the SIEDRA soils staff should insure continued contact with the Benchmark Soils Project in order to use the basic technology transfer ideas within the D.R. The soil families presently under study by the Benchmark Soils Project include Hydric Dystrandepts, Tropic Eutrusterox and Typic Paleudults. Unfortunately, these soils are not representative of those predominating in the Dominican Republic.

Based upon the limited amount of time spent with the soil scientists involved with the SIEDRA staff, it was demonstrated that there is a great deal of cooperation between them and other groups in which soil resources are being studied and documented. The SIEDRA soil staff demonstrated a high degree of competency and are capably being led by one who is trained to the Ph.D. level in soil science, Dr. Cesar Lopez. This speaks well for insuring a high degree of success of the project which is so integrally structured upon the very important soil resources of the country.

#### Aerial photography

The fourth major SIEDRA/CRIES effort at interagency primary data coordination was in eliminating duplicate costs of aerial photography coverage by the National Cadastral Survey and the State Sugar Council (CEA). Through activities with both agencies on various aspects of SIEDRA/CRIES work, it was determined that both agencies were planning to contract aerial photographic coverage of overlapping geographic areas. A cost-sharing plan was proposed by CRIES

and accepted by both agencies. This resulted in the opening of an interagency communication channel which heretofore had not existed, and in the savings of [US] \$18,000.

SIEDRA has also submitted a proposal for funding for remote sensing. The proposal is documented in SIEDRA document No. 4, "Propuesta creacion unidad de percepcion remota". If above proposal is funded, SIEDRA will have to upgrade its systems analytical and program writing abilities.

Data coordination and standardization is essential in achieving project outputs number one and two, i.e.

1. A data management and evaluation system capable of estimating the resource/production potential of a developing country, applied specifically to the land and water resource data of the Dominican Republic.
2. A data bank including information on land and water resources, production levels and costs, technology options and institutional restraints.

The review team is of the opinion that substantial progress has been made towards this purpose, particularly in the area of soils classification. However, data on the country's land and water resources, land use, production inputs, expected outputs, production costs, technology options and institutional constraints are neither complete or authoritative. SIEDRA has produced an integrated data set, and for the time being this may be considered the best available data set, but continued work in this area is required.

SIEDRA should devote more attention to water use aspects at the farm and project level. Data on soils is far more detailed than for the other resources vital to agriculture. This data set is valuable, but there is a need for balanced data; too much detail on one resource, and nothing on others is as bad as little data on all of them.

There are four resources which contribute to agriculture: (1) soils; (2) climate; (3) water; and (4) human, but all four must be considered in agricultural planning. We see little emphasis within SIEDRA on the use of water, although there is an effort to indicate where land is being irrigated.

CRIES/SIEDRA data are collected on a crop basis. They, therefore, abstract from the institutional setting within which these resources are used. Particularly for a resource with uncertain and variable availability such as water, on-farm utilization patterns should be studied. With the CRIES/SIEDRA approach there is little concern for the idiosyncracies of how farmers behave. It is almost as if farmers are assumed away; there is soil and climate, and out of this felicitous mix comes crops as if by magic. But, it is farmers who do it all, and it is farmers who will confound the mightiest of planning scenarios.

#### PADRE - Programa de Analisis de Recursos

The first phase of CRIES/SIEDRA put great emphasis on rapid electronic access and use of the multidimensional CRIES/SIEDRA data bank. The PADRE geocoded program is operational, but to our knowledge has had little user demand. Anticipated user demand was predicated upon continuous application of the MADRE<sup>1/</sup> linear programming model as a critical input into a continuous D.R. agricultural sector analysis to be used by D.R. agricultural policy decisionmakers.

The latter expectations were not fulfilled. Because of this, the capability of PADRE to provide problem specific output formats of CRIES/SIEDRA data bank was never fully tested.

