

Findings and Recommendations

New Mexico State University Project Team Report
(Second Draft)

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General Objective:

The general objective of this analysis is to evaluate how the Faculty of Agriculture (FOA) of the University of Sana'a (UOS) can assist in increasing incomes to small farmers and contribute to improved standards of living in rural communities.

General Findings:

1. The FOA houses 72 Professors, 19 of them with PhDs from U.S. universities, about 5 with PhDs from Western European Universities, and the remaining 48 with PhDs from Egypt, Iraq and the former Soviet Union. Although all professors have been trained at the PhD level, many could benefit from targeted training to refresh and upgrade their scientific and technical knowledge.
2. The FOA had adequate laboratory and experimental farm facilities and equipment ten years ago, but they have since lacked funds to maintain and update them as needed. They have no operational funds for research or extension activities.
3. As a result, the faculty's current focus is on teaching, with very little involvement on research or extension activities. However, they appear eager to develop or assist applied research and extension programs if provided with the necessary resources.
4. With some additional training, scientific/technical backstopping, basic equipment, and operational expenses the faculty would be well positioned to assist in the task of increasing agricultural productivity and income in Yemen's rural areas.
5. There are opportunities for small farmers to significantly increase their incomes by adopting better farming practices, changing choice of crops and improving their marketing of farm products.
6. Currently, - unlike in the U.S. - the responsibility for direct public assistance to small farmers lies with the Extension Service, which is administratively under the Ministry of Agriculture and Irrigation (MAI).
7. The Extension Service has a large number of employees with centers and agents scattered throughout most rural areas where they can be in contact with farmers.
8. Delivery of expertise and information available at the various departments in the FOA to small farmers must involve the Extension Service as (unlike in the U.S.) the faculty does not have extension personnel in the field.
9. Currently, the FOA, the Extension Service, and the MAI-AREA (Agricultural Research and Extension Authority) research stations do not coordinate any of their activities.
10. Although the Extension Service has an adequate number of personnel, operating funds are extremely scarce. It has little or no money for extension equipment purchases and maintenance, travel, the development and reproduction of training/ information materials, and other basic extension program resources.
11. Extension agents also lack training on extension methods and have insufficient knowledge and little technical backstopping to help farmers deal with their main agronomic and pest problems.
12. Agribusiness professionals are needed to help develop a more "commercial" agricultural sector. The FOA is currently unable to provide specialized training in this field of Agricultural Economics.

Principal Conclusion:

The lack of involvement of the FOA of the UOS on applied problem-solving research and extension backstopping activities implies that most of Yemen's best-trained agricultural experts are not directly contributing to the development of this country's agricultural sector. Therefore, USAID assistance to The UOS and to the MAI should be structured in such a way that it promotes cooperation between the FOA and the Extension Service on problem-solving research and extension initiatives.

Providing operational funding for specific cooperative projects could produce short-term impacts but would not contribute to the formation of an integrated adequately funded research-extension system (such as the U.S. Land Grant system) that is needed for the sustainable long-term development of Yemen's agricultural sector.

Therefore, in addition to the funding short-term projects, there is a need to devise and implement a strategy to provide the FOA with additional training, scientific/technical backstopping, basic equipment, and a sustained source of operational resources that is contingent on cooperation with the AREA and/or the Extension Service to achieve relevant research and extension outputs.

The information and rationale leading to this conclusion and to the following three main recommendations is presented in more detail in Appendix A.

Recommendations:

1. To strengthen the organizational and technical capabilities of the FOA so that it can effectively participate in an integrated research-extension system that will support the long-term development of Yemen's agricultural sector.

To accomplish this first objective, we recommend to continue with the implementation of the IALC/NMSU proposal (see appendix), expanded to include the possibility of "refresher" and "updating" training of faculty members in several other agricultural fields rather than focusing only on agricultural economics and agribusiness. Most of the other activities envisioned in the initial IALC/NMSU proposal, such as training and support on institutional/ organizational and administrative development, are also in agreement with this first objective and with the needs and priorities of the FOA.

