Sahel Resource Inventory & Mapping Coordination Workshop

Bamako, Mali

May 20-24,1982

WORKSHOP RECOMMENDATIONS

SDPT/Bamako

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I. Introduction

The Sahel Resource Inventory and Mapping Coordination Workshop was convened by USAID's Sahel Development Planning Team (SDPT) at the Hotel l'Amitie in Bamako May 20-24. Participants attending included project technical personnel from USAID-assisted resource inventory projects in Cape Verde, Senegal, Mauritania, Mali, Upper Volta and Niger; Sahelian project directors from Senegal and Mali; representatives from REDSO/WA and AID/Washington; and a cross section of technical personnel from other regional and international organizations involved in resource inventory work including the Regional Remote Sensing Center (CRTO, Ouagadougou), the International Livestock Center for Africa (ILCA/CIPEA) and the FAO. Although originally designed to include both USAID project managers and project technical personnel, project managers were not represented at the Workshop.

A brief sketch of the background and objectives of the Workshop is provided in the Executive Summary (Section II) along with the principal recommendations of the workshop. The Workshop Program, a list of participants and a list of Workshop papers are provided in Section IV. The rest of this Report presents the Workshop Recommendations.

Workshop Recommendations were prepared, some in draft and others in final form, by two Working Groups during the course of the Workshop. These were then discussed by participants in a plenary session prior to the conclusion of the Workshop. Following the Workshop, a Writing Group composed on Working Group Chairpersons (Charles Poulton & Vernita Fort), Working Group Rapporteurs (Roy Hagen & Richard Pellek), Tim Resch and George Taylor worked together on the preparation of the text of this document. The logistics of final synthesis and editing have been the responsibility of SDPT.

The recommendations that follow are Workshop Recommendations and, as such, do not necessarily represent the views of SDPT, the U.S. Agency for International Development or any other participating organization.

II. Executive Summary

A. Workshop Background & Objectives

The U.S. Agency for International Development is currently financing a wide range of resource inventory and mapping efforts across the Sahel. An initial listing prepared for the Workshop included some twenty-seven projects and project components spread across every country in the Sahel in which the Agency is currently working, representing, by a conservative estimate, an investment of some forty million dollars. The rationale out of which the Workshop developed was based on the perception that although much was being done in the field of resource inventory, virtually no systematic exchange of information and experience was taking place either among USAID-assisted projects or between USAID-assisted and other activities across the region.

Workshop objectives were essentially threefold:

1. to exchange information on completed, ongoing and proposed resource inventory and mapping projects across the Sahel.

2. to examine, both as a case study and possible model, the work done by GRM/TAMS on the Mali Land Use Inventory.

3. to discuss a number of specific issues related to resource inventory projects. Three key issues identified prior to the Workshop were:

   a. possibilities for increased standardization/comparability of inventory techniques, classification schemes and mapping legends across the region.

   b. steps needed to insure utilization of project outputs including the provision of periodic updating and environmental monitoring capabilities, and

   c. the role of the regional remote sensing center (CRTO, Ouagadougou) in providing training and other services to USAID-assisted projects.

B. Workshop Program

Details of the Workshop Program are provided in Section IV.A below. Based on the objectives outlined above, the Workshop was divided into three parts:

1. Information exchange - this was handled through a series of fifteen project presentations by personnel from USAID-assisted projects, CRTO, ILCA and FAO. The presentations provided a valuable forum for

the exchange of technical and other project-related information. In addition, USAID delegations had been asked to prepare Country Papers outlining in some detail both USAID-assisted and other resource inventory and mapping efforts in their respective countries. SDPT and USDA/Forestry Support Program had also assembled a variety of additional information/documentation that was distributed at the Workshop.

2. Case Study: The Mali Land Use Inventory Project - one morning was devoted in its entirety to the presentation by GRM/TAMS personnel of the results of the Mali Land Use Inventory at the project's offices in Sotuba.

3. Effective Resource Inventory in the Sahel: issues/recommendations - an Issues Paper was prepared prior to the Workshop outlining a number of key issues related to the effective planning, implementation and utilization of resource inventories in the Sahel. Using this paper as a starting point, the Workshop divided into two Working Groups - one focusing on technical issues, the other on utilization issues - to refine the issues and then develop a series of specific recommendations designed to improve the effectiveness of resource inventory projects across the region.

Working Groups:

Technical - C.Poulton (Discussion Leader), R.Hagen (Rapporteur), A.Cameratti, J.Fickes, A.Gaston, E.Hammermaster, J.Heermans, J.Malacamp, K.Milligan, G.Tappan, G.Taylor, M.WaNsanga.

Utilization - V.Fort (Discussion Leader), R.Pellek (Rapporteur), G.Grosenick, P.Mika, T.Pierce, T.Resch, M.Thiam.

C. Principal Recommendations

1. Standardization of Inventory Techniques, Classification Schemes and Mapping Legends.

The standardization of inventory techniques, classification schemes and mapping legends was not seen to be a priority concern at the regional level. However, standardization and comparability were seen as essential at the national level.

Recommendation: that the most practical way to achieve standardization and comparability at the national level is to require contractors performing an inventory to provide a table of comparison between the system used and others in use within the country.

2. Improved Utilization of Project Outputs

A number of areas were identified where concerted effort could increase utilization of inventory outputs. Areas of particular emphasis included improved information collection & dissemination, increased user involvement and host country commitment to the inventory process, and education & training.

Recommendations: 1) that increased attention be given to the review and objective assessment of existing published information and inventory maps in the region of any proposed inventory project. 2) that inventory design should be the result of a thorough problem analysis and careful specification of information needed. 3) that substantially increased attention be given to the examination and, where possible, the incorporation of traditional knowledge of natural resources into inventory projects. 4) that host countries be fully involved in an inventory project at all levels and in all phases to the extent of their ability, and 5) that at an early stage in project development, host country decision makers, other donors, and beneficiary groups be sensitized to project goals and possible application of project outputs.