Data can be used for several purposes. Data needed for decisionmaking need to be reliable, problem specific and producible on demand. Most data,

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<sup>1/</sup> MADRE is the acronym for Modelo de Analisis de Recursos.

however, are never used for decisionmaking. More often, data are used to improve general knowledge about specific questions such as areas actually in rice, areas with highest labor use per hectare, commodity and input price differentials between areas, etc.

The review team feels that SIEDRA could obtain a lot of recognition very cheaply by using its data bank to produce in commented format a series of informational data sets for commodity, input and regional specialists within the Secretariat of Agriculture.

SIEDRA must sell its products to policymakers and other users. Within the Secretariat of Agriculture, SIEDRA has established a growing relationship with the Sub-Secretariat of Sectoral Planning.

Initially, SIEDRA was located in that Sub-Secretariat, but its activities were judged to be incompatible with the objectives of that office, even though the sectoral planning office at that time was engaged in the construction of a large-scale quantitative sector planning model.

With the relocation of SIEDRA under the Sub-Secretariat of Natural Resources (SURENA), a complementary relationship has developed between these two staff agencies.

SIEDRA, as of May 1979, did not have major functional linkages with the agrarian reform agency, the rural development institute and the crop-livestock production agencies. SIEDRA could provide a very important input for the latter agencies by providing them with the probable returns of public expenditure in agricultural education, research and extension by crops and species on a GDSS differentiated basis.

In addition to linkages with these national level agencies, SIEDRA has critically important communications with regional and sub-regional decision-makers. This interaction is largely related to production data gathering, but

also results in important ground-level identification of policy issues, and program and project needs. However, as of May 1979, no specific SIEDRA outputs immediately useful to regional decisionmakers had been produced.

#### Agricultural sector analysis

From the foregoing follows that project purpose number four,

"In-country capability to construct, refine and utilize this system as an integrated component of sector planning activities, :

has not been achieved. In this connection, it is useful to quote the following sentence from the original proposal [1, p.6],

"This project (i.e. CRIES/SIEDRA) is viewed as an integral part<sup>1/</sup> of sector analysis work and is directed, therefore, to the achievement of the same goals,"

CRIES/SIEDRA certainly has produced its part of what would have been a comprehensive agricultural sector planning model.

There was considerable discussion during the review concerning sector analysis, sector assessment, sector planning, sector models, etc. In a sense, these are mere words without much significance. The important task in development is to obtain for the campesinos a little better existence, a nicer house, a little better health, a slightly wider and dynamic choice set, and perhaps most importantly a sense of participation in the economic and political life around them. For this it is of little import whether we use model A, model B, or model Z. What is important is that we develop a systems view of their political-economic setting, and that we understand what arguments are in their utility functions. Along with this, we ought to pay special attention to present cultural practices on various RPU/GDSS configurations, types and

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<sup>1/</sup> Underlining is ours.

cultivars of crops grown, the technological "package", and the benefits and costs of feasible options. Output number four is not currently feasible for the following reasons<sup>1/</sup>:

1. Sector planning is currently not the institutional responsibility of SIEDRA.
2. The State Sub-Secretariat of Agricultural Planning (SEAPLAN) has de-emphasized its institutional responsibility in the area of comprehensive quantitative sector planning.

It is axiomatic that any group of experts is well advised to stick to their strength. It is our view that the strength of SIEDRA is not in planning, it is not in models, nor is it in agricultural economics. The strength is in the meaningful inventorying of natural (and to a certain extent human) resources, the general evaluation of those resources, and in the development of an information system. It should be emphasized that we make a distinction between data and information. Data are mere numbers; information is knowledge.

The essence of SIEDRA is a system for organizing information concerning Dominican agriculture. In this sense, SIEDRA is merely a list of possibilities for economic change, as well as a description of the resource base for the existing agricultural activity. What will convert this compilation of numbers into useful scientific information for agricultural planning is the development of a rudimentary economic capacity within SIEDRA. This would permit enhanced communication with agricultural planners in various government agencies and would allow the SIEDRA group to illustrate the advantages of its system of resource data.

