

**Development and Evaluation of Models and
Methods to Improve the Assessment of
Status and Estimate the Economic and
Environmental Impact of Options to
Enhance Food Security**

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Palais des Congrès
Bamako, Mali**

WORKSHOP REPORT
Volume I
Findings and Recommendations

**Institute of Rural Economy
INSAH
Texas A&M University
FAO - WAICENT**

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Volume I

Workshop Results and Conclusions



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Foreword

A planning workshop, hosted by the Institut du Sahel (INSAH), was held in Bamako December 7-9, 1999 to initiate the Mali FIVIMS-GOOS Pilot Study and agree on the approach and plan of action to be used. The pilot study deals with the development and evaluation of models and methods to improve the assessment and estimate the economic and environmental impact of options to enhance food security.

The Cosponsors of the workshop were:

- Secretariat General De La Presidence De La Republique
- Ministere de Developpement Rural et L'Eau
- Ministere de L'Environnement
- Institut du Sahel (**Host**)
- USAID- Mali Mission
- FAO
- USAID SANREM CRSP - Texas A&M University

Beginning in May 1999 plans for the planning workshop on the pilot study were developed by the relevant Ministries and Offices of the Government of Mali, the Institute of Rural Economy, The UN Food and Agriculture Organization and Texas A&M (SANREM).

A draft plan of action for the study, coordinated on two prior occasions with Malian participants, served as the point of departure for a planning workshop sponsored by the several concerned parts of the Government of Mali (GOM) and donor agencies and conducted by the Institute of Rural Economy (IER), INSAH, FAO-WAICENT, and Texas A&M. The workshop was held at the Palais des Congres in Bamako, Mali.

There were approximately 40 participants, including key government decision makers, national researchers and staff of government agencies that will use the methods, donors, FAO, and Texas A&M University under the USAID SANREM CRSP.

The report of this workshop is contained in two volumes. The first is a summary of findings and recommendations. The second is a more complete proceedings of the workshop presenting or summarizing the presentations made by the participants.

The product of the workshop is the finalization of the work plan for the pilot study and recommendations for action by various participants.

Acknowledgment and Appreciation

The Institute of Rural Economy, INSAH, Texas A&M University and FAO-WAICENT are very grateful to the participants for their strong support of the workshop and whose contributions made this workshop a success.

Appreciation is expressed for financial and in-kind support for the workshop provided by USAID - EGAD-AFS, FAO-WAICENT, INSAH, and the Mali Institute of Rural Economy.

The team would like to extend their sincere appreciation to the different chairpersons who conducted perfectly the intensive and numerous sessions of the workshop : Dr. Mamadou Goita, General Secretary, MDRE, Makan Fily Dabo, ME, Dr. Neville Clarke, Texas A&M, Dr. David Wilcock, FAO-FIVIMS, Dr. Bino Teme, IER, and Dr. Gaoussou Traore, INSAH.

This workshop would not have materialized without the full commitment and dedication of Alpha Kergna, agro-economist at IER. We are specially grateful and would like to give a special thanks for the support of the TMG team, especially Wilbur Thomas, Jorge Oliveira and their administrative assistant Mme Tangara.

The members of the Texas A&M Impact Assessment Group wish to express their special thanks to their colleague Dr. Michele A. Schilling for her outstanding contributions in organizing and facilitating the workshop and in the preparation of the reports following.

Executive Summary

Food security and natural resource management are very high priority issues for all governments in Sub-Saharan Africa. Integrated planning at national and regional levels in West Africa is being undertaken to address issues related to food security and environmental consequences of alternative management of natural resources. International conventions have set goals and called for methods to monitor progress towards them. USAID is sponsoring research to contribute to the development of improved methods to monitor progress towards achieving these goals and to assess the impact of alternatives for introduction of new technology and policy options to help in achieving the goals related to enhancing food security through sustainable use of natural resources. In previous research under USAID sponsorship, Texas A&M developed a suite of economic, environmental, and biophysical models to provide a holistic approach to impact assessment. These models were developed in Mali, Senegal, and Burkina Faso to estimate the impact of new sorghum production systems developed under the USAID INTSORMIL CRSP. The research was conducted jointly by the Institute of Rural Economy, the INTSORMIL CRSP, and Texas A&M. These early studies provided proof of concept for the use of this suite of models for more general applications related to food security and natural resource management.

During the period from May to August 1999, consensus was developed between key political leaders in the Government of Mali, the Institute of Rural Economy, INSAH, FAO, and Texas A&M to conduct a pilot study in Mali to further develop and evaluate the suite of previously developed models for their use in the areas of food security and natural resource management. Agreement was achieved on a draft plan of action to be used as a point of departure for this planning workshop. The term “pilot study” denotes the intent to develop and evaluate the methods in Mali with the expectation that they may be applied with minimal modification for use in other West African countries.

The workshop began with general comments by senior government officials noting the relevance and importance of the subject. Current activities and discussion of the need for improved methods of assessment were provided by participants from national and regional research institutes and parts of the Government of Mali (GOM) responsible for implementing plans on food security and natural resource management. Then, the suite of models developed by Texas A&M was presented and discussed by the workshop participants. This was followed by a demonstration of how these models might be used in assessing the results of several intervention scenarios to improve the status of food security in the year 2015, when the World Food Summit calls for a reduction in hunger by 50%. There was further discussion by representatives of research and government agencies and tentative

conclusions were drawn for subsequent presentation in summary form to GOM decision makers. After discussion at this level, general conclusions and plans for follow on action were developed by the policy group.

Workshop participants believed that the approaches to be developed and evaluated in the pilot study were highly relevant to the needs of the GOM. They agreed that this suite of models should form the conceptual framework for assessing the status and progress towards achieving food security and NRM goals. They endorsed the further development of this capability as described in the draft plan of action, and modified by discussions during the workshop.

It was generally agreed by both technical participants and senior government officials that the workshop provided excellent awareness and feedback about general needs for such models for planning and monitoring progress towards achieving food security and NRM goals. The importance of the holistic approach, the comprehensiveness, and the utility of the Texas A&M concept was recognized. The importance of linking these models with monitoring and projecting status of human nutrition was stressed. The workshop concluded that there is a need for further development and simplification to make the models more readily usable. The importance of participation by both scientists and users of the models during their further development and application was recognized. A very high priority was attached to national capacity building.