Given the importance of promoting agribusiness growth and supporting the small holder – agribusiness interest linkages described in Appendix A, we recommend that the graduate-level training envisioned in the IALC/NMSU proposal is focused on Food and Agribusiness Planning, Management, and Marketing. Because of the scarcity of specialists in this field, this training would have to begin at the Master's level. Some Master's graduates would return to work in Yemen's agricultural sector while others could continue on for a PhD in Food and Agribusiness and come back as UOS faculty so that this university can eventually organize its own educational programs to supply the county's need for this type of professionals.

To strengthen the capability of the FOA to carry out their "Agricultural and Environmental Research and Consultancy Center" initiative (see Appendix A for details), we also recommend that the agreement is expanded to provide training and backstopping in:

- a) Procedures for participatory prioritization of research and extension efforts. These involve all relevant parties (farmers, extension agents, researchers, research administrators, agribusiness

owners, policy planners, etc) in a systematic process of determining research and extension priorities (i.e. which crops to work on, on what ecosystems and farm scales, the most pressing problems, the specific technologies that should be investigated or promoted, etc.)

- b) Participatory problem-solving research strategies and methods, which involve farmers and extension agents in the research process thereby increasing the relevance, adequacy, and the likelihood that the research outputs are useful and eventually adopted by the target farmers.
- c) Extension strategies and methods suitable for technology “transfer” to small farmers, so that UOS faculty can in turn assist MAI extension personnel in their efforts to communicate and convey information to the farmers.
- d) Procedures to conduct feasibility, cost-benefit and risk analyses of agricultural production systems, agribusiness ventures, and environmental and rural development projects, as well as agricultural and food product marketing studies.

We recommend that the above activities are funded by USAID/Washington through the IALC, at a level of at least \$200,000/year for a minimum of three years.

2. To provide operational funding for specific short-term projects that will have an immediate impact on small farmer incomes and rural well being.

Although the FOA is strategizing to develop an eventually self-funded applied research and outreach program through a proposed “Agricultural and Environmental Research and Consultancy Center,” we believe that the kind of research and extension effort needed to launch the development of Yemen’s agricultural and agribusiness sector can not be self-funded through the sale of services to the private sector only. In addition, this would provide an incentive for the FOA to focus on serving the larger farm operations and agribusiness interests that are able to pay for their services.

Therefore, we recommend that USAID/Yemen funds the procurement of essential equipment for problem solving research and extension support as well as operational the resources needed for the FOA to implement priority short-term projects that will have an immediate impact on small farmer incomes and rural well being.

Examples of possible priority projects identified during this visit include:

a) A Soil Fertility Analysis Service Center

Our field visits revealed that most small farmers are not making appropriate use of fertilizers and, therefore, substantial yield and net income gains are possible through improved soil fertility management. The FOA has equipment to do soil fertility analyses but, because of its antiquity, the cost per soil sample analyzed is prohibitive to the point that the equipment is seldom used.

We recommend that USAID/Yemen funds the purchase of state-of-the-art soil fertility analysis equipment and a project to make this service available to small farmers in the priority Governorates. The project could also fund one-time fertilizer “donations” to farmers so that they

can experience the yield and income increases resulting from optimal soil fertility and hopefully adopt this practice.

The state-of-the-art equipment donated by USAID/Yemen would significantly reduce the cost per sample analyzed allowing the FOA to also sell soil fertility analysis services to the private sector through the “Agricultural and Environmental Research and Consultancy Center.”

b) A Pesticide Residue Testing Center

We also identified the need to test food products for pesticide and other chemical residues to protect the public health and for export certification. The Department of Food Technology of the FOA of the UOS is willing and able to lead a food safety testing and certification program, provided some specialized equipment, training and salary funding for technicians.

We recommend that USAID/Yemen funds a project in which the FOA in cooperation with the MAI and the Extension Service develops the capabilities for pesticide and other chemical residue testing, and begins a program of testing regionally representative samples of Yemen’s major food products. This would quickly identify the agricultural products (and their regional origin) which are dangerously contaminated with chemical residues and provide the basis for corrective action. The project could also fund technical assistance to the farmers that are producing contaminated crops to help them resolve this problem.