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<sup>1/</sup> Dr. Glen Johnson, who participated in the review as an observer for the Department of Agricultural Economics at Michigan State University, wrote a separate memorandum on this issue. Dr. Johnson's observations are attached as Appendix A to this review.

The review team proceeded on the assumption that above state of affairs would continue in the near future. It implies that SIEDRA will not be expected to have the primary role in comprehensive sector planning. This, however, does not preempt the possibility that SIEDRA may be asked to develop integrated analytical models which specifically focus on land use management problems, i.e. output number three,

"selected analyses of resource constraints, production potentials, resource development progress etc."

SIEDRA has initiated the study of problems related to the utilization of land and water resources for two problem commodities, i.e. rice and sugar cane. The review team examined the study proposals. It would give priority to the proposed "Agro economic land resource assessment for rice production in the Dominican Republic", because it can be executed with available SIEDRA resources. It would also offer an excellent opportunity to integrate the economics and natural resources professionals of the SIEDRA team.

The sugar cane study depends on financing and continued interest by the State Sugar Council (CEA) and the World Bank. The study is also much more ambitious in scope in that it must study, in detail, agro-industrial linkages. Furthermore, political and structural factors related to landownership and distribution must also be taken into consideration. The review team does not think that SIEDRA can execute this study with its current staff within reasonable time limits.

The review team is of the opinion that SIEDRA should replicate the rice study with respect to other crops and forages. It would be very helpful to planners and other specialists within the Ministry to have information about the comparative economic potential of different crops and pastures in different locations of the D.R. under assumed conditions as to technology and prices.

This requires comparative representative farm budgets, possibly expanded into small linear programming models. Large scale linear programming models should be contemplated only as part of the proposed natural resources management loan.

SIEDRA as an analytical aid to agricultural planning will be useless without some behavioral elements being introduced--either formally or heuristically. We see no effort at that now, and some of us worry that it will never occur. Short-term consultancies for social anthropologists familiar with Dominican agriculture would be helpful.<sup>1/</sup>

#### SIEDRA - Normative linkages

Normative linkages specify the linkages with institutions which incorporate norms and values which are relevant to the doctrine and program of the institution. The primary linkage of this class of interest to the review team was the relationship between CRIES and SIEDRA. It is this linkage which provides for the internalization of CRIES concepts, methodologies and objectives.

Successful internalization should reflect itself in increasing self-reliance on the part of SIEDRA. With this achieved, SIEDRA itself can be expected to take the initiative in propagating its concepts, methodologies and objectives vis a vis other agencies.

Of particular interest to the review team was the relationship between SIEDRA and major international developmental agencies such as the Food and Agriculture Organization (FAO), the Inter-American Institute of Agricultural Sciences (IICA), the Organization of American States (OEA), and the Agency for International Development. An examination of above relationships is

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<sup>1/</sup> Professor Bromley in his report mentions the interesting work carried out by Dr. David Werge at CIAT in Colombia.

important, because SIEDRA can be expected to have a major role in the near future in determining the nature and priorities for international technical assistance and loans related to the management of natural resources in the Dominican Republic.

SIEDRA's relationship with CRIES has been excellent. The CRIES/SIEDRA project has been very fortunate in its choice of project leader, John W. Putman, and its resident adviser, Gary S. Kempf. At the same time, CRIES was fortunate in finding high caliber D.R. leadership in Dr. Lopez and Ing<sup>o</sup> Agron. Hernandez. Dr. Lopez started with an initially specialized background in soil fertility but had little difficulty in adopting and supporting the more comprehensive and policy oriented CRIES concept. This greatly facilitated the transfer of the technological aspects embodied in CRIES. The primary difficulties, therefore, have been those of putting CRIES on an operational basis in the D.R.

#### CRIES Internalization strategy

The internalization strategy followed in the CRIES/SIEDRA project was as follows:

1. Provision of TDY assistance in land resource base identification (Knox), current land use (Tilman, Scott, Johnson), potential land use (Knox), potential production techniques (Knox), economic analysis (Cochran), and computer use (Lodwick, Tilman).
2. Resident advisory assistance (Kempf).

