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**PROGRESS REPORT**

**October 1, 1966 to March 31, 1967**

**Contract AID/ csd 1467**

**Factor Analysis for Accelerating Agricultural Productivity  
in Less Developed Countries**

**To: Project Monitor  
Agricultural and Rural Development Service  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523**

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**Date: March 31, 1967**

### Introduction

1. The work to be described in this and subsequent progress reports is centered in the State of Jalisco, Mexico, with operational headquarters at Eclipse 1543, Jardines del Bosque, Guadalajara. The contract between AID and the International Marketing Institute (IMI) became effective October 1, 1966; field work began in Mexico approximately November 1, 1967.

2. Prior to the signing of the contract between AID and IMI, official letters of welcome were received from the Federal Secretary of Agriculture and Animal Husbandry and from the Governor of the State of Jalisco. These letters expressed recognition of the potential importance, both to Mexico and the world at large, of successful innovation in the attraction of more private capital investment in agriculture.

3. To further facilitate and strengthen the field work in Mexico, as well as to ensure widespread and continuing awareness of the project as one of international character, an affiliation was arranged with the Centro Internacional de Mejoramiento de Maiz y Trigo (CIMMYT) whereby both the project and the Principal Investigator are sponsored by this organization as part of its World Wide program of research and development. CIMMYT was established in 1966 by the Rockefeller and Ford Foundations as an advanced research center focussed on basic and applied problems of crop improvement. Headquarters of CIMMYT are in Mexico City; its Board of Trustees is comprised of distinguished representatives from nine nations: Brazil, Chile, Colombia, Ecuador, India, Mexico, the Philippines, Thailand and the United States. It is through CIMMYT that agricultural sciences competence is being made available to the Principal Investigator of the AID/IMI project.

### The Problem

4. Many who will receive this progress report may not recollect or may not have seen the original statement of the problem being faced. It is reproduced in paragraphs 5 through 12, below, to facilitate understanding of this and subsequent reports.

5. At a significant number of points scattered throughout Africa, Asia and Latin America, improved agricultural practices have been worked out by reputable research agencies which predict major increases in productivity on existing farmland, with traditional crops. These practices generally include a package of inputs integrating the benefits of improved seed, fertilizer, pesticides, proper soil preparation and proper timing. The capital inputs are obtainable at a cost subsumed by the resultant profit. The practices are within the capacity of small farmers to utilize them with but modest additions to their equipment and to their skills.

6. Despite clear-cut and impressive increases in productivity and profit predicted by these new practices, ranging up to fifteen and more times normal yields, and variously relating to corn, wheat, rice millet and other basic foodstuffs, a conspicuous lag is evident in moving these practices into general application. The obvious profitability of the new practices has failed to stimulate the necessary flow of investment capital to bring them to fruition. This is contrary to what has happened in the United States, in Europe, in Japan, and, more recently, in Taiwan and Israel.

7. One major source of capital which has hardly been tapped and which must be made to flow into world agriculture is the private investor who up to now has largely been concerned with commercial, financial and manufacturing enterprise and who collectively controls vast amounts of money, manpower and know-how. It is imperative in the years ahead that these resources be applied to the general attack on world hunger and rural depression, historically led by national and international public and private, non-profit agencies such as U.S.A.I.D., F.A.O., Ford and Rockefeller Foundations, among literally hundreds of others.

8. Of course, there are already hundreds of millions of dollars invested for profit in agriculture around the world, by others than farmers...in plantations, in food processing plants, in marketing organizations and in the manufacture of farm machinery, fertilizer and pesticides. These are important. They lead the way. But they simply are not adequate to meet the capital needs of world agriculture capable of overcoming world hunger and rural poverty.

9. Indeed, it is in the very size of the investment needed in agriculture that the problem arises. When we observe current investment from "off-farm" sources, foreign or domestic, in food related enterprises scattered throughout Africa, Asia and Latin America, the amount of money and its impact on total food supplies or on social and economic development, is small. Because of this, with occasional exceptions, such investment is tolerated even by governments in the midst of revolutionary agrarian reform movements. This is especially true where the companies involved are conspicuously extending supervised credit, training, offering growing numbers of jobs and otherwise make recognized contributions to local and national development.

10. However, when we look to the future and envision the investment of billions of dollars every year, touching the lives of millions of small cultivators and their families and communities, an issue of great political significance emerges. Will this investment be regarded as exploitation? Will it seem like a retreat from agrarian reform and the revolutionary march toward social justice? Can profit and foreign capital be benign forces in the surge toward a better life?

11. To be realistic, it can only be concluded that if the profit potential in improved agriculture around the world is to serve as a catalyst to the large-scale private investment needed, a new kind of institutional form for such investment must be invented. No matter how pressing the problem of hunger, large amounts of private capital coming from others than farmers, often from foreign sources, destined for use on the land, at a profit, will be rejected unless profit and free-enterprise can be made recognizable and believable as revolutionary instruments with which national aspirations can be achieved.

12. The problem, then, is this: within the varying conditions of crop, social and political organization, and the state of technical and economic development which characterize the developing nations, can the obstacles now interfering with the flow of large amounts of private capital into world agriculture be overcome by creating novel institutional forms by means of which a harmony can be found between investor, farmer and national interests?