In addition, the residue testing services could be contracted by agricultural export business through the “Agricultural and Environmental Research and Consultancy Center” to certify that their products are below the internationally allowed levels of chemical contamination.

c) A Pest Problem Diagnostics and Proper Pesticide Use Program

Our field visits revealed that most small farmers are not making appropriate use of chemical pesticides and, therefore, substantial yield, net income, and farmer safety gains are possible through an improved use of pesticides. Specifically, many small farmers are not even using the correct pesticides for the control of the particular pests (insect, plant diseases and weeds) that are most problematic (i.e. yield-reducing) in their crops. In addition, they are applying dangerous chemical pesticides without using even minimal safety and applicator protection measures.

We recommend that USAID/Yemen funds a project to diagnose the main pest problems in the key agricultural crops grown in the target Governorates, to identify the correct pesticides and other pest management practices needed for their control, and to train the farmers on these practices and on the safe application of chemical pesticides. The pest problem diagnostics and proper pesticide use expertise consolidated under this program could also be contracted by the private sector through the “Agricultural and Environmental Research and Consultancy Center.”

d) A Crop Production and Marketing Resource Center

Economic (cost and income) information about alternatives for growing, processing, and marketing crops and livestock is not currently available. Farmers need to know if other crops could be more profitable than the ones they are current growing or if the adoption of

recommended practices would be cost effective. Biological and economic feasibility studies on high value crops for domestic and export markets would be useful as well.

Such information could help increase small farmers' income in at least three ways: 1) motivating them to grow more higher-value crops; 2) showing them the potential economic benefits of adopting improved production practices that increase yields, increase quality, or lower costs; or 3) allowing them to get higher prices through better marketing.

The Yemeni government, international development agencies, and other public and private supporters of agricultural sector projects also need this type of information to make better decisions on programs that have the potential to improve small farmer incomes.

We recommend that USAID/Yemen funds a project to support a cooperative effort between the FOA and the Extension Service to carry out the necessary studies and develop a database containing this information, and to make it readily available to government and other development agencies, extension agents and small farmers. The maintenance and updating of this database should become part of the FOA's long-term research undertakings. This project should also fund the preparation and supplying of video and printed information on improved production practices, high value crop opportunities, improved marketing alternatives, etc.

A successful implementation of the four projects outlined above would require further development and planning; specialized training for UOS and Extension Service personnel; and technical backstopping. Therefore, we recommend that NMSU faculty members assist USAID/Yemen and the FOA of the UOS in developing, monitoring, and evaluating the implementation of these projects; and in the identification and design of additional high-impact projects to be implemented in the future.

3. To provide for a long-term source of funding for problem-solving research and extension oriented projects.

Implementation of recommendation 1 above would institutionally and technically strengthen the FOA so that it can become a leading participant in an integrated problem-solving research and extension system for Yemen. Implementation of recommendation 2 would provide the basic equipment, operational resources, and the specialized training and technical backstopping required for carrying out select cooperative extension-oriented projects that could quickly impact small farmer incomes; i.e. for this system to become operational.

However, past experience suggests that critical applied research and extension activities like those discussed under 2 above would likely stop without external funds. Therefore, our third recommendation is that USAID/Yemen fund the establishment and commit to the monitoring of a long-term external program that would, on a competitive basis, grant the FOA of the UOS, MAI (i.e. the AREA and the Extension Service), and any other public or private sector entity to access operational resources for the implementation of specific high impact projects.

We recommend that this program is launched by conducting participatory "priority setting" workshops to determine the applied research, extension and service priorities at each of the five USAID target governorates. This would provide baseline knowledge for the program "manager(s)" to make more informed project funding decisions.

Subsequently, we envision that the program manager(s), in close consultation with UOS and MAI extension agents, specialists, researchers, and administrators, put out periodical calls for competitive project proposals (CCPP). Some of these could be very specific in nature, to address key needs identified by the program manager(s). Others could be more “open” in scope, so that the program can continuously benefit from the experience and ideas of UOS, MAI, and AREA researchers and extension agents.