The plan of action for the Pilot Study has been modified to reflect the recommendations of the workshop. A Malian Advisory Committee of technical experts on the agriculture of the country has been established to help ensure that realistic assumptions are made, in the next round of scenario evaluations, about farming practices and factors affecting adoption. The preceding collaboration between Texas A&M and IER for development of the models has been expanded to include scientists with expertise in soils, range management, and GIS/spatial analysis. Plans for capacity building have been further defined, including the assignment of an IER scientist for long term training at Texas A&M.

One of the most important outcomes of the workshop was the decision by senior GOM officials to establish a National Task Force on Models for Food Security. This task force will organize and evaluate the multiple existing and emerging methods within the country that contribute to assessing food security and NRM. The task force will develop a coherent internal ongoing communication as these methods are further developed and made operational. The task force will to help guide and develop ownership of the products of the FAO-Texas A&M effort as well as others directed towards improving food security. The establishment of a National Task Force on Models for Food Security

will assure integrated planning and action on the use of models in enhanced decision making on food security and on meeting the mandates of the World Food Summit.

In parallel to the pilot study, discussions have been initiated between the FIVIMS Secretariat, UNDP and the GOM about the establishment of a national FIVIMS for Mali. This would promote and facilitate the development of an integrated method for assessment of the status and trends of human nutrition and related methods to improve food security and reduce vulnerability. Linking the development of the suite of models from this pilot study into the broader Mali FIVIMS would be highly beneficial.

Immediately following this workshop, further engagements are occurring between an expanded cadre of IER scientists, INSAH, and Texas A&M to more explicitly define the plan of work, taking into account the results of the workshop and refining the indicators and data requirements for the further development of the models. Selected scenarios will be evaluated to assess economic and environmental impact. A second workshop is planned for late June 2000 to further plan the details of the remaining studies and to evaluate progress since the December workshop.

Introduction

The purpose of the workshop was to engage all partners in planning for further development and evaluation of models previously developed by Texas A&M under USAID sponsorship. The objective is to enhance the capability of the Government of Mali (GOM) in assessment of the current and future status of food security and natural resources and to evaluate the impact of policy and technology options as they affect access to and availability of food and on the sustainable use of natural resources in production of food. Mali was selected as a country for developing and evaluating these methods because it is a nation whose governance and policies are in transition and the issues of food security and natural resource management are pivotal.

Mali, and many other developing countries, are signatories to several international conventions such as the World Food Summit and the Convention to Combat Desertification. As such, they have recognized responsibilities to achieve the goals established by these international agreements. FAO, through monitoring and other support functions, actively supported a series of related international programs, to which most developing countries are partners or signatories. These monitoring and mapping systems offer major opportunity to evaluate the utility and make significant use of the Texas A&M models at multiple levels of scale.

The results of previous studies to develop and evaluate the models (1) provided “proof of concept” for a methodology for impact assessment that was developed in Mali and other locations over the last two years. New research and development are now being jointly conducted by Texas A&M, The Malian Institute of Rural Economy (IER), and the Worldwide Agricultural Information Center (WAICENT) of FAO. Ongoing interaction with and guidance from several ministries within the Government of Mali (GOM) provide focus to these deliberations.

As described in the announcement of the planning workshop (2), the expected product was a refinement of the plan of action for a pilot study in Mali to develop methods and their practical use in assessing the status of food security now and in the future and the impact of new technology or policy options on food security.

This workshop is one of a series of ongoing engagements and activities related to the use of the Texas A&M models in Mali. First was the proof of concept that the models have utility. Then the decision taken by the GOM to apply these models to issues of food security and natural resource management. This was followed by the development of a draft plan of action to be the

basis for the this planning workshop. The planning workshop itself offered the opportunity for both scientists and technicians and government decision makers to participate in setting the agenda and future collaborative activities of the pilot study. This is being followed by start-up research on the study with an additional planning and evaluation workshop to be conducted in June 2000.

Objectives of the Workshop

The overall purpose of the workshop was to plan for further development and evaluation of the Texas A&M models and methods to improve the assessment of status and estimate the economic and environmental impact of options to enhance food security. Its product will be a refinement of the plan of action for a pilot study in Mali to develop methods and their practical use in assessing the status of food security now and in the future and the impact of new technology or policy options on food security.

Specific objectives of the workshop were:

- Increased understanding and insight into the needs of several agencies of the Government of Mali for analysis of the impact of alternative policy options and use of technology to enhance food security and ensure protection of natural resources and environment.
- Presentation of methods and results from previous Texas A&M research in Mali and FAO data and management information systems for use in food security assessment and analysis
- Discussion by workshop participants to enhance understanding and to identify potential applications of the assessment methodology
- Enrichment of the design of the pilot studies and agreement on the roles and contributions of national and regional collaborators.

International Programmes and Agreements Monitored and Supported by FAO

A series of related international programs, to which most developing countries are signatories, is actively supported by FAO through monitoring and other support functions. These monitoring and mapping systems offer major opportunity to evaluate the utility and make significant use of the Texas A&M models at multiple levels of scale. The following are the major conventions considered in these studies:

1 The Food Insecurity and Vulnerability Information Mapping System (FIVIMS)

consists of national and global systems for tracking progress towards meeting the goals of the World Food Summit.

2 The Global Terrestrial Observing System (GTOS) is part of a broader network of observing systems charged to monitor and evaluate the status and use of natural resources related to food, agriculture, and the environment. The Secretariat is located in FAO Headquarters.

3 The UN Convention to Combat Desertification (CCD) This convention is particularly active in Mali and West Africa because of the large fluctuations in climate and resulting risk to fragile environments and vulnerable populations. Mali just completed the National Action Plan (NAP) for the CCD with a donor meeting in May 99. The methodology proposed in this pilot study is particularly interesting for the CCD programme first as it could become a tool for the NAP of the GOM and also because it could be proposed as a test exercise for the design of a new initiative called the Overall assessment of desertification (OA) under discussion by FAO at the request of the CCD UN Secretariat. The CCD Interdepartmental-working group on desertification, which is facilitating an FAO CCD programme, agreed to become a partner of the pilot project within its support to both the NAP and the OA.

Taken together, FIVIMS, GTOS, and CCD activities are facilitating the development and enhancement of national systems for monitoring the status of food security and vulnerability, the status of natural resources related to food production, and the progress towards achieving the stated objectives of the several international conventions and treaties to which most countries are committed.