Internalization was influenced by the following tactical principles:

1. Assume the initial leadership role and then phase out as D.R. leadership is developed.
2. Develop and maintain interest and support without creating unrealistic expectations.

3. Work through Dominicans to influence other Dominicans.
4. Keep support demands consistent with output.
5. Develop reliable data before analysis.
6. Adjust all inventory and analytical techniques to the technical competence of SIEDRA staff and product users.
7. Maintain long-term project direction toward comprehensive, multi-level land use analysis, but search for short-term, high impact, activities to maintain the interest and support of administrators.

A formal CRIES/AID Mission linkage was provided under the administrative agreement for the CRIES resident advisor position. The AID Mission interest to date has been primarily in the CRIES-related resident loan monitoring activities (soil classification, fertility, conservation in rural areas) and in the resident's development of a Project Identification Paper for natural resources management.

As a result of increasing D.R. interest in SIEDRA/CRIES activities, epitomized by SEA and CEA letters to the Mission requesting a post-FY 79 extension of CRIES technical assistance, the Mission has responded by increasing its attention to the project's potential in formulating a natural resources management loan. Should such a loan be approved, then the long-term stability of SIEDRA as an institution seems assured.

SIEDRA has many informal communication channels with agencies outside of SEA, including the Office of the Technical Secretary to the Presidency (STP), which has overall responsibility for the performance of the national economy. All government agency financial budgets and expenditures must now be approved by the STP office. SIEDRA, at STP request and with SEA support, is developing a memorandum of understanding with the National Planning Office (ONAPLAN) to

reflect ongoing cooperation on a regional planning study being conducted by ONAPLAN with OAS (Organization of American States) technical assistance. SIEDRA is also developing a memorandum of understanding with the CEA to provide technical assistance on identifying excess sugarcane areas and transferring them to the Agrarian Reform Institute (IAD) for establishment of agrarian reform settlements.

SIEDRA is cooperating with the National Cadastral Survey in developing a methodology for evaluation of land values on the basis of agricultural productivity. Preliminary discussions have taken place with the national agricultural Census office in order to explore the feasibility and desirability of geocoding, in PADRE, the results of the 1981 census.

The total of the two-way transaction of SIEDRA with other organizations constitutes SIEDRA's progress of work. Successful completion of the program of work depends on three generic key elements: doctrine, leadership, and resources. Doctrine must be reflected in repeated expressions of what SIEDRA stands for, what SIEDRA hopes to achieve and a specification of operational methods. SIEDRA document No.1 "Enfogue general del programa SIEDRA" provides a convenient summary for that purpose.

SIEDRA is an innovative institution. Institutional viability means that SIEDRA and its innovations are accepted and supported by other organizations. It implies that other organizations have accommodated themselves to SIEDRA's innovations more than SIEDRA has accommodated itself to the original environment. But accommodation is a reciprocal process. The operational question is, therefore, how much SIEDRA accommodates itself to other organizations and on what issues. Without a constant awareness of basic priorities and objectives, SIEDRA cannot be expected to function as an innovative organization.

On the basis of the evidence examined, the review team concludes that

1. CRIES management has successfully internalized its concepts, method-

ologies and objectives through a viable D.R. institution, i.e. SIEDRA.

2. SIEDRA is making substantial progress in internalizing its CRIES-shared concepts, methodologies and objectives vis a vis the Secretariat of Agriculture and institutions with similar interests outside the SEA.

#### SIEDRA - Leadership and professional resources

Leadership is critical in all innovative organizations. Leadership formulates the doctrine and progress of the institution and directs its operation and relationships with other organizations. Leadership is reflected in the political acceptability and staying power of members of the SIEDRA leadership group. It is reflected in professional status of SIEDRA in its chosen field of activity. It is reflected in technical competence with respect to the technologies and activities contemplated by SIEDRA. It is reflected in SIEDRA's organizational competence in creating an effective internal structure for the operation of the organization. It is reflected in a balanced distribution of roles so as to maximize the complementarity of abilities among the human resources of SIEDRA. It is reflected in the continuous and voluntary association of members of the leadership group with SIEDRA.