As needed, some of the CCPP’s could require collaboration between UOS, MAI and AREA, to promote a more effective utilization of the available human resources. The program manager(s), particularly during the initial stages of implementation, should be given some latitude to fund projects on a non-competitive basis, so as to rapidly achieve a well-defined high priority objective.

In regards to the program administrative structure, we recommend funding for a small management office based in Sana’a, and for significant backstopping from USAID, USDA, and internationally experienced research and extension faculty from U.S. and Middle East universities and research/outreach centers such as ICARDA. We suggest that this backstopping comes mostly in two forms:

- a) A core group of advisors that would help organize and attend the research and extension prioritization workshops, recommend the funding of specific non-competitive projects, provide ideas and guidance for the preparation of the calls for competitive project proposals, review and decide on the funding of the proposals received, monitor and evaluate the progress and outcomes of the projects funded by the program, etc.
- b) Short-term consultants that can be called in to support or carry out specific initiatives beyond the realm of expertise of the core group of program advisors.

Suggestions on how USAID/Yemen could secure the substantial amount of funding required for the establishment of this type of program are provided in Appendix B

APPENDIX A
SUPPORTING INFORMATION AND RATIONALE FOR THE MAIN CONCLUSION
AND RECOMMENDATIONS

The Current Situation of the FOA of the U.O.S:

The Faculty consists of 72 full-time faculty members with PhDs, organized in eight Departments:

Animal Production
Soils and Water
Food Science and Technology
Crop Production
Agricultural Economics, Extension and Rural Sociology
Horticulture
Plant Protection
Rural Development and Extension

Of these 72, 19 hold PhDs from U.S. Universities, three or four hold PhDs from Western-European (mostly British, German and French) Universities. Most others hold PhDs from Egypt and Iraq. Salary levels range from U.S. \$700 to \$900.

Dean Ahmed Hamza El-Yamany is the Head of the Faculty, and there are Associate Deans for Research, Community Outreach (which includes extension linkages), and Academics (i.e. student affairs). A diagram of the administrative structure of the FOA and a listing of all faculty members by Department including their fields of specialization, the universities from which they earned their PhDs and the dates of PhD completion is provided in the appendix.

Team met with all Deans and Department Heads, and with select faculty members (mostly trained in the U.S. and Western Europe). We were very impressed by their enthusiasm and commitment to teaching and research. They all appeared to be well-trained and knowledgeable in their fields of expertise, which are exhaustive (see appendix). They also seemed to be familiar with the situation and problems facing the small farmers in Yemen, and appeared confident about being able to contribute to the solution of some of these problems (more details about this later).

We asked the Dean, in the presence of some of the Department Heads, to rank the Departments according to their level of need for faculty training and development. He indicated that his highest priority would be Agricultural Economics, Extension and Rural Sociology; followed by Horticulture, Crop Production, Plant Protection, and Soils and Water. He indicated that the Agricultural Economics, Extension and Rural Sociology Department is very important to the faculty because it is supposed to lead, integrate and coordinate the outreach and “extension” efforts of the other Departments.

Our brief assessment of the situation of the Agricultural Economics Department revealed that they do not offer or have the expertise needed to offer undergraduate and much less graduate level training in the critical field of food and agribusiness management, which leaves a void in

the array of professional expertise needed for the development of Yemen's agricultural sector. This would be discussed in more detail later.

Infrastructure Situation:

The Faculty is housed in a fairly new complex of buildings built through an USAID-funded project in the late 80's. Office, classroom, and laboratory space is adequate. Labs and some experimental/teaching farm facilities were also built through that project but they are in dire need of refurbishing, maintenance and/or updating. The team was told that the farm facilities were never completed because the project was "suspended" in 1990 with about U.S. \$15 million left unspent.