FIVIMS, GTOS, and CCD recognise the necessity for national and regional programs and count on the information contained in these programs to develop an improved estimate of the global status of food security and natural resource use. One of the intended contributions of the Co-Sponsors of FIVIMS, GTOS, and CCD is to help improve such national systems through collaboration with selected countries as they build or enhance their capacity to address the key issues. Most countries have some level of data information systems related to these issues. But, they have limited capacity to conduct meaningful quantitative analysis to predict future status or to estimate the consequences of various policy and technology options that can influence future outcomes.

Texas A&M Integrated Suite of Models and Global Decision Support System

Texas A&M suite of linked georeferenced economic, environmental, and biophysical models for Mali are part of a broader effort to develop a global decision support system (GDSS) to holistically assess the impact of changes in technology or policy on food, agriculture and use of natural resources in developing countries.

The GDSS is being developed and adapted for use at levels of scale from farm or household, watershed, sub-national (provincial) to national levels. Methods are developed and refined in collaboration with ultimate decision makers and use relevant real-world assessments as development-demonstration platforms. This approach produces methods tailored to needs of specific users who participate in their development; the case studies also produce early useful products from the analysis.

Given the demonstration of proof of concept of IMPACT models, their utility is being further explored in the Mali FIVIMS Pilot Study. To introduce the way the models will be used, several scenarios were examined assuming the projected population growth for Mali to the year 2015, the anniversary date for the World Food Summit goal of reducing hunger by 50%. Without major intervention or innovation, the projected price of food in 2015 is between 2 and 4 times greater than today, which is clearly not acceptable. The Agricultural Sector Model provides quantitative projections suggesting that a combination of the introduction of new technology, intensification and extensification of production, and adjustment of imports of food, is required to achieve a more sustainable situation for food security in the year 2015.

Outputs of the Texas A&M suite of models will (*inter alia*) provide proxies for indicators that are needed for assessment of future food security – such as quantities and prices of food produced under various policy and technology scenarios. The impact of interventions, which affect sustainable production of food, environmental quality, and land degradation (desertification), are being evaluated using this suite of models.

For more details of the current sets of tools that are actively used in the impact assessment process and development on results, refer to *Volume II – Workshop Proceedings, appendix 6*.

The FAO World Agricultural Information Center (WAICENT)

The Worldwide Agricultural Information Center of FAO (WAICENT) is an ongoing participant in the pilot study. WAICENT has a major role in supporting the FIVIMS Secretariat by providing relevant data bases in an accessible form and methods for assessment of the status of food security and vulnerability at national, regional, and global levels. WAICENT is collaborating with Texas A&M to assess the models and analytic capacity emerging from the development of the global decision support system, using the pilot study in Mali as a “real-world platform” for development and evaluation. The WAICENT databases and the Knowledge Management Information System (KIMS) were demonstrated during the workshop. Information systems on human nutrition are an integral part of this development.

Texas A&M Models: Overview and Results

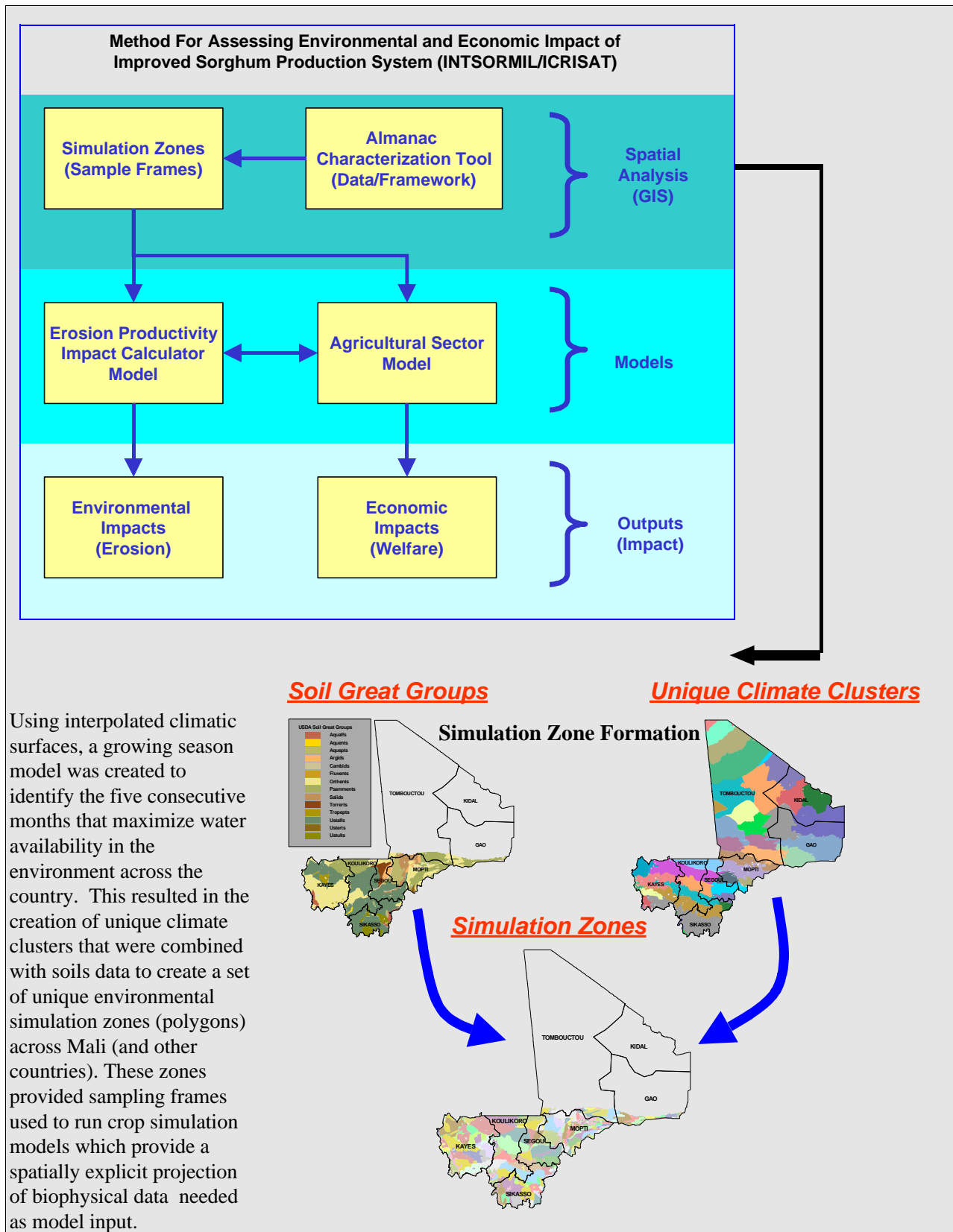
To provide improved methods to assess the impact of introduction and use of technology resulting from USAID investments in agricultural research, a suite of integrated interactive models was created for use in developing countries. Economic, environmental, and biophysical models were developed to provide a holistic evaluation of the impact of new technology or policy options.