The review team systematically examined above listed aspects in connection with the CRIES/SIEDRA project and concluded that SIEDRA has been fortunate in attracting excellent leadership with Dr. Cesar Lopez (Director) and Ing<sup>o</sup> Agron. Hernandez (Technical Coordinator).

SIEDRA is composed of a multi-disciplinary team of professionals. The review team examined the Curriculum Vitae of these professionals and throughout the review was able to assess the capacity of SIEDRA's staff. In terms of numbers, there is an adequate balance between natural resource specialists and other disciplines.

The review team was impressed by the comparative professional competence of the natural resource group of the SIEDRA team. On the other hand, the professional economic and system analytical capability of the SIEDRA team needs to be strengthened considerably. Without this, outputs number three and four of the SIEDRA project cannot be realized.

### Resource development

No organization can function without the provision of adequate and timely resources. Resources for SIEDRA relate to staff, funds and information. The review team is of the opinion that an improvement in the professional capabilities of the staff of SIEDRA will fairly quickly translate itself into improved information and additional funds for more staff and information.

We would suggest that provision be made for the commencement of a training program for individuals on the SIEDRA staff in:

1. Water use and management at the farm (and collective) level.
2. Evaluation and assessment of ground water resources.
3. Agricultural economics.
4. Forestry.
5. The use of SIEDRA as an information device in agricultural planning.

In the short run an attempt should be made to:

1. Retain a resident advisor with a strong agricultural policy orientation for at least two additional years.
2. Expand the SIEDRA staff with one or two D.R. nationals with a M.Sc. or Ph.D. in economics or systems analysis.
3. Provide for TDY assistance that is complementary with outputs number three and four of the SIEDRA project. Putman's memorandum, "Technical assistance for SIEDRA in fiscal year 1980," provides the essential details.

### Size of SIEDRA staff

The question of increasing the size of the SIEDRA staff was discussed in Santo Domingo during the review. The review team stressed the importance of rational management of SIEDRA's staff. For this purpose an annual work plan with projected activities, individual responsibilities and target dates is indispensable. The review team felt that SIEDRA's current resources are underutilized because of the lack of such a plan of work.

Additional staff will be needed if SIEDRA is to assume a major role in administering the natural resources loan or if the Secretariat of Agriculture assigns SIEDRA the major responsibility for studying a similar project in the natural resources area. Currently, however, the major issue for SIEDRA is to demonstrate its capacity to deliver wanted outputs by the rest of the Secretariat, rather than emphasizing its need for additional resources.

### Translation services

CRIES and SIEDRA staff emphasized the lack of budgeted funds for translation services. As of May 1979 several of the CRIES publications, written in English, had as yet to be translated into Spanish. The majority of professionals on SIEDRA's staff do not have an English language capability. Consequently, the CRIES resident advisor was forced to make continuous ad-hoc translations of the original CRIES documents into Spanish. This process is inefficient and may lead to distortions of the very technical terms used, for example, in the CRIES Land Resource Base Report. It is suggested that the project in the Dominican Republic and additional CRIES projects in other countries budget the required funds for translation services.