3. Regional Remote Sensing Center (CRTO, Ouagadougou)

As part of a network of three Africa regional remote sensing centers (Ouagadougou, Kinshasa, Nairobi), CRTO is responsible for the coverage of both francophone and anglophone West Africa. As such, the training of English-speaking technicians is an important component of the Center's regional program. At the same time the recruitment of African counterparts to run this program is crucial to its long-term vialibity. However, given the need to continue the training of English-speaking technicians and encourage anglophone member-countries to continue and expand their role in the Center, it was felt that the training program should be continued without interruption.

Recommendation: that CRTO's anglophone training program, including AID-sponsored technical positions, be continued without interruption until counterparts can be selected, trained and integrated into the Center's operations.

4. GRM/TAMS Mali Land Use Inventory

The Workshop had the opportunity to examine the results of this project in some detail. Given the lack of a resource inventory and planning office within the GRM with a staff and adequate funds to continue the work started under the project, it was felt there is a strong possibility that effective use of the results of this project will not occur unless continued funding can be assured for the next few years.

Recommendation: that USAID fund a follow-on activity to assist the GRM to effectively use the data and Malian skills developed under the current project. The follow-on should include assistance in natural resource planning, institution building, additional data collection, data evaluation and training. It is recommended that a permanent Unit of Natural Resource Inventory, Evaluation and Planning be the focus of this follow-on activity.

5. Regional Environmental Monitoring

The Workshop reviewed a number of monitoring activities across the region including the proposed CILSS Regional Ecological Monitoring Project.

Recommendations: 1) that priority be given to national level environmental monitoring over regional activities, and 2) that the proposed CILSS project not be funded. It was felt that funds would better be spent supporting a continuation of the ongoing GEMS (FAO/UNEP) monitoring project in Senegal and in a timely country by country expansion of that project.

6. Technical Backstopping of Resource Inventory Projects

The Workshop felt that a lack of technical backstopping by both USAID Missions and AID/W served as a significant constraint to the design and implementation of effective resource inventory projects.

Recommendation: that AID/W, regional field offices and, where possible, USAID Missions strengthen their technical capability to design, implement and backstop resource inventory projects and project components by recruiting qualified staff with a remote sensing/resource inventory background.

III. Workshop Recommendations

A. Workshop Recommendations - a conceptual framework.

A consensus developed at the Workshop that the most important issue related to improving the quality, the appropriateness and the use of resource inventory results hinged on the extent to which an inventory was conceived and carried out in a broader context of resource management planning. More specifically, it was felt that many of the problems identified in ongoing inventory efforts could have been avoided if the inventory exercise had been tied more closely to the planning process. For example, in the project design phase, it was felt that problem analysis had not generally been perceived as a distinct and essential part of project planning. Thus a clear conceptualization of the problem(s) to be adressed by the inventory and an analysis of the cause(s) of the problem had often been either missing or inadequate. Once the problem had been identified, existing information relevant to the inventory effort was often only superficially examined. Important documentation was frequently overlooked and contractors were rarely funded to do an adequate job of collecting and reviewing this material. Finally, the information needs specific to a particular project were rarely spelled out as a guide for inventory design.

Given limitations of time it was not possible during the course of the Workshop to tie specific recommendations to issues arising at various steps in the planning process. It was felt, however, that this approach merited further attention.

Recommendation:

- that REDSO/WA review Workshop proceedings in light of the conceptual framework outlined above (i.e. the planning process) with a view to the possible development of guidelines to assist USAID in planning and implementing more effective resource inventory projects.

B. Workshop Recommendations

Workshop recommendations, tied to a series of nine issues, are outlined below.

1. The Need for Resource Inventory - is it real?

Workshop participants were unanimous in affirming that resource inventories were necessary so long as a problem analysis had revealed weaknesses in or a lack of information required in a planning and decision-making process. However, concern was expressed that inventories should not be carried out until existing information and knowledge had been fully evaluated and a real and specific need for more information about the elements to be inventoried had been established.

There was some divergence of opinion about circumstances prerequisite to the implementation of an inventory project. Two points of view were expressed:

a) Until the perception of the need for an inventory is developed within a country, the inventory should not be performed; and

b) Under some circumstances it is necessary to perform an inventory in the absence of host country perception of need i) so that donor nations can use the information for better decisions on what kind and where to recommend development projects, and ii) to use the information gathered by an inventory to sensitize the host government to its value and to demonstrate the role of an improved information base for national planning.

The Workshop was unable to resolve this divergence of opinion.

Recommendations:

- that increased attention be given to the review and objective assessment of existing published information, basic knowledge, and inventory maps in the region of any proposed inventory project.

- that inventory design should be the result of a thorough problem analysis and careful specification of information needs, and

- that substantially increased attention be given to the examination and, where possible, the incorporation of traditional knowledge of natural resources into inventory projects.

In order to facilitate the implementation of recommendation No.1 above, it was further recommended:

a. that in the absence of national documentation center on natural resource information, USAID either i) create its own library of natural resource and inventory-related maps, reports, statistical data, and scientific journal articles or ii) routinely budget in at the design stage of all projects, time and money for the project manager and/or contractor to gather and index this vitally important information.

b. if option (ii) above is followed, that USAID either insure the transfer of these materials to an appropriate host country documentation center at the conclusion of the project or, in the absence of such a center, incorporate the materials into the Mission Library.

c. that USAID routinely disseminate bibliographic summaries of these documentation collection efforts to other USAID Missions and key national and regional documentation centers.