Student/Teaching Situation:

Current enrollment is about 900 undergraduate and 100 graduate students, with approximately 70% coming from rural areas (i.e. farm families) and 30% from urban environments. This is a very low student/faculty ratio, which is good for students but an inefficient use of public resources. Given that this is by far the premier FOA in Yemen (all other agricultural faculties combined do not enroll more than another 400 students), we believe that this low number of agricultural students would be a severe constraint to the country's future agricultural development.

The Faculty has recognized and analyzed this problem. They believe that their lack of adequate laboratories and farm/field facilities hinders their ability to provide students with the kind of hands-on training needed to make them confident in applying their newly acquired technical knowledge. As a result, too many of their graduates do not end up working in agricultural production. Some are also of the opinion that there is simply not enough employment for university graduates in agricultural sciences.

The Dean of the Faculty indicated that one of the actions that they are planning to undertake in order to alleviate the previously discussed problem, is to go through a process of academic curriculum revision and development (i.e. updating) for all Departments. They expressed the need for expert support to carry out this activity.

Research Situation:

The two main limitations to research by the FOA are:

1. The lack of any funding for operational research expenses. Faculty indicated that the little research they get done is funded by themselves, from their salaries, so that they can achieve promotion within the UOS system. Graduate students also have to fund their thesis research, which results in the selection of a low cost (and often low priority) topic.
2. The lack of research support infrastructure, including access to most recent (post 1990) literature and adequate lab/equipment and farm/field facilities. Many faculty members would also need an updating (or at least "refreshing") of their knowledge base in order to re-engage in relevant and effective research projects.

However, all faculty members interviewed appeared optimistic and eager about the prospect of revitalizing their research programs.

Outreach Situation:

The FOA has been strategizing on how to establish an effective and sustainable (i.e. eventually self-funding) program of community outreach. They have developed a proposal for an “Agricultural and Environmental Research and Consultancy Center” which would include training, consultancy (i.e. technical assistance and problem-solving research when needed), agricultural services (such as soil fertility testing, animal health, pesticide residue analyses, etc.), and environmental evaluation capabilities. The Center’s proposal (see appendix), which includes a request for seed start-up funds, is currently under evaluation by higher UOS authorities.

The Faculty does not envision becoming directly involved in extension activities (i.e. in directly providing technical advice to farmers and agribusiness), but it appears eager and determined to develop effective linkages and programs to support the extension “apparatus” of the Ministry of Agriculture. The expertise needed to design and coordinate the implementation of such programs is supposed to be at the Agricultural Economics, Extension, and Rural Sociology Department. However, the Dean of the Faculty indicated that they are not confident in their knowledge and abilities to work effectively in this area.

The Ministry of Agriculture and Irrigation

The team spent about two days visiting with Ministry of Agriculture (MAI) officials at different levels, including the Chairman of the Northern Area Authority (who oversees the DGs of the Sana’a, Sadah, Hajja and Amran Districts), the DG of the Amran District, two Extension Directors at “block” centers, and two extension agents; and visited the extension center for the Medina-Sala’a area also in the province of Amran. The objective of these visits was to learn enough about the MAI extension system to be able to evaluate possible linkages with the UOS.

We learned that, in the Northern Area Authority, the MAI has 34 extension centers housing approximately 60 extension agents who possess a secondary education specializing in agriculture. These centers are modest non-research facilities. The one we visited included housing for the extension agent and his family, a meeting room, and a meager set of extension pamphlets and flip-posters that have not been updated since 1994. The pamphlets and posters are not available for distribution to farmers, but rather serve as library/instructional materials for the extension agent.

The extension agent was enthusiastic about his work. He stressed the need for training, access to technical backstopping, updated extension materials, transportation, and more effective means of conveying information to farmers. He indicated that sometimes he can make good recommendations to farmers, such as the use of better seed and fertilizer, but they don’t have access to the capital needed to implement them. This observation was validated several times by other extension system contacts, and is consistent with what we have observed in many other developing countries.

The extension agent's salary is about U.S. \$100/month and housing appears insufficient, but we were told that he often receives payment-in-kind from the farmers he serves, which may obviate the need to seek a second job.

Although this is anecdotal information on the basis of one visit and supplementary insights from MAI and UOS officials, it provides key insights that we hope are confirmed in the more extensive ARD assessment of Yemen's Agricultural Sector.