The Almanac Characterization Tool (ACT) is a GIS-based analytical tool with the capacity for organizing, accessing, and interacting relevant natural resource, land use, and weather information (*inter alia*). An ACT for Mali was developed and used to provide input to models, and to organize model outputs in a spatially coherent manner. Interpolated climatic surfaces were combined with soils data to create a set of unique environmental simulation zones across Mali (and other countries). These zones provided sampling frames used to run crop simulation models which provide a spatially explicit projection of biophysical data needed as model input. These models are then used for estimating the economic and environmental consequences of use of the new sorghum production system across the country with current and new production systems. This method is particularly important in situations where reported or observed data on crop performance are limited or absent. In these cases, crop simulation models are used to estimate values for missing data. Looking ahead, the approach allows one to define areas of “geographic equivalence” which estimate the performance of the new technology where experimental data do not yet exist. In turn, one can estimate the economic and environmental impact of new technology in these areas.

National and regional agricultural sector models were developed for Mali. The models represent the major commodities produced in the country. In the agricultural sector model (ASM), social welfare is maximized when supply and demand functions are in equilibrium. The model generates estimates of prices and quantities of agricultural commodities, input use, crop mixes, and consumer and producer economic surpluses. Comparison of current practices and adoption of the new technology provides an estimate of the economic impact of the new technology at regional and national levels. Farm level models were also developed and evaluated using the same sorghum production system technology. Farm models provide more specific estimates of the impact of new technology by modeling households and estimating the future impact of new technology on the economic health of the enterprise.

The Erosion Productivity Impact Calculator (EPIC), which was used for crop simulations, also provides an estimate of environmental impacts of cropping systems. It was used to compare the environmental impact of the current and new sorghum production system with a focus in this initial study on water runoff and soil erosion.

The results of development and evaluation of the suite of models in IMPACT provided proof of concept of the ability to use this new holistic approach to assessment of the impact of new technology or policy options. The results may be used broadly by developing countries, donors and research organizations to evaluate options, set priorities, and estimate outcomes.

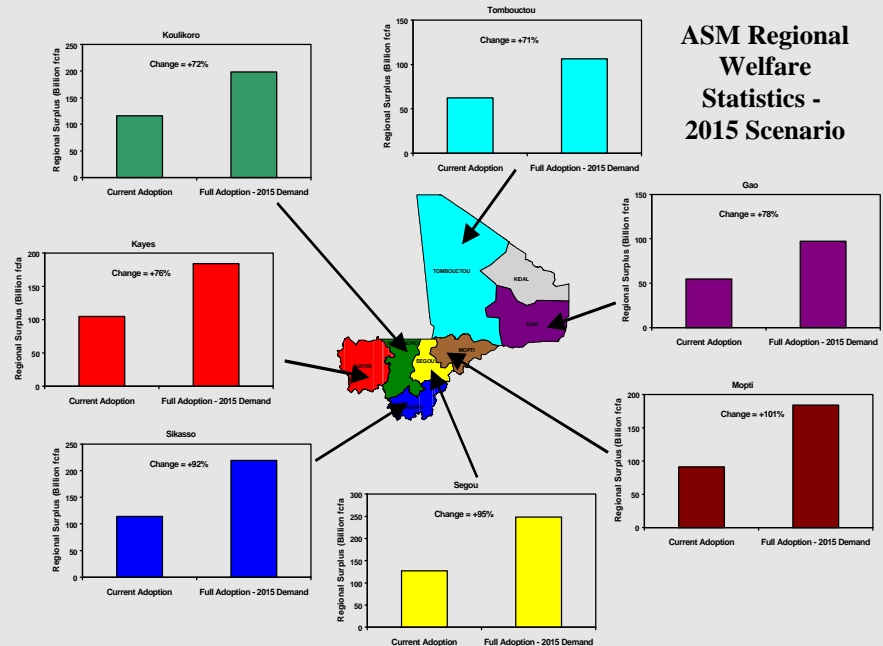


The Agricultural Sector

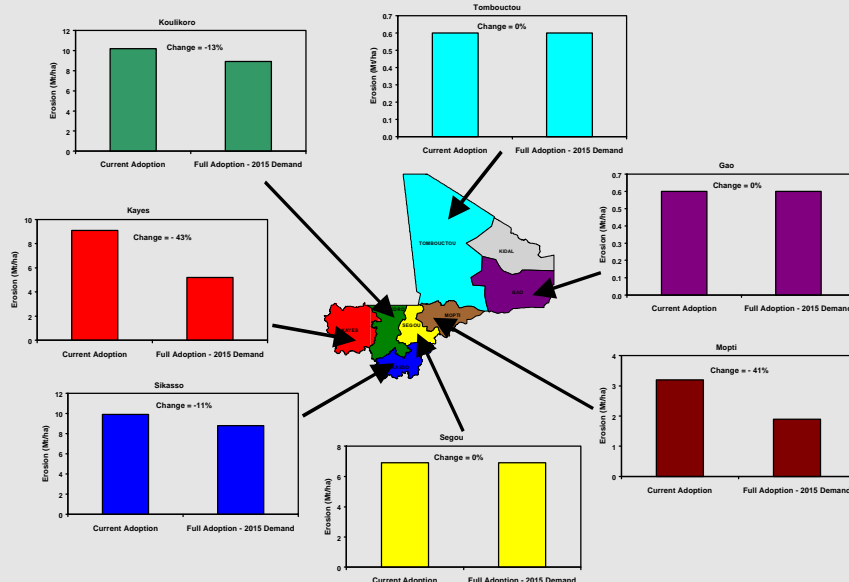
Model (ASM) was used to estimate the economic consequences of adopting the new sorghum production system. It assumes an ultimate adoption rate of between 20 and 30% among regions of Mali.