### CRIES projects in other countries

We think that the current review has several useful conclusions for CRIES projects in other countries:

1. CRIES-developed concepts, methodologies and objectives are sufficiently simple, such that a group of host-country nationals with limited professional specialization can adopt and apply above things to local problems related to resource use and management.
2. Institutional viability depends on identifying, very early in the project, capable leadership in the host country so as to generate the necessary interest and support on the part of high-level administrators. The choices of Dr. Cesar Lopez as SIEDRA director and Abel Hernandez as technical coordinator was the single most critical factor in the success of the SIEDRA project in the Dominican Republic. We do not know as to whether the choice of Dr. Lopez was negotiated or just plain luck. In any case, great attention should be paid to the choice of country project leaders if CRIES is to be repeated in other countries.
3. Wherever possible, the CRIES project should search for a tie-in with ongoing AID technical assistance or lending activities. Our review found that AID/Washington relations with the AID/DR Mission never obtained sufficient clarity or understanding as to how the CRIES project might contribute to the success of the AID/DR program. Tying CRIES too closely to comprehensive sector analysis projects should be avoided. There is a sufficient number of resource use and management problems that can be studied separately from a comprehensive sector analysis.
4. CRIES country projects will typically need 3-5 years to achieve a reasonable set of output goals. Permanent resident advisory assistance is critical. The choice of resident advisor is more important yet. TDY assistance should be concentrated in the first year of the project with intermittent TDY assistance the following 3-4 years.

5. **The internalization strategy followed by CRIES in the Dominican Republic should be used as a model for subsequent efforts.**

**Appendix A**

**Some thoughts on SIEDRA/CRIES and  
the Agricultural Sector Analysis Project  
of USAID/ANSE of SEA**

**Dr. Glenn Johnson  
Department of Agricultural Economics  
Michigan State University  
May, 1979**

**Some Thoughts on Siedra CRIES and the  
Agricultural Sector Analysis Project of  
USAID/ANSE of SEA**

- I. **CRIES is contractually obligated to develop an L.P. of DR agriculture to utilize data created by CRIES. The L.P. has been or will soon be developed.**
- II. **The agricultural sector analysis project of USAID has developed an agricultural sector L.P. The decision has been made by USAID and GODR authorities that this model will now be documented and "put on the shelf." Thus, attempts to link the CRIES L.P. with the agricultural sector L.P. do not seem warranted at this time.**
- III. **The agricultural sector analysis project (ANSE) has now been lodged in the Agricultural Economics Department of the Agricultural Planning Subsecretariat of the Ministry of Agriculture which is gathering primary data as well as performing various partial analyses of agricultural sector, subsector and regional problems in order to feed information into Ministry problem solving processes. It is also responsible for documenting and shelving the agricultural sector L.P.**
- IV. **The agricultural sector L.P. does not have credibility with GODR and USAID decision makers. Among reasons which can be hypothesized to explain this lack of credibility are:**
  - A. **Its lack of a time dimension which is the "name of the game" in analyzing development problems.**
  - B. **The absence of familiar national accounts, indices and performance indicators commonly used by DR officials in agricultural decision making.**
  - C. **The absence of an I/O component to use in determining the impacts of agricultural changes on the non-farm sectors and vice versa.**
  - D. **The absence of a demographic component to deal with migration and other changes in population.**
  - E. **The absence of an international trade/balance of payments component to handle the problems associated with sugar and rice international trade.**
  - F. **The lack of an energy component.**
  - G. **The lack of certain policy variables to be manipulated to forecast the consequences of alternative policies.**
  - H. **The lack of certain criterion variables in terms of which the consequences of policy alternatives can be expressed.**

- V. Our own experience is that decision makers do not find models credible which
- A. Omit data which they know are important -- both positive and normative data, the latter including non-monetary as well as monetary values
  - B. Omit logic which they know is important
  - C. Are not understandable to them and which tend to support recommendations which the decision makers known from experience are unworkable in practical situations.

The four criteria listed above are familiar to students of research methodology and the philosophy of science as (1) correspondence, (2) coherence, (3) clarity or unambiguity and (4) workability. Comprehensiveness is implied by coherence and correspondence. Comprehensiveness implies multidisciplinary. Workability implies consideration of practical problems which, in turn, implies a need to apply the first three criteria to normative as well as positive knowledge, both of which are necessary in reaching recommendations or prescriptions to solve practical problems. Our experience also indicates that interaction between analysts and decision makers is essential -- this implies process analysis with positive, normative and prescriptive knowledge emerging iteratively out of an interactive process involving decision makers as well as investigators or researchers.