The MAI structure in the Northern Area Authority also includes 10 "block" centers, each of them housing six to eight specialists on relevant agricultural fields. These centers don't conduct research, but provide technical support and backstopping for the extension agents.

Research is conducted by the Agricultural Research and Extension Authority (AREA) at 8 regional stations located throughout Yemen. One of these stations is supposed to serve the four districts in the Northern Area Authority. We were not able to collect enough information to provide a reliable opinion on the amount, quality and relevance of the research conducted in these stations, but the general message from our Northern Authority contacts at all levels was that they have never asked for or received information from the researchers at the AREA station. [Octavio, this contradicts what we heard at the General Seed Multiplication Corporation, where they are involved with both AREA scientists and MAI extension agents.]

Further, the DG of the Amran District stated that "Up until now, the MAI extension system has not faced any problems requiring research." We interpret this statement as either a lack of understanding from the part of the MAI officials about the kind of things that can be accomplished through agricultural research, a lack of confidence on the AREA station's ability to conduct research or simply a lack of communication among the institutions.

Cooperation between the UOS and the MAI

In short, the officials/administrators and personnel of both the UOS and MAI at all levels expressed willingness and desire to cooperate and we believe would agree on the fact that the FOA of the UOS should:

- a) Conduct its own problem-solving research using information and feedback from the MAI extension system to identify and evaluate the results of these research activities.
- b) Support or cooperate on the research taking place at the AREA stations.
- c) Provide training and technical backstopping for the MAI specialists in the "block" centers" and, when needed or most efficient, directly to the extension agents.
- d) Support or cooperate with the AREA researchers and MAI specialists and extension agents in the preparation of the content for extension materials, such as TV and/or radio spots, comprehensive crop production/management guides, and problem-specific pamphlets and flip-posters.

The mechanisms proposed for the accomplishment of the above are discussed in the recommendations section.

Other Relevant Agricultural Sector Issues and Findings

As in most relatively unindustrialized countries, the majority (an estimated 70%) of Yemen's population lives in the countryside producing crops and livestock for self consumption and cash sales for the generation of a modest amount of income that is barely enough to satisfy their basic survival needs. The net income per unit of area can be moderately increased by developing and promoting the use of more biologically and economically efficient crop and livestock production systems. However, given the current prices of agricultural commodities, with the exception of a handful of high-value crops with limited demand which can be met with the production from a few hundred hectares, it is not possible for a farm-family to make a decent living out of one, five, or even ten hectare plots.

If Yemen is to further develop and industrialize, like all other countries before it, the agricultural sector must go through a process of farm-land consolidation so that the families that remain in this sector can increase their standard-of-living in tandem with the rest of the country. If the other economic sectors grow at high-enough rates to provide competitive employment opportunities for a significant segment of the population currently in the agricultural sector, AID needs to help prepare this sector to face a process of farm-land consolidation and increased use of technology.

Such a process is clearly feasible in the flat lands, which represent an estimated 50% of Yemen's arable surface. Large-scale mechanized production would be more difficult in the remaining 50% that is under the terrace structure. However, our limited technical knowledge leads us to believe that, with adequate "small plot" technology (such as the one used in the West Bank terraces) some land consolidation and the resulting production efficiency and family farm income gains could be achieved in the terrace areas.

As it has happened in other countries, this process of land consolidation and use of technology would be accompanied by the growth of a cadre of small, midsize and large agribusinesses that provide technical services to the farmers, facilitate in the marketing of agricultural inputs and raw agricultural products, take charge of processing, value-added activities, coordinate the wholesale and retail marketing of processed foods within the country, and arrange for the export of raw and processed commodities into the international markets. Significant numbers of trained professionals in the fields of agribusiness planning, marketing and management would be needed to support an efficient growth of this agribusiness sub-sector.