Demand is based on estimates of population growth in the year 2015 (World Food Summit target date) for the various regions of Mopti. The Mali ASM includes a new stochastic component that allows for modeling of risk at the household level. Total benefits include both producer and consumer benefits. The regional benefits of adopting the new sorghum technology

are greater by between 40 and 100% compared to current technology. This is one of the several outputs of the ASM shown to illustrate the products from the model. The annual total national welfare associated with adoption of the technology for all of Mali in this scenario is estimated to be FCFA 635 billion in the year 2015.



EPIC Soil Erosion Estimates - 2015



The EPIC model was run with 20 year simulations for all the simulation zones. The results include a comparison of runoff and soil erosion between current practices and the new sorghum production system. There were no significant differences in runoff between current and new practices across regions.

However, in all cases, the model predicts a reduction in erosion using the new production system ranging from 1-3% in the Segou region to 30-43% in Kayes. The reduction is attributed to faster development of canopy cover and increased biomass exhibited with the new system. This is due both to the improved germplasm and

the increased use of fertilizer. Thus, the EPIC outputs suggest that the economic benefits are accompanied by positive environmental consequences through reduction in soil erosion. Other environmental factors seem to be unchanged between the current and new systems.

Planning and Institutional Relationships

Research and development are jointly conducted by Texas A&M, IER, the GOM, and FAO. Since the GOM is a member of CILSS, INSAH is also a collaborative partner at both national and regional levels. The INSAH major program on Agro-Socio-Economic Research (AGROSOC) has operational objectives with main activities that will directly benefit from the assessment methods developed being developed by SANREM and FAO in these pilot studies, including the goal of applying lessons learned in Mali to other member States of CILSS. INSAH therefore agreed to host the planning workshop and participate in the ongoing pilot study. This is an activity encompassing four years for full development.

First Draft Action Plan: Texas A&M and FAO started by developing concept papers describing the proposed activity. Decision-makers in the GOM and the national research organization contributed to and supported development of a plan of action and a planning workshop in Mali to launch the study. USAID's global, regional and mission level managers endorsed the Mali FIVIMS-GOOS Pilot Study. Following discussions with government officials, sponsors, and national collaborators, the action plan was prepared for discussion with FAO colleagues.

Second Draft Action Plan: FAO and Texas A&M used draft one of the action plan as a basis for further defining the separate and joint efforts of the two institutions in the Mali Pilot Study. This was done with FAO colleagues in a workshop conducted in July 1999 where commitments to the collaboration and suggestions on content of the paper were received. The product of the workshop is this second draft to be discussed with national partners and customers.

Coordination Meeting: The second draft of the plan of action was discussed with national and regional participants in the pilot study August 14-20, 1999, where revisions were made and there was confirmation of their support for the pilot study and co-sponsorship of the planning workshop which initiates the process. These meetings resulted in further changes and final commitments from GOM officials and others to proceed with the pilot study December 7-9, 1999.

Planning Workshop in Mali: The planning workshop, with which this report deals, was held in Bamako in December 7-9, 1999, jointly sponsored by several government agencies in the GOM and donor agencies and conducted by FAO-WAICENT, Texas A&M, INSAH, and the Mali Institute of Rural Economy. The product of this workshop was the definitive detailed action plan for research and the terms of reference for each of the collaborators.

Second Planning and Evaluation Workshop: A second planning and evaluation workshop will be held in the late Spring of 2000 involving all stake holders to determine the changes needed in the suite of models initially used and to define specific impact assessments to be undertaken in subsequent studies.

Advisory Committee: An advisory committee consisting of representatives of key offices in the GOM and regionally located donors and NGOs will be identified and tasked to provide initial guidance and ongoing evaluation of the project.

National Task Force on Models for Food Security: As a result of the workshop, a national task force is being established to bring together those involved in Mali in the development and use of models for assessment of status and planning on interventions in food security. This group will develop ongoing internal communication and will advise and evaluate the pilot study.

Workshop Results and Conclusions

The Planning workshop was held at the Palais des Congres in Bamako, Mali from 7 to 9 December 1999. The agenda for the workshop is found in *appendix 1*. Between 30 to 40 participants were presents for the technical sessions as well as the decision-makers session. The first two and a half days were targeted toward key operators and managers that will use the methodology being developed and evaluated in the pilot study. The last half-day was directed toward policy makers in the government, national research institute leadership, regional institutions, and potential donors. It provided an overview of the workshop and the conclusions reached in the first two days. In the first two and a half days, about 70% of the time was used for more or less formal presentations; 30% for discussion and feedback.

Dr. Idriss Alfarouk, Director General of INSAH, opened the workshop by a welcome address while Dr. Mamadou Goita, General Secretary of MDRE, made the opening comments. Then, to refine the targets and scope of proposed studies, national and regional partners in the pilot study were asked to discuss their needs for analysis and assessment in these areas. The Texas A&M models were then presented and their use discussed. Results from analysis of the impact of sorghum technology on Malian economy and environment were presented as a case study to illustrate the utility of the suite of models. National and regional partners were asked to discuss the utility of these systems and to recommend ways in which their utility can be enhanced. In a second session, the utility of the model for analysis of food security scenarios was demonstrated and results discussed. Details of these presentations are contained in volume two of this report. Workshop participants included a small

cadre of advisors enlisted to participate in and ongoing evaluation of results and design of modification of products as the pilot study proceeds.

Twenty five presentations from International, Regional and national institutions and produced were presented. The workshop produced very intensive discussions and effective recommendations from which main points are summarized below. Details of these presentations are found in Volume 2 of the report which contains the workshop proceedings.

Technical Workshop - Main Points of Discussion

1. After one day and a half days mainly devoted to presentations from National, Regional and International Institutions, the participants agreed to the importance of developing Methods and Models to improve the assessment on the Status and Estimate of the Economic and Environmental impact of Options to Enhance Food Security.
2. It was agreed that a major focus of the use of the models is to provide to Decision-Makers better methods and tools to address new technology and policy options that meet the goal of the World Food Summit in 2015 and the Convention to Combat Desertification.
3. To reach this objective, the participants recognized the need to develop national capabilities in modeling at different levels of decision-making including government, research, university, non-governmental organizations, private sector and community based organizations.
4. An institutional coordination unit for modeling, later referred to as the National Task Force on Models for Food Security was recommended to harmonize and diffuse national modeling efforts and results.
5. To optimize the diffusion and integration of models, the participants recognized the need to develop model interfaces for easy use and greater impact among users.
6. Regional organizations such as INSAH and AGRHYMET should be involved at the outset in the Mali Pilot Study to ensure a successful transfer of knowledge and capability to other CILSS countries. Also, involvement of other countries with specific interests should be invited at an early stage of development in the Mali pilot study.