2. Standardization of Inventory Techniques, Classification Schemes and Mapping Legends.

Prior to the Workshop concern had been expressed about the need for increased standardization/comparability of inventory techniques, classification schemes and mapping legends across the Sahel. Working participants did not see this as a priority concern. However, standardization and comparability were seen as essential at the national level.

It was felt that the cost, time and effort required to reach agreement on these issues on a region-wide basis would not be justified. Some work of this type is already being carried out by specialized U.N. Agencies (FAO, UNESCO, UNEP). It was felt that this was appropriate and should remain their initiative. More importantly, it was felt that the most appropriate inventory technique, classification scheme or mapping legend for a given inventory was one that most fully met the specific objectives of that inventory, that corresponded to the characteristics of the area inventoried, and that took into consideration the limitations imposed by the type and qualityof the imagery used. It was recognized that all of these conditions would rarely be the same for two different inventories. As such, it was considered inappropriate to call for standardization to a point that the conditions outlined above could not be met.

Workshop participants felt that if contracts clearly specified the intensity of inventory, the resource features and conditions to be inventoried, and that each taxonomic unit or mapping unit be clearly identified and described in the legend and the project report, that knowledgable users should have no serious or irresolvable problems when working at the boundaries of two surveys or in resolving most differences in legend detail between two surveys of the same area. This would be particularly so if contractors were also required to comply with the following recommendation:

Recommendation:

- that the most practical way to achieve standardization and comparability of classification schemes at the national level is to require contractors performing an inventory to provide a table of comparison between the system used and others in use within the country.

3. Improved Utilization of Project Outputs

A primary concern of Workshop participants was that the results of resource inventory and mapping projects were not being used as fully as had been hoped and could be expected. While most USAID-assisted

projects currently underway across the Sahel had not yet reached the stage where non-utilization of project outputs was an issue, it was noted that the history of similar projects both in the region and elsewhere was full of cases where maps and other project documents were lying on Archive or Ministry shelves slowly gathering or being reduced to dust instead of being used by planners and resource managers for the more effective management and use of a nation's natural resource base.

Based on the Workshop Issues Paper, participants identified a number of reasons why utilization of project outputs may be low. These included:

- lack of user involvement in and host country commitment to the inventory.

- intensity and scale of the inventory did not match the specific information needs of the most urgent problems to be solved.

- lack of a critical mass of trained host country resource analysis and planner-managers.

- organization within the host country for integrated planning, development and management either nonexistent or overly segmented, understaffed and/or underfinanced.

- failure to interpret data and show concrete applications as a part of the inventory project.

- failure to provide project follow-through or a phase-out period of continuing technical assistance after an inventory is completed.

The Workshop identified a number of areas where concerted action could increase utilization of completed resource inventories and improve utilization of information to be gathered in ongoing or proposed efforts. Areas of particular emphasis were a) improved information collection & dissemination, b) increased user involvement and host country commitment to the inventory process, and c) education & training.

a. Information Collection & dissemination

Considerable attention was devoted to the need for improved information collection & dissemination and the role that this could play in improving the utilization of project outputs. It was recognized that the French and, more recently, Sahelian governments and a wide range of donor organizations had accumulated a vast amount of information about various facets of the natural and human environment across the region. While some of this material was readily available, much of it could only be found in special collections (of host countries, donor organizations and specialized

agencies both inside and outside of the region) that were frequently difficult to access. As such, the Workshop felt that inventories were not infrequently carried out without adequate reference to existing work and that, unless special efforts were made to disseminate the results of a new inventory, it would also likely be forgotten and the process perpetuated/repeated. In such an environment it is not surprising that planners, resource managers and politicians conclude that they have inadequate information on which to base management decisions.

As an example of what can be done if information collection is pursued conscientiously, the GRM/TAMS Mali Land Use Inventory project presented participants with a Preliminary Bibliography of some 1400 citations - information on Mali that had been identified and collected during the course of the two year project and used by project staff and consultants to develop the inventory maps. This material, currently housed in the project's documentation center, represents one of the most complete and perhaps most accessable collections of its type in Mali.

Principal recommendations on information collection & dissemination were outlined in Section B (1) above. In addition, it was suggested that USAID reassess its policy on the number of copies of maps and reports required with a view to more adequate distribution within the host country and that inventory projects be followed by an adequate series of in-country seminars to present results to host country personnel and to make sure that the results are understood.

b. User involvement and host country commitment to the inventory process.

Workshop participants generally concurred with the observation of the Issues Paper that host country utilization of USAID and other donor-sponsored resource inventories was low in part because the host governments were not sufficiantly involved in either the conceptualization and/or the implementation of the inventory. With the exception of the 'special case' outlined in Section B (1) above, it was agreed that host country involvement in and commitment to a project idea was important in all phases of project conceptualization, design, implementation and follow-up. Participants felt that this had often not been the case and that a lack of involvement/commitment was in considerable measure responsible for the non-or under-utilization of outputs from certain projects.

In the pre-project phase, for example, it was felt that the host country should be involved in contributing to the problem analysis and specification of information needs, participate in determining the appropriate scale and intensity of analysis, and participate in deciding whether the project was to be a single-phase or multi-phase effort. In addition the host country financial contribution to the project and the issue of recurrent costs needed be faced squarely by both host country and

donor agencies during the project design phase. Another aspect receiving considerable attention was post-project followup. It was felt that increased attention by USAID and others to project followup, involving minimal additional financial commitments, could significantly increase the utilization of the products and skills developed by an inventory project.

Recommendations:

- that host countries be fully involved in an inventory project at all levels and in all phases to the extent of their ability.