- VI. It must be stressed that the absence of an adequate capability to analyze the agricultural sector (with or without a model, computerized or not) has not eliminated the need for analysis of the DR agricultural sector and its subsector (regional, commodity or functional). Sectoral analysis will continue despite shelving of the agricultural sector L.P. The question is how to proceed? We see advantages in the following procedure:
- A. Cooperation between CRIES/SIEDRA and the agricultural sector analysis group in carrying out investigations of questions of interest to DR and USAID decision makers require resource inventory data.
  - B. ANSE execution of projects investigating a wide range of questions about the agricultural sector and subsector.
  - C. The doing of A and B on a "heat of the pants" basis without preconception as to what specific technique to use. Two or three years of such ANSE experience will almost inevitably involve the use of L.P., I/O, RLP, econometric time series and cross sectional analysis, B/C analysis, project evaluation techniques, demand/price elasticity analyses, demographic cohort analysis, national and regional accounting, and less rigorous analysis of technological advance, institutional change and changes in people. Further, most of the reasons hypothesized for the low credibility of the agricultural sector L.P. will have been overcome.

**D. We also believe that the analytic capacity of the ANSE/SIEDRA group will increase and become consistent and comprehensive more rapidly if:**

- 1. the ANSE leadership concentrates on building a descriptive "picture" of how the agricultural system works and**
- 2. ANSE looks forward to having the capability of putting their separate project results together in a comprehensive but decomposable model of the agricultural sector based firstly on the national accounts but capable of receiving L.P. input, of using an abbreviated national I/O and of receiving and generating demographic, world trade and BOP, energy, agricultural credit, income distribution, etc. data. Computerization is not essential but will most likely be economic. Thus, systems analysis skills beyond programmer and computer science (hardware) levels will be needed. In fact the leadership which puts the total picture together needs access to such skills in order to know what is feasible. There is an economics of simplifying aggregating and disaggregating and balancing analytical capacity which requires technical knowledge of what can and cannot be done.**

Appendix B

REVISED

SCHEDULE - CRIES/SIEDRA EVALUATION (MAY 10-19, 1979 IN DR)

<u>Date</u>	<u>Hour</u>	<u>Activity</u>	<u>Location</u>	<u>Participants*</u>
30 April Monday	-	Supporting documents sent to evaluators:  Committee Head - Ike Van De Wetering Agr Economist - Dan Bromley Agronomist - Trevor Arcott	-	-
10-12 May Thurs-Sat.	-	Arcott reviews SIEDRA technical documents with SIEDRA staff	SIEDRA office	1, 4
12 May Saturday	PM 9-12 PM	Arrival Van De Wetering and Bromley Informal mixer near Hotel Hispaniola swimming pool	Airport Hotel Hispaniola	- 1
13 May Sunday	1 PM	Field trip - CRIES/SIEDRA land classification system Preliminary briefing by Kempf	" "	1, 2, 3, 4
14 May Monday	AM	Introduction of evaluation team to AID Mission Kempf explain project history and plans	" "	2, 4
	PM	López and Hernández (SIEDRA) explain project evolution	" "	1, 3
15 May Tuesday	8-1 3-5	Discussions with SIEDRA staff Question and answer session	" "	1,4 2,4
16 May Wednesday	8-1 3-5	Meeting with Secretary Mejía, Undersecretary De los representatives of agencies cooperating with SIEDRA staff Evaluation team discussion of preliminary findings	" "	1, 3, 4, 20
17 May Thursday	8-3 3-5	Evaluation team interviews with specific individuals selected by the team Discussion of preliminary findings	" "	selected Kempf, Putman Sutton
18 May Friday	8-10 11-1 2-5	Presentation of tentative conclusions to US personnel " " " " " DR " Evaluation team prepares outline for final report	" " " " " "	2, 4 1, 3, 4 -
19 May Saturday	AM	Evaluation team leaves	Airport	

- Plans will be made for distribution and discussion of final report both in U.S. and D.R.