In order to meet these objectives, the Planning Workshop concluded that the main issues to consider are:

%Data Collection

- 1 Reliability of models depends on the reliability of the data. It is necessary to develop, acquire, and integrate reliable and updated data showing sources. Data available at the national and subnational levels should be promoted.
- 2 At the same time, modeling researchers should identify information needs and missing data that would provide essential variables for further analysis and help to develop surveys methodologies.

The participants agreed on the importance of data base development and harmonization. They recommended support of the Integrated National System for Agricultural Statistics (INSAS) and take advantage of two key surveys to be conducted in the year 2000: an Agricultural Census and a Dietary and Health Status of the population to improve Malian Institutional Information System capacity.

Participants agreed on the need for a natural resource inventory, using high-resolution aerial videography, remote sensing with spatial interpolation and improved data integration.

- 3 Improvement should be made on data distribution and access. Data should be accessible at the lowest cost for the different categories of users.

%Data Analysis

1. Food Insecurity and Natural Resource Management should be considered in an integrated and multi-disciplinary manner and in conformity with the specific issues of the country.
2. Rural population dynamics are most often linked to problems arising from climate changes, environmental degradation and resource depletion in Mali. Farmers' risk assessment is a strong component affecting technology adoption, production and marketing strategy. Lack of adequate water resources and variability of rainfall is the dominant limiting factor in food production in Mali. Future strategies should be oriented to reducing crop failure in high yielding crops, degradation of natural resources, depletion of nutrients, and pollution.

3. Economic models should reflect cross-border exchange, flow issues, and actions should be taken to substitute or collect missing data on informal markets.
4. Model development should proceed from a clear analysis of eco-systems and livelihood systems interactions. Environmental variables should be linked to socio-economic and human nutrition variables in a spatial georeferenced framework to allow spatial analysis, indicators identification and better information diffusion.

%Scale / Time Issues

1. Analyses and results should be useful at different spatial and time scales.
2. Historical analyses should provide trends and a basis to establish scenarios.
3. Methodologies and tools should address national, sub-regional, local and farm level issues. This reflects the different categories of decision-makers and users.

%Modeling Process – Participatory Approach

1. The participants agreed on the importance of clear definition of goals and procedure in a multi disciplinary operational environment.
2. Model development should proceed from a participatory approach, including all categories of decision-makers at all steps of development. This includes government decision-makers, researchers, regional institutions and NGOs.
3. They could form an informal group of experts to meet and work on a regular basis to assess models and results. An informal modeling seminar can be organized once a year to exchange knowledge and modeling effort between scientists and to avoid duplication.

%Capacity - Building

1. The participants recognized the need to develop and enhance modeling capability at regional and national levels.

2. Capacity building should be done to ensure the sustainable use and recognition of the suite of models. Approaches include collaborative research, short/long term training, graduate students and technical workshops.

%Information Dissemination and Diffusion

1. The participants recognized the importance of developing methods and tools and presenting outputs from the complex set of models in a simple, understandable, and attractive manner to meet the needs of the different categories of Decision-Makers and users.
2. The participants recognized the need to develop model interfaces that provides Decision-Makers and Users with an easy and user- friendly access to outputs.
3. In accordance with the interests of each category of users, from national to farm level, products need to be well targeted and adapted to the different information infrastructure capabilities. This means using different diffusion and communication techniques, such as Web page, CD-ROMs, bulletins, workshop, and radio.
4. To strengthen technical and institutional exchange and information dissemination, networks among decision-makers and users should be established and reinforced.

Decision Makers Session: Discussion and Recommendations

Decision Makers Discussions

Representatives at the level of Permanent Secretary and Senior Administration participated along with others in this session. The Office of the Presidency, Ministry of Rural Development and Water, and Ministry of Environment were represented along with the Director General of IER and INSAH.

Dr. Bino Teme, Scientific Director of IER summarized the discussion and recommendations from the technical group. He noted that the workshop had dealt with 25 presentations, with national and regional participants as well as international inputs from FAO and Texas A&M. He reported the technical discussions of the Texas A&M models and noted the importance of dealing concurrently with issues affecting food security and natural resource

management. He said that the agenda of this workshop was at the heart of the country and that such models were critical to enhancing the decision making process for future planning. He noted the role of the research community in helping the government make more informed decisions. He recommended the formation of the National Task Force for Models on Food Security.

Director General Dr. Alpha S. Maiga of IER extended congratulations to participants of the workshop for the success of the meeting. He noted the important use of models in better ex ante planning. He stressed the importance of ensuring that working assumptions are clear defined, pragmatic, and connected to reality. He hopes that the models will move past prices and quantities and deal with ways to reduce production costs and help find ways to increase the viability of currently non-competitive agriculture in the country. He noted the importance of dealing with risk in the models- variability associated with rainfall, crop failure in high yielding crops, degradation of natural resources, depletion of nutrients, and pollution. He emphasized the importance of making communications with senior decision makers brief with clear definition of options and their consequences, providing the precise information needed for decision making.

Dr. Lamine Keita of the Office of the Presidency endorsed the comments of Dr. Beno Teme and promised to support the effort at the national level, including a pledge to help find funds to build the capacity of the National Task Force. His office is advisory to decision makers in the GOM but has a facilitatory role in promoting inter-ministerial activities.

Dr. Salif Kanoute, Permanent Secretary of the Ministry of Environment expressed satisfaction with the initiative and emphasized the importance of linking natural resources and environmental consequences to the evaluation of policies of technology to increase food security. He endorsed the utility of these modeling tools, especially their long term importance. He noted that short term fiscal gains may have disastrous long term consequences if environmental issues are not considered. He noted that the results of this workshop have broad implications across the government and pledged the support of the Ministry of Environment to the development and evaluation of the models.