- that both host countries and donors have a clear understanding of the recurrent cost implications of resource inventory projects and that arrangements be made both to assure host country commitment to the project through its contribution to the effort and insure that recurrent costs can either be met by the host country or will be covered by the donor over a clearly specified period of time.
- that wherever possible, projects be carried out within an existing government structure to help assure ongoing viability of the inventory unit and increased likehood that project outputs will be utilized.

- that at an early stage in project development host country decision makers, other donors, and beneficiary groups be sensitized to project goals and possible application of project outputs.

c. Education & training

Workshop participants felt that education and training were vital elements of resource inventory efforts that were important not only to host country involvement in inventory work per se but, more importantly, to the utilization and ongoing refinement and updating of project outputs once a project had been completed. The Workshop felt that the types and levels of project-related training should be carefully geared to the complexity of the inventory to be undertaken. In some cases, it was felt, greater emphasis needed to be given to on-the-job training of technicians while in other cases a broad-based university education in resource management and planning was appropriate. In either case it was host country participation in the inventory process that should be maximized. The Workshop also recognized that the pool of technically qualified host country personnel was often limited and that this served as a constraint to the transfer of skills from expatriate to host country technicians during project implementation.

Recommentations:

- that project conceptualization and design include specific attention to an assessment of the combination of formal education and on-the-job training required by host country personnel to carry out the inventory project.

- that African educational institutions (including CRTO) be used as much as possible for project-related training and, to the extent that training is done outside of the region, that problems and methodologies applicable to the African situation be incorporated into studies to the maximum extent possible.

- that, to the extent possible, increased attention be given to appropriate on-the-job training of host country personnel.

4. Appropriate Levels of Inventory/Survey Technology

Workshop deliberations on the issue of appropriate levels of inventory/survey technology were tied closely to discussions on the role and appropriate functions of the regional remote sensing center (CRTO) in Ouagadougou. However, a number of recommendations were developed on data receiving, data processing and the use and application of remote sensing data that were not tied specifically to CRTO:

a. Data Receiving

Recommendation:

- that in general, and for most applications, there is no great need for real time or near real time satellite data for inventory/survey work in the Sahel.
  (for additional recommendations see Sections 5 & 9 below)

b. Data Processing

Recommendations:

- that photographic processing capabilities such as those already in place and functioning at CRTO represent an appropriate level of processing technology that can be supported and managed in the region.

- that sophisticated and specialized types of image enhancement which certain European and North American firms are capable of not be developed in the region but that it be done by these firms where justified for specific applications.

c. Use & Application of Remote Sensing Data

It was felt that aerial photography would remain a very important part of the spectrum of available remote sensing systems in West Africa. However, although 23 cm format aerial photography will remain the basic type of aerial photographic product, it was felt that there is a strong potential for the increased use of small format photography taken from light aircraft, especially in cases where photogrammetric precision is not required.

5. Regional Remote Sensing Center (CRTO, Ouagadougou)

The Regional Remote Sensing Center in Ouagadougou is one of three satellite data receiving centers and five training and user assistance centers projected for Africa by the ECA and the donor community. Once fully operational the receiving centers will provide virtually complete coverage of the continent with real-time satellite data.

CRTO is now, four years after its establishment, officially recognized as a Regional Center. It is being developed under the umbrella of the African Remote Sensing Council (CAT), is managed by a Regional Management Committee made up of representatives from its twelve member states, and is receiving funding from Canada (CIDA), France (FAC), West Germany and USAID as well as from some of the African member states. The program of the Center is focused on three primary areas: training, user assistance, and the distribution of Landsat photographic products prepared in the Center's photographic laboratory. Construction of a receiving station is planned with funding from France, Canada and West Germany. This station is expected to cover some nineteen countries in their entirety and is expected to receive both Landsat D and SPOT data.

As a regional center responsible for the coverage of both francophone and anglophone West Africa, training programs at the Center have been developed in both English and French. Under present arrangements, USAID-supported anglophone training will be discontinued in June 1982 unless alternative arrangements can be made. While recognizing that the recruitment of African counterparts to run this part of the training program is crucial to its long-term viability, Workshop participants felt that given the need a) to continue the training of English-speaking technicians and b) to encourage anglophone member-countries to continue and expand their role in the Center, that the training program should be continued without interruption.

Recommendation:

- that CRTO's anglophone training program, including AID-sponsored technical positions, be continued without interruption until counterparts can be selected, trained and integrated into the Center's operations.

At the same time it was recognized that if qualified African personnel are available now, it would be in the strong interest of the African community to assign them immediately to the Center.

Recommendation:

- that all parties involved in the funding and administration of the Center reassess the time frame in which the various functions of CRTO can realistically be fully Africanized. Possibilities for improving the administrative structure of the Center should also be assessed with a view to making it more effective in carrying out CRTO's primary functions.

Additional recommendations related to CRTO were developed on data receiving, data processing, the use and application of remote sensing data, improving CRTO effectiveness, and national remote sensing capabilities:

a. Data Receiving

The Workshop felt that France, Canada and West Germany should be encouraged to construct the receiving capability in Ouagadougou as planned.

Recommendation:

- That if the receiving capability is developed, CRTO should furnish imagery for inventory/monitoring projects but should not undertake the implementation of such projects.

b. Data Processing

The Workshop felt that the photographic processing capabilities already in place and functioning at CRTO represent an appropriate level of processing technology that can be supported and managed by the Center.

Recommendations:

- that USAID continue to support the Center's photographic processing function.

- that CRTO not develop a digital analysis service laboratory for remote sensing applications.

- that CRTO not provide high precision cartographic services.