- \* 1 - SIEDRA staff
- 2 - AID Mission staff and other local US
- 3 - DR invitees
- 4 - US observers (AID/W, MSU, CRIES)

**Appendix C**

**Persons interviewed by the review team**

## 1. Secretariat of Agriculture

- 1.1 Agron. R. Hipolito Mejia D., Secretary of Agriculture
- 1.2 Agromet. Angel Feliz Deño, Sub-Secretary of the Sub-Secretariat of Natural Resources
- 1.3 Ing<sup>o</sup> Italo Russo, M.Sc., Coordinator Sub-Secretariat of Natural Resources (SURENA)
- 1.4 Dr. Cesar Lopez, Director SIEDRA Project, Sub-Secretariat of Natural Resources, SURENA
- 1.5 Ing<sup>o</sup> Agron. Jose Abel Hernandez, Technical Coordinator, SIEDRA Project, SURENA
- 1.6 Sr. Jose Ramon, A.A., statistician, SIEDRA Project, SURENA
- 1.7 Ing<sup>o</sup> Agron. Frank Rodriguez, B.A., farm management specialist, SIEDRA
- 1.8 Ing<sup>o</sup> Agron. Jose Ogando, B.S., soil scientist, SIEDRA Project, SURENA
- 1.9 Sra. Zamira Haché, B.A., agricultural economicst, SIEDRA Project, SURENA
- 1.10 Ing<sup>o</sup> Agron. Jose Santiago, B.S., soils scientist, SIEDRA project, SURENA
- 1.11 Ing<sup>o</sup> Agron. Espormirio Herrera, M.Sc., pastures specialist SIEDRA Project, SURENA
- 1.12 Ing<sup>o</sup> Agron. Rafael Fajardo, B.S., irrigation specialist, SIEDRA Project, SURENA
- 1.13 Sr. Antonio Gutierrez, A.A., programmer, SIEDRA Project, SURENA
- 1.14 Ing<sup>o</sup> Samuel Encarnación, Director Departamento Planes, Programas y Proyectos.
- 1.15 Lic. Magaly de Mitchell, Sub-Director, Departamento de Planes, Programas y Proyectos
- 1.16 Lic. David Alvarado, Sub-Director, Departamento Economía Agropecuario
- 1.17 Lic. Gerardo Taveras, Proyecto ANSE.

## 2. Other D.R. public sector agencies

- 2.1 Ing<sup>o</sup> Raul Mendez Cruz, Director, Direccion General de Catastro
- 2.2 Ing<sup>o</sup> Manuel Calcano A., Director, Proyecto PIDAGRO, Direccion General de Catastro
- 2.3 Ing<sup>o</sup> Hector Acosta, Economica, Concejo Estatal de Azucar

3. **United States Agency for International Development**
  - 3.1 **Dr. Patrick Morris, Director USAID Mission to the Dominican Republic**
  - 3.2 **Mr. Eric Shearer, Rural Development Officer, USAID/DR**
  - 3.3 **Dr. Ronald Troestle, Economist, USAID/DR**
  - 3.4 **Mr. Felipe Manteiga, Economist, USAID/DR**
  
4. **Other International Technical Assistance Agencies**
  - 4.1 **Dr. Arnold Kreisman, resident advisor, OEA-ONAPCAN**
  - 4.2 **Dr. Manuel Paulet, resident advisor, IICA-SURENA**
  
5. **Comprehensive Resource Inventory and Evaluation System**
  - 5.1 **Mr. John W. Putman, project leader, USDA, Michigan State University**
  - 5.2 **Mr. Gary S. Kempf, resident advisor, CRIES/SIEDRA project, Michigan State University**
  - 5.3 **Dr. Daniel Chapelle, Head, Department of Natural Resources, Michigan State University**
  - 5.4 **Mr. John Sutton, Research Associate, Department of Natural Resources, Michigan State University**

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