Dr. Mamadou Goita, Permanent Secretary of the Ministry of Rural Development and Water expressed his support for the development and use of the Texas A&M models in his opening address to the workshop. He noted the importance of linking food security and natural resource management and referred to the Celle Planification Statistique as the agency within MDRE with responsibility for agricultural census and management of

information related to food security. He noted the importance of support from IER to decision makers in government at all levels. He congratulated the organizers of the workshop for their initiative and wished them well in the outcome.

Modibo Diarra, Ministry of Health: Noted the importance of linking assessment of status of human nutrition and methods of enhancing it to the models being developed for improving productivity with sustainable use of natural resources.

Dr. David Wilcock, FIVIMS Secretariat, FAO: reiterated comments made in the technical sessions, noting the importance of the World Food Summit commitments made by the GOM. He stressed the importance of an overall management information system that deals broadly with the human nutrition and food availability/accessibility issues. He endorsed the further development and evaluation of the Texas A&M suite of models, noting that this could be an important part of a larger effort on food security in Mali. He noted initial actions had been taken to propose the organization and development of a national FIVIMS for Mali similar to the one being initiated in Senegal. He indicated that the FIVIMS Secretariat would help facilitate the decisions and funding to initiate the Mali FIVIMS. Such an initiative would obviously have major impact on the utility of the models being developed by Texas A&M and its partners.

Dr. Idriss Alfarouk, Director General of INSAH noted that models have been developed and often not well used and stressed the importance of ensuring that appropriate care is given to defining the needs and uses for the products of this research. He noted that lack of credible data is often the most limiting factor in using models in this part of the world. He mentioned the importance of capturing the informal bartering system within and between countries in economic models. He strongly stressed the importance of having the right people in the right places in the decision making process - and the vital importance of capacity building. This pertains to fiscal and human resources and facilities and equipment. He closed by noting the importance of capturing in models the indigenous factors affecting farmers choices as this relates to decisions on adoption of new technology or policy. He expressed thanks to the organizers of the workshop and said that he believes the joint research and development for the pilot study was off to a good start.

Decision Makers Recommendations

The optimal use of models for food security and natural resource management depends on the existence of a broader commitment to action by the Government of Mali to meet its international convention obligations i.e. as a signatory to the World Food Summit, the Convention to Combat Desertification, and several other related international agreements. It is in the context of the broader goals that the models will find utility as a set of decision aids to decision-makers at multiple levels of scale. Recognizing this and to ensure that all objectives mentioned above will be undertaken, Decision Makers made the following recommendations.

- 1 A National Task Force on Models for Food Security, comprised of participants in the technical workshop plus representatives from other relevant parts of the GOM, should be formed to plan and put into operation an overall initiative and coherent strategy to deal with food security and the environment.
- 2 It was clearly recognized in the workshop that the responsibility for this task force and its results are the responsibility of Malians and that regional and international organizations will play a facilitatory role.
3. Members of this group should be experts from relevant regional and national institutions related to Natural Resource Management, Food Security and Health Information Systems.
- 4 The groups should be organized in an international network to allow communication among international, regional and national institutions and to have access to international information networks.

%National Task Force on Models for Food Security

1. The National Task Force on Models for Food Security should be Malian and involve senior decision-makers representatives in government.
2. The National Task Force on Models for Food Security mandate should be to plan and coordinate the overall actions needed for the GOM to address the food security and related environmental issues.

3. The National Task Force on Models for Food Security will ensure that the modeling decision support system is carried as an important assessment and planning tool.
4. To do so, the National Task Force on Models for Food Security should have the mandate to make the inventory and assess existing models and give expert opinion on development to be made in accordance with Mali Rural Schema Director 1999-2000.

%Advisory Committee – Informal Group of Experts

1. The Advisory Committee should involve members with regional knowledge of agriculture, natural resource and sociological factors related thereto and familiar with model construct and their use.
2. The Advisory Committee will advise the scientists conducting the pilot studies and review the results of the first outputs of the models and use their expert opinion to express judgement on such factors as adoption rates in various parts of Mali, and factors that will affect them.
3. The Advisory Committee broader mandate will be to assess the methods and models developed for use in Mali and give expert opinion on outputs and estimates as models development continues.

Workshop Conclusions

Mali FIVIMS Pilot Study Planning Workshop was a highly useful engagement that produced awareness and buy-in among all collaborators and decision-makers in Mali and the region and the valuable inputs on the plan of action for the pilot study.

The workshop provided insight and guidance from decision-makers and generated understanding and relevant discussions by technicians. The workshop provided excellent feedback about general needs for use of models with recognition of their necessity.

Texas A&M recognized the importance of clear definition of goals and procedures in a multi disciplinary operational environment and the need to meet the needs of different decision-makers.

As described in the announcement of the planning workshop, product will be the final plan of action for a pilot study in Mali building on the draft presented at the workshop and the discussion and guidance obtained at this workshop.

Models will be modified to enhance their utility and will be adapted to meet the priorities of the GOM (e.g., food security and desertification) by:

1. The engagement of a technical advisory committee on Mali agriculture
2. The expanded collaboration with scientific colleagues in IER
3. Contacts and tentative agreements to collaborate with CILSS organizations
4. Evaluation in analysis of “real-world” food security related planning scenarios i.e. the opportunities for broadening the engagement on food security to include human nutrition.

An important recognition of the utility of models was the decision made by Malian decision-makers to form a National Task Force on Models for Food Security to help guide and develop ownership of the products of the IER-FAO-Texas A&M effort toward improving food security. The establishment of a National Task Force on Models for Food Security will assure integrated planning and action on the use of models such as the Texas A&M suite in enhanced decision making on food security and on meeting the mandates of the World Food Summit and the Convention to Combat Desertification.

This workshop is the starting point of a process that will led to institutional utility and survival by ongoing participation of national partners in the research and development, workshops and mentoring, and training of key operators.