- that CRTO continue its policy that staff will not do applications work for a client but that it's intervention will be limited to pilot projects with CRTO staff working with African technicians in on-the-job training of the Africans. As a result, it is recommended that CRTO should not perform applications work for a client on a contract basis.

c. Use & Application of Remote Sensing Data

The Workshop felt that CRTO should continue to encourage the use of both aerial photography and satellite imagery as appropriate. However, it was recommended that CRTO not become involved in the acquisition of aerial photography.

d. Improving CRTO Effectiveness in Serving the needs of West Africa.

In addition to the items outlined above, four areas were identified for specific attention in the context of improving CRTO's effectiveness:

1. Africanization of CRTO - this was seen as a central issue in improving the long-term effectiveness of the Center (see discussion and recommendation above).

2. Program focus - it was recommended that CRTO continue to concentrate on the development of African abilities to make use of remote sensing technologies through the Center's three primary functions of training, user assistance and the provision of photographically-processed images. As a result it was felt, for example, that the Center should not provide basic training in earth sciences.

3. Appropriate technologies - it was felt that the use of specialized and advanced remote sensing technologies should be encouraged in West African nations where appropriate to their capabilities. However, with regard to CRTO, it was recommended that the acceptance of additional and more complex functions by the center as a West African regional institution should be very carefully weighed in the light of its ability to support and maintain these functions.
(for specific recommendations see Section (b) above).

4. CRTO and USAID projects - it was noted that USAID projects had not generally been making use of CRTO's facilities or services. The Workshop did not have time to examine the reasons for this in detail. It was recommended that USAID projects with a remote sensing component should take advantage of the Center's training programs, technical expertise and photographic laboratory facilities. It was also suggested that the staff of USAID projects in which remote sensing techniques have been used be encouraged to make the results of their work available to the staff and trainees of CRTO preferably by means of a formal presentation but, if that were not feasible, at least in the form of copies of the documents produced.

e. National Remote Sensing Capabilities

The Workshop felt that the development of national remote sensing capabilities should be encouraged. Specifically, the creation of national remote sensing committees and/or centers within each West African country should be encouraged. It was emphasized, however, that the technology assembled in such centers must be consistent with local capability to maintain efficient, quality service in each technical area that is implemented in-country. In most cases it would be most appropriate for these facilities to concentrate on building local capability to do image interpretation of materials supplied from outside (by CRTO, for example). It was felt that individual countries should not install computer facilities for digital classification and processing of imagery until i) a continuous, non-surge power source was absolutely assured, ii) a reliable, continuously air conditioned and humidity controlled building to house computer facilities and tape and disc storage was in place and proven to be dependably operable, and iii) earth science and computer science technicians had been trained and were on hand to do digital analysis.

6. GRM/TAMS Mali Land Use Inventory

The Workshop examined as a case study the results of the Mali Land Use Inventory Project (688-0205). Work on the project is due to be completed in June, 1982 and final project documents are expected to be ready by the end of the year. The Workshop found a generally successful project which, against considerable odds, had accomplished most of the scope of work set out for it. However, the project purpose, including the building of a Malian capacity for continuing work in this field, has not yet been met.

Given the lack of a resource inventory and planning office within the GRM with a staff and adequate funds to continue the work started under the project, the Workshop felt there was a strong possibility that effective use of the results of this project would not occur unless and until continued funding could be assured for the next few years. It was felt likely that unless follow-on funding could be found, the Malian team trained under the project would be disaggregated and resources scattered upon completion of the project.

Recommendation:

- that USAID fund a follow-on activity to assist the GRM to effectively use the data and Malian skills developed under the current project. The follow-on should include assistance in natural resource planning, institution building, additional data collection, data evaluation and training. It was recommended that a permanent Unit of Natural Resource Inventory, Evaluation and Planning be the focus of this follow-on activity.

7. Regional Environmental Monitoring

The Workshop examined a number of monitoring activities including work by ILCA in the Niger Inland Delta (Mali) and the pastoral zone of Niger, by FAO/UNEP in the Ferlo zone of Senegal, and plans for future monitoring activities across the region. Two projects were examined in some detail: the GEMS (Global Environmental Monitoring System) FAO/UNEP Rangeland Ecosystem Monitoring project currently underway in Senegal and the proposed CILSS project - Monitoring of Renewable Natural Resources (625-0943). The GEMS activity is part of a world-wide effort to develop appropriate methodologies for monitoring of the environment.

Workshop participants felt that the proposed CILSS project was outdated and duplicative of recently initiated national level monitoring and assessment projects. In addition, it was felt that there were important limitations in the technical design of the proposal as well as a variety of implementation problems that could be foreseen . Based on these deliberations, the following recommendations were made:

Recommendations:

- that priority be given to national level environmental monitoring over regional activities.

- that the proposed CILSS project not be funded. Rather than revising this project it was felt that funds would better be spent supporting a continuation of the ongoing GEMS (FAO/UNEP) monitoring project in Senegal and in a timely country by country expansion of that project.

It was noted, for example, that the USAID-funded Niger Range and Livestock project is currently undertaking vegetation and biomass studies in Niger's pastoral zone and that there was potential for incorporating the methodology being developed in Senegal into this project.

8. Technical Backstopping of Resource Inventory Projects

Considerable time was spent discussing technical backstopping (or lack thereof) in relation to USAID-assisted resource inventory projects in the region. The workshop felt that because AID/Washington is primarily dependent upon USAID Missions to provide the bulk of the background data and analysis for project development and design, the design of resource inventory projects or project components was likely to be less than optimum if either Mission personnel involved in project design had limited technical expertise or if AID/W reviewers, similarly constrained, were unable to critically evaluate the proposed project. At the same time it was felt that a lack of technical backstopping by USAID Missions, regional offices, and AID/W served as a significant constraint to the implementation of effective resource inventory projects (including, for example, support to Regional Remote Sensing Centers in Ouagadougou and Nairobi).