Although the majority of the land and agricultural production is currently in the hands of small holders (typical farm size of one hectare), there appears to be an emerging intermediate- and large-scale farming and agribusiness sub-sector. As a result of this sprawling sub-sector, we identified the potential for agricultural production efficiency and income gains for small holders through organized linkages with this sub-sector. Following a "model" that has been successful in several other developing countries, farmers could be organized to receive technical guidance and even loaned input supplies from a major agribusiness that commits to buy their production at a certain price if they meet pre-established quality standards.

We heard several times during our visits that "cooperative" small farmer organizations (mainly for equipment-sharing and marketing purposes) already exist in some parts of the country. The

highly social nature of the Yemenis could facilitate these types of arrangements. The general managers of two of the large agribusiness interests that we visited during our field trips (the Yemen Stores for Fruit, Meat & Trading and the A.T.A.C. group) expressed interest in pursuing such arrangements if they were to be initially facilitated by USAID. Trained professionals in the fields of agribusiness planning, marketing and management would also be very useful for designing and supporting the implementation of these arrangements.

APPENDIX B
ALTERNATIVE STRATEGIES FOR USING PL480 FUNDS
FOR A SUSTAINABLE AGRICULTURAL SECTOR DEVELOPMENT
(BY SCOTT CHRISTENSEN, SENIOR AGRICULTURAL DEVELOPMENT
ADVISOR, USAID/ANE/TS/ENV)

Implementation Strategy Ideas:

1. The lack of operational resources and inadequate framework is a huge problem that has not been overcome by prior efforts and review teams that preceded the present mission. This fact should not stop USAID from taking action; however, since this report must assist the Mission in a logical framework for decision-making, the recommendations should be laid out as a set of possible options, i.e.
 - (a) let the Yemeni government program U.S. assistance funding as they see fit because, hopefully, they will eventually be forced to take actions that will solve their own intractable situation;
 - (b) accept the substitutive effect of injecting U.S. assistance to temporarily solve the lack of operational funding by
 - (i) supporting the Extension Service but dropping any connection to the university because the funding will be programmed by government agencies;
 - (ii) allocating PL480 Section 416(b) resources into MAI only, but complementing this with ESF funds to the UOS in a way that will not compete with the work of the Extension Service;
 - (iii) creating a Competitive Grant Program that will make funds available to high-priority proposals, identifying in the notes to submitters that inter-institutional collaboration and contributions from partners would be strongly considered in awarding grants; thereby creating a real model of research, education, extension and private sector cooperation that will positively affect the restructuring process;
 - (c) condition USAID support by accepting that an immediate reduction in force – from which operational funding could be obtained through restructuring – is politically undesirable at the moment; however, insist that other actions could accomplish the same effect over time, e.g.
 - (i) agree to a hiring freeze to allow attrition in the work force to create a greater amount of operational funds available over time;

- (ii) establish a Trust Fund to which a percentage of the total U.S. contribution (say 20% every year) will be allocated so that at the end of 10 years the Trust Fund will be available to perpetuate the Competitive Grant Program;
- (iii) establish a Trust Fund with 20% allocated from the Government of Yemen instead of as a percentage of the foreign assistance;
- (iv) if available, put a much larger sum of money from the monetized commodities into the Trust Fund this year and lower the fractions in subsequent years when programming is based on a better assessment of needs;
- (v) use a combination of (i), (ii),(iii) and (iv) to more quickly reach a target amount of annual funding needed for a suggested starting date 5 or 10 years from now.

Strategy Recommendations:

1. Conditional support requiring the establishment of an Agricultural Research, Education, Extension and Private Sector Trust Fund.
2. If the Yemenis reject the faster methods including a hiring freeze and matching contribution to the Trust Fund, drop back to the position where only 20% is allocated from the U.S. assistance;
3. If the Yemenis still reject establishment of the Trust Fund then drop back to a model where we accept the fact that U.S. assistance will substitute for Yemeni operational funding; however, a Competitive Grant Program will establish a model of cooperation that will be adopted or institutionalized within the restructuring effort.
4. Next, agree to establish the Competitive Grants Program but allow adequate time to establish it properly and use the first year to fund cooperative projects agreed to through a consultative process by a technical committee of stakeholders.