APPENDICES

Agenda

Planning Workshop

Development and Evaluation of Models and Methods To Improve the Assessment of Status and Estimate the Economic And Environmental Impact of Options to Enhance Food Security

December 7-9, 1999

Palais des Congrès

Bamako, Mali

Tuesday December 7, 1999

9:00 AM Convene Workshop

Chairperson : Dr. Mamadou Goita, General Secretary, MDRE

1. Welcome by Dr. Idriss Alfarouk, Director General of INSAH
2. Opening Comments by Senior Representative of Government of Mali (Dr. Mamadou Goita, General Secretary, MDRE)
 - Agriculture and Natural Resources as a National Planning Initiative (Dr. Lamine Keita, Centre D'Analyse et de Formulation de Politiques de Developpement, Secretariat General de la Prescience de la Republique)
 - Perspectives on Need for Enhanced Assessment Capabilities by Senior Representative of Government of Mali (Dr. Bino Teme, Director Scientific, IER)
 - (1) Food security and vulnerability
 - (2) Environment and natural resources
 - FAO Perspective (Dr. David Wilcock, Director of Food Insecurity and Vulnerability Mapping Information System FIVIMS)
 - Overview, Goals and Results of Workshop (Dr. Neville Clarke, Texas A&M)

10:30 Coffee and Informal Discussion

11:00 Needs of the Government of Mali for analysis of the impact of alternative policy options and use of technology to enhance food security and ensure protection of natural resources and environment.

Chairperson : Mr. Makan Fily Dabo, ME

- **The National System for Integration of Agricultural and Food Security Statistics – SNISA (Mr. Abou Doumbia, CPS)**
- **The National Action Plan Responding to The Convention to Combat Desertification (Dr. Salif Kanoute, Coordinator National Environmental Action Plan)**
- **The Mali Famine Early Warning System (Mr. Salif Sow, National Representative FEWS)**
- **Regional Perspective (Dr. Gaoussou Traore, Director INSAH – AGROSOC, Agro-Socio-Economic Research / PRISAS Programme Regional de Renforcement Institutionnel en Securite Alimentaire au Sahel)**
- **The use of Natural Resource Data in Assessment of Food Security (Mr. Djaby Bakary, AGRHYMET)**
- **Discussion**

13:00 Lunch and Informal Discussion

14:30 Texas A&M Decision Support System: Models and Results

Chairperson : Dr. Neville Clarke, Texas A&M

- **Overview and Purpose (Dr. Neville Clarke, Texas A&M)**
- **Geographic Overview of Mali (Dr. John Corbett, Texas A&M)**
- **Development of the Mali Agricultural Sector Model and Assessment of the Impact of INTSORMIL CRSP Production System (Dr. Bobby Eddleman, Texas A&M)**
- **Discussion**

17:30 Recess

Wednesday December 8, 1999

8:30 Texas A&M Decision Support System: Models and Results (suite)

Chairperson : Dr. Neville Clarke, Texas A&M

- **Farm-Household Level Models and Their Use in Assessing the Impact of INTSORMIL CRSP Production System in Mali (Mr. Harvey Hill, Texas A&M)**
- **Methods and Data Bases for Spatially Explicit Analysis to estimate the Impact of INTSORMIL Technology in Mali, Senegal, and Burkina Faso (Dr. John Corbett, Texas A&M)**
- **Methods For and Results of Impact Assessment at Farm and National Levels of INTSORMIL in Senegal and Burkina Faso (Mr. Harvey Hill and Dr. Bobby Eddleman, Texas A&M)**
- **Preliminary Analysis for Environmental Impact Assessment in Mali and West Africa (Dr. Jerry Stuth, Texas A&M)**
- **Discussion**

10:00 Coffee and Informal Discussion

10:30 FAO-Worldwide Information System (WAICENT)

Chairperson : Dr. David Wilcock, Director of Food Insecurity and Vulnerability Mapping Information System FIVIMS

- **FAO Data Bases and Information (Dr. Cristina Petracchi, WAICENT-FAO)**
- **Relationship to Mali -FIVIMS- GTOS (Dr. David Wilcock, FIVIMS-FAO)**
- **Discussion**

12:30 Lunch and Informal Discussion

14:00 Plan of Action for The Mali FIVIMS-GTOS Pilot Studies

Chairperson : Dr. Neville Clarke, Texas A&M

- **Synopsis of Draft Plan of Action (Dr. Neville Clarke, Texas A&M)**
- **Results of Initial Sector Models Runs on Basic Scenarios (Dr. Bobby Eddleman, Texas A&M)**
- **Questions and Discussion**

15:30 Coffee and Informal Discussion

16:00 Synthesis of Needs of the Government of Mali and the Draft Action Plan -- Group Discussion

Chairperson : Dr. Bino Teme, Scientific Director, IER

- **Crop Modeling at LaboSEP (IER) : Overview of ongoing and forthcoming activities (Mr. Sibiri Traore, SEP - IER)**
- **Review and informal discussion of needs for decision support systems and data bases for food security and environmental planning in Mali**
- **Enriching the plan of action to improve utility by the Government of Mali**
- **Contributions and collaboration by Malian and Regional institutions**

17:30 Recess

Thursday December 9, 1999

8:30 Discussion Leading to Summary and Consensus Statement

9:30 Coordination Meeting with Pilot Study Collaborators

Chairperson : Dr. Bino Teme, Scientific Director, IER

- **Review of separate and joint responsibilities**
- **Schedule of related events**

- **Commitments for action**
- **First Thoughts on the Second Workshop**

10:30 Coffee and Informal Discussion

11:00 Review of Summary Statement

- **Conclusions from the preceding sessions**

11:45 Concluding Remarks and Adjournment (Dr. Bino Teme, Scientific Director IER)

12:00 Lunch and Informal Discussion

13:00 Senior Decision Makers Session

Chairperson : Dr. Gaousou Traore, Director INSAH – AGROSOC

- **Purpose (Dr. Gaoussou Traore, INSAH -Director Agro-Socio-Economic Research)**
- **Summary of Models and Results Relative to Decision Making on Status and Options to Enhance Food Security (Dr. Neville Clarke and Dr. Bobby Eddleman, Texas A&M)**
- **Needs for and Use of Texas A&M Models By the Government of Mali : Conclusions of Workshop (Dr. Alpha S. Maiga, Director General IER and Dr. Bino Teme, Scientific Director IER)**
- **Discussion by Senior Decision Makers**
- **Examples of High Priority Issues for Potential Assessment**
- **The Way Ahead**

15:00 Overview of Goals and Approaches for the Mali FIVIMS - FAO Perspective (Dr. David Wilcock, Director of Food Insecurity and Vulnerability Mapping Information System FIVIMS)

**15:45 Concluding Remarks and Adjournment (Dr. Idriss Alfarouk,
Director General INSAH)**

19:00 Reception at Akwaba Restaurant

Appendix 2

Contacts Participants

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