Recommendation:

- that AID/W, regional field offices and, where possible, USAID Missions strengthen their technical capability to design, implement and backstop resource inventory projects and project components by recruiting qualified staff with a remote sensing/resource inventory background.

9. Continuity and Availability of Satellite Remote Sensing Data.

Workshop participants were concerned about the projected unavailability of satellite remote sensing data, particularly from Landsat D, over the next few years.

Recommendation:

- That NASA re-examine this situation (including plans that Landsat D data will be unavailable to West African and oth r users during a lengthy period of testing) and take steps to rectify it.

In addition it was felt that, in response to a NASA request, both CRTO and USAID-assisted projects (e.g. Senegal's National Plan of Land Use and Development) should be encouraged to participate as Coinvestigators in the Landsat D program.

IV. Workshop Documentation

A. Workshop Program

A. Workshop Program

SAHEL RESOURCE INVENTORY AND MAPPING COORDINATION WORKSHOP

May 20-24, 1982

Hôtel de l'Amitié (Salon Gundo)

Bamako, Mali

PROGRAM

THURSDAY, May 20

Program Chairman, Vernita Fort, REDSO/WA Natural Resources Advisor

7:30 Registration (Salon Gundo)

8:00 Opening Session

Welcome and Opening Remarks

Larry Dash, Director, Sahel Development Planning Team

Rollo Ehrich, Agricultural Development Officer USAID/Bamako

8:30 Presentation of Program and Opening Remarks

George Taylor, SDPT, Forestry Advisor

9:00 Workshop Issues Paper - an introductory overview

Charles Poulton, Consultant, Forestry Support Program

9:45 Coffee Break

10:15 Resource Inventory & Mapping in the Sahel: The ILCA Experience

Introduction

R.T.Wilson, Team Leader, Arid and Semi-Arid Zone Programme-ILCA, Bamako

Presentations:

P.Hiernaux and L.Diarra - Production Primaire - Carte de Ressources Fourrages

J.Marie - Cartographie foncière pastorale du delta du Niger

K.Milligan - Assessing Human, Animal and Environmental Conditions by Low Altitude Aerial Survey: The ILCA experience in the Sahel

Discussion

12:00 Lunch Break

14:00 Resource Inventory and Mapping in the Sahel: The Role of CRTO, Ouagadougou

Introduction:

J.C.Malacamp - Responsable, Projet Monitoring CRTO - Ouagadougou

Presentations:

J.C. Malacamp - Inventaire des Projets de Télédétection Spatiale au Sahel - Simulations Spot en Afrique de l'Ouest - Activité du Projet Monitoring en 1981

Paul J. Mika - Overview of Center Activities

Roy T. Hagen - Remote Sensing Application to Forestry in West Africa

Regional Remote Sensing Centers - An AID/W perspective

Tim Resch - USAID/USFS Forestry Support Program

Discussion

16:30 Coffee Break

17:00 Presentations:

ERIM International Symposium on Remote Sensing of Arid and Semi-Arid Lands (Cairo January 1982) - overview of results

Tim Resch - USAID/USFS Forestry Support Program

Monitoring of Renewable Natural Resources - a CILSS Project Proposal (625-0943)

Tobey Pierce - Ecologist CILSS, Ouagadougou

Discussion

18:00 Chairman's Summary

FRIDAY, May 21

Program Chariman: Charles Poulton, Consultant, Forestry Support Program

8:00 Resource Inventory & Mapping in the Sahel: The USAID Experience

Project/Country Paper Presentations:

Senegal - Senegal's National Plan for Land Use and Development

Mamadou Thiam, Project Director, National Plan of Land Use and Development (685-0233) and Directeur de l'Aménagement du Territoire

Gray Tappan, Remote Sensing Specialist South Dakota State University, Technical Assistance Team

Mauritania

M.WaNsanga, Team Leader, South Dakota State University Renewable Resource Management (682-0205)

Cape Verde - Resource Inventory/Mapping in Cape Verde

Richard Pellek, Soil Conservation/Land Use Planning Advisor, Watershed Mgmt/Soil Conservation (655-0006)

Discussion

10:00 Coffee BREAK

10:30 USAID Presentations continued

Niger

John Heermans, Project Technical Advisor, Forestry and Land Use Planning (683-0234)

Upper Volta - Status of the Resource Inventory for the Upper Volta Forestry Education and Development Project (686-0235)
Jim Fickes, Forest Manager, USDA Team, Bobo-Dioulasso

Sahel/West Africa Regional
Balancing Animals with Vegetation for optimal and Sustained Productivity: A case Study of Methodology from the Niger Range and Livestock Project (683-0202)
Vernita Fort, Natural Resources Advisor, REDSO/WA Abidjan

Discussion

12:30 Lunch Break

14:00 Resource Inventory and Mapping in the Sahel: The FAO Experience
Presentations:
National Forest Inventory in Upper Volta - FAO Project UPV/78/004
A.Cameratti - Forest Inventory Specialist, Projet Développement des Ressources Forestières, Ouagadougou, Upper Volta
Village/Homestead Forest Inventory - Bangladesh
E.Hammermaster - FAO/Monrovia

Discussion

16:00 Coffee Break

16:30 FAO Presentations continued
Evaluation de la Production Primaire Herbacée Sahélienne par Mesures Simultanées au Sol et par Satellite mise au point d'une Technique rapide and Extensive
A.Gaston - FAO/UNEP Projet Pilote d'Inventaire et de Surveillance Continue des Ecosystèmes Pastoraux Sahéliens. Dakar, Senegal.

Discussion

17:45 Chairman's Summary

18:00 Organizational Meeting of Working Groups
Technical Working Group - Discussion Leader, Charles Poulton
Utilization Working Group - Discussion Leader, Vernita Fort

SATURDAY, May 22

Resource Inventory and Mapping in the Sahel: Mali Land Use Inventory (688-0205) - A Case Study

7:45 Technical Working Group Picked up at Hotel for transport to MLUI/PIRT Project Headquarters, Sotuba

8:00 Technical Working Group - Sotuba
Mali Land Use Inventory Case Study Presentation:
Introduction - John Buursink
Soils/Vegetation Survey - Geoffrey King
Water Resources Inventory - Madia Sidoro
Land Use Inventory - Seydou Bouaré
Discussion - GRM/TAMS Staff

Utilization Working Group - Hotel l'Amitié
Workshop Issues Paper - an indepth look:
Charles Poulton, Consultant, Forestry Support Program

9:45 Utilization Working Group picked up at Hotel for transport to MLUI/ PIRT Project Headquarters, Sotuba

10:00 Technical Working Group picked up at Sotuba for return to Hotel

Utilization Working Group - Sotuba
Introduction - Gaoussou Traoré
Land Potential - N.Sacko/J.Adamec
Land Use Planning - Derrick Thom
Economic Considerations - John Erikson
Discussion - GRM/TAMS Staff

Technical Working Group - Hotel l'Amitie
Workshop Issues Paper - An indepth look
Charles Poulton, Consultant, Forestry Support Program

12:15 Utilization Working Group picked up at Sotuba for return to Hotel
12:30 Lunch Break
14:30 Working Group Meeting
(refinement of issues and development of Recommendations)
15:30 Coffee Break
16:00 Working Group Meeting continued
17:00 Summary

SUNDAY, May 23

Open
(Working Group Chairmen and rapporteurs refine Recommendations)

MONDAY, MAY 24

Program Chairman: John Heermans

8:00 Working Group Meetings
- preparation of recommendations/guidelines and conclusions
9:45 Coffee Break
10:15 Technical Working Group Report
11:15 Utilization Working Group Report
12:15 Lunch Break
14:00 Discussion of Recommendations/Guidelines and Conclusions
15:30 Coffee Break
16:00 Discussion of Recommendations/Guidelines and Conclusions (continued)
16:45 Chairman's Summary
17:00 Concluding Remarks/Closing Ceremony

B. List of Participants

Sahel Resource Inventory and Mapping Coordination Workshop

Bamako May 20-24, 1982

1. Mamadou Thiam
   Directeur de l'Aménagement du Territoire
   Ministère de l'Urbanisme, de l'Habitat et de l'Environnement
   DAT/MUHE
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2. Armando G. Cameratti
   Forest Inventory and Photointerpretation Expert
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3. Pierre Hiernaux
   Agrostologiste
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4. Timothy M. Resch
   Forestry Support Program
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5. Thomas A. Pierce
   Ecologist/CILSS
   Ambassade des Etats-Unis
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6. Roy T. Hagen
   Forestry Applications Specialist in Remote Sensing
   Regional Remote Sensing Center
   Ouagadougou, Upper Volta
   or
   Ambassade Américaine
   B.P. 35
   Ouagadougou, Upper Volta

7. Gaoussou Traoré
   Project Director, PIRT/Mali Land Use Inventory
   B.P. 2357
   Bamako, Mali

8. André Gaston
Ecologiste des Parcours
FAO/UNEP Range Land Ecosystem Monitoring Project
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9. Paul J. Mika
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10. Gray Tappan
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11. Eric. T. Hammermaster
Forest Resource Survey Officer - FAO
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12. Richard Pellek
Soil Conservation Specialist
USAID/Praia
c/o Embaixada Americana,
Praia, Cabo Verde

13. Buhendwa Lubagire Kabiyona
Secrétaire Général , Conseil Africain de Teledetection
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14. Diarra, Z.
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15. Dr. L.J.Lambourne
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16. Richard Trevor Wilson
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18. Jean Malacamp
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19. Jim Fickes
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B.P. 1105
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20. Charles E. Poulton,
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21. John Heermans
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22. Cees de Haan
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23. Jerome Marie
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24. John Erikson
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25. Diane McLean
Project Manager - Action Blé
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26. Norman Rifkin, Human Resource Development Officer
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27. Vernita Fort
Natural Resource Advisor
REDSO/WA
Abidjan, Ivory Coast

28. John Buursink
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Bamako, Mali

29. Rollo Ehrich, Agricultural Development Officer
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30. George F. Taylor, Forestry Advisor
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Bamako, Mali

31. Larry A. Dash
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32. M.WaNsanga, Team Leader, South Dakota State University
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33. Gerry Grosenick
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34. Jon Anderson, Project Manager - Energy/Forestry
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35. Mark Stephen Haywood
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International Livestock Centre for Africa (ILCA)
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C. Workshop Papers

I. Preparatory Papers

1. Poulton, Charles E. 1982. Effective Resource inventory in the Sahel: Planning, Implementation and Utilization. Workshop Issues Paper. 49 p.

2. International Livestock Centre for Africa. 1975. Evaluation and Mapping Tropical African Rangelands: Recommendations and Conclusions. p. 385-390 Proceedings of the Seminar Bamako, Mali 3-8 March 1975. ILCA, Addis Ababa, Ethiopia.

3. Taylor, George F. 1982. USAID-funded Resource Inventories in the Sahel - A Preliminary Listing. (With project descriptions of Selected Regional Projects). 8 p. USAID/SDPT Bamako.

4. Taylor, George F. 1982. Remote Sensing and Natural Resource Inventories in the Sahel: A preliminary Selected Bibliography. (131 citations). 14 p. USAID/SDPT Bamako.

5. Taylor, George F. 1982. USAID, Remote Sensing and Bamako: An Historical Retrospective (Program and Materials prepared for the Sahelian Remote Sensing Seminar and Workshop. Bamako, Mali. April 16-27, 1973. Agenda and Table of Contents of Papers Presented) 4 p. USAID/SDPT Bamako.

6. Palgen, Jack and Jan W.Van Roessel. 1974. Photographic and Map Coverage of the Sahel. p. 90-99 in Chap. 5 Cartography and Mapping in J.B. Bale et al. (eds) Remote Sensing Applications to Resource Management Problems in the Sahel. Earth Satellite Corperation Washington, D.C. July, 1974. USAID contract AID Afr-c-1058.

7. H.J. Croze and M.D.Gwynne. 1981. 'A Methodology for the Inventory and Monitoring of Pastoral Ecosystem Processes.' In: J.Galaty et.al. (Eds.) The Future of Pastoral Peoples. Ottawa: IDRC. p. 340-352.

II. Presented Papers

1. Taylor, George F. 1982. Workshop Background and Objectives. 10 p.

2. Milligan, Kevin. 1982. Assessing Human, Animal and Environmental Conditions by Low Level Aerial Survey: The ILCA Experience in the Sahel. 17 p.

3. Hagen, Roy T. 1982. Remote Sensing Applications to Forestry in West Africa. 10 p. CRTO. Ouagadougou.

4. Gaston A. et E.Boerwinkel. 1982. Evaluation de la Production Primaire Herbacée Sahélienne par Mesures Simultanées au Sol et par Satellite mise au point d'une technique rapide et extensive. 9 p.

5. Pierce, Thomas H. 1982. Monitoring of Renewable Natural Resources (625-0943). 11 p.

6. Thiam, Mamadou and Gray Tappan. 1982. Senegal's National Plan for Land Use and Development. 37 p. (Texte aussi en Français).

7. Pellek, Richard. 1982. Resource Inventory/Mapping in Cape Verde. 10 p.

8. Heermans, John. 1982. Niger Country Paper. 10 p.

9. Fickes, James L. 1982. Status of Resource Inventory for the Upper Volta Forestry Education and Development Project (USAID 686-0235). 7p.

10. Fort, Vernita. 1982. Balancing Animals with Vegetation for Optimum and Sustained Productivity: A case Study of Methodology from the Niger Range and Livestock Project (683-0202). 9p.

11. Cameratti, A.G. 1982. National Forest Inventory in Upper Volta FAO Project UPV/78/004.

III. Distributed Papers

1. Centre Regional de Télédétection de Ouagadougou (CRTO). 1982. Development of the Regional Remote Sensing Centre-Ouagadougou. 1978 to Feb. 1982. 23 p. CGR/27-03-82/KIN/9. CRTO, Ouagadougou

2. Malacamp, J.C. 1982. Liste des Projets Incluant un Volet Télédétection Spatiale dans les Pays du Sahel. 38 p. CRTO. Ouagadougou

3. Malacamp, J.C. 1982. Synthèse des Rapports du Projet Suivi Ecologique-Année 1981. 34 p. CRTO. Ouagadougou. Février 1982.

4. Centre Regional de Télédétection de Ouagadougou (CRTO). 1981. Synthèse des Rapports du Projet suivi Ecologique - Année 1980. 42 p. CRTO Ouagadougou. Janvier 1981.

5. Centre Regional de Télédétection de Ouagadougou (CRTO). 1982. List of Landsat Imagery Available at CRTO- 1 April 1982. 19 p. CRTO-Ouagadougou

6. Centre Regional de Télédétection de Ouagadougou (CRTO). 1982. Landsat Images-Price List (Janvier 1982). 1 p. CRTO - Ouagadougou.

7. Centre Régional de Télédétection de Ouagadougou (CRTO). 1981. Liste des Stagiaires. 17 p. CRTO-Ouagadougou.

8. Maiga, Abdou Yehiya et Roy Hagen. 1982. Possibilities d'Application de la Télédétection dans l'Inventaire et l'Aménagement d'une Forêt Naturelle: Forêt Classée de Dinderesso. 28 p. CRTO - Ouagadougou.

9. Projet Inventaire des Ressources Terrestres. 1982. Mali Land Use Project: A Case Study. 5 p. Project PIRT. Bamako, Mali.

10. Projet Inventaire des Ressources Terrestres. 1982. Preliminary Bibliography. PIRT USAID Project 688-0205. 114 p. Mai 1982. Ministère de l'Elévage et des Eaux et Forêts. Bamako, Mali. (1400 citations)

11. Savanna Regional Water Resources and Land Use Project. 1978. Land Use/Land Cover Map Vol. 6 Map. 1. Interafrican Committee for Hydraulic Studies.(CIEH)/TAMS. Ouagadougou.

12. Lund, H. Gyde, Miguel Caballero, R.H.Hamre, Richard S. Driscoll, and Willian Bonner, Technical Coordinators. 1981. Arid Land Resource Inventories: Developing Cost-Efficient Methods. (Proc. of the Workshop Lapaz, Mexico, Nov. 30-Dec. 6, 1980) USDA Forest Service. Gen. Tech. Report. WO-28, 620 p. Washington, D.C. (to be distributed by USDA/FSP).

13. Environmental Research Institute of Michigan. 1982. Remote Sensing of Arid and Semi-Arid Lands, Proceedings of the Symposium Jan. 19-25, 1982 Cairo, Egypt. Ann Arbor, Mich. (to be distributed by USDA/FSP).

Note: Copies of Workshop Papers are available on request from either SDPT/Bamako or ST/FNR (USDA-Forestry Support Program).