Procedure and Work Done to Date

13. The work being done is directed to the end of constructing a model investment project, acceptable to the government and the small scale farmers involved, based initially on the introduction of a new practice for growing corn which predicts an increase in productivity per hectare from a base of 1.5 to 2.5 metric tons to roughly 4.5 to 7 metric tons. The task is to work out from the particulars of technical and financial feasibility to the manner in which such a project can actually function as a profit-making corporation in the face of government policy, marketing obstacles, legal restrictions, local customs, the attitudes of potential investors toward the risks, among other factors which are assumed to be critical, not only in Mexico but as well throughout Latin America, Africa and Asia. The conceptual framework of the corporate body envisaged is outlined in an article, Private Investment in World Agriculture, Harvard Business Review, November-December, 1965.

14. Current field work is proceeding along the following lines:

- a. site selection
- b. market analysis
- c. diversification studies
- d. legal and organizational study
- e. study of potential sources of financing in Mexico
- f. study of cultural problems
- g. study of political issues
- h. study of technical resources

Site Selection

15. Twelve possible sites have been examined in detail, all within 125 kilometers (77.5 miles, roughly) of Guadalajara (see map):

Ameca  
Ciudad Guzman  
Cocula  
Jocotepec (Huejatitan and Zapotitan)  
La Barca  
Santa Cruz de las Flores  
San Isidro Mazatepec  
San Martin Hidalgo  
Tepatitlan  
Tlajomulco  
Zapopan  
Zapotlanejo

16. Each of the valleys has been analyzed wholly or in part for area under corn and other crop cultivation; accessibility; water, power and communication facilities; historic yields; use of fertilizer and improved seed; population; some aspects of economic status; land ownership patterns, e.g. percent private owners and percent ejiditarios (members of communities who farm but do not own land made available under the agrarian reform laws of Mexico); and, diversification potential.

17. A decision has been reached based on quantitative and qualitative judgements to concentrate further attention on:

a. the Huejotitan-Zapotitan section of Jacotepec, an area of approximately 6000 hectares (1 hectare=2.5 acres), all under cultivation and controlled 100% by ejiditarios;

b. the valley dominated by Santa Cruz de las Flores which is contiguous to San Isidro Mazatepec, an arable area of roughly 5000 hectares, an undetermined portion of which rests" unused each year and another unmeasured portion of which is subject to immediate land reclamation and fertility improvement, the whole a mixture of about 80% ejiditarios and 20% private owners; and,

c. an area of about 5000 hectares which touches upon both Cocula and San Martin Hidalgo, mostly under cultivation but with a significant yet unmeasured area which is only used every other year, also with 80% ejiditarios.

18. As a first step in a more detailed study of these three sites, plans have been drawn for a test planting of corn in each, for the 1967-68 season. Plantings will begin in Santa Cruz de las Flores in May; in the other two sites in early June. The aim of these plantings is to satisfy ourselves that we can reach the yields predicted, since the original research by the Mexican Department of Agriculture and the Rockefeller Foundation, upon which the new practice is based, was not done on any of the sites in which we are interested. Cost analyses will be made, not only of our practice but, as well, of the practices of the farmers in each area. Precise measurements of yield in the test plots and throughout each valley will also be made.

19. Arrangements for land have been completed. Individual farmers have been contacted (selected for their reputation in the community as both good farmers and honest men) and an option has

been obtained for the use of up to 3 or 4 hectares. The arrangement is this: All inputs will be supplied at no cost to the farmer. The farmer, under supervision, will supply the labor. Once the harvest is measured, it belongs to the farmer to dispose of as he wishes. The farmer is guaranteed against loss by assuring him that if the experimental plot fails or produces less than his yield on the remainder of his land he will be given the additional cash value of the yield so to match the total he might have grossed.

20. The design of the planting tests has been supplied by the staff of CIMMYT. Diamond Chemical de Mexico has volunteered to gather up, place on site and cost out the inputs. The National Seed Company (Productora Nacional de Semillas), which controls the production and sale of all improved hybrid corn seed, through the manager of the Jalisco office, has volunteered to help review past use practice on each site, recommend the best seed and make it available. An agronomist will be taken on to supervise all test plots on a full time basis during the season. He has not been selected at this writing. CIMMYT is screening possibilities. Plan Lerma, a regional land development agency headquartered in Guadaluajara has offered help from its staff but to date a satisfactory candidate has not been put forward. It is hoped to resolve this problem by mid-April.

21. Once the test plantings are under way, each community in each area will be studied in depth to help arrive at a sensitive estimate of the odds of gaining cooperation should the site be chosen for corporate activity. These findings will then be integrated with those from the studies of diversification possibilities, legal issues, and so on, leading to final site selection.

22. It is intended to continue to concentrate attention on the three sites in Jalisco noted above in which the initial profit potential lies in increasing the yield of corn. However, other possible sites, outside of Jalisco, not based on corn, are being called to our attention. As time permits, several of these alternatives will be examined. For example, three projects in the State of Michoacan were visited recently (see map):

a. Patzcuaro - work done by Dr. Harvey Baty, Purdue University, with several ejidos, has clearly demonstrated that

by using water from Lake Patzcuaro, yields of corn can be greatly increased, a second crop of winter wheat can be obtained, and, by applying fertilizer, no land need stand idle, thus doubling the area under cultivation.

b. Cheran - work done by Mr. Max Lathrop, a missionary who has worked with the Tarascan indians in the area for thirty years and who now heads a non-profit technical assistance project in agricultural development called "Servicio Agropecuaria", indicates that year round use of the land is feasible, combining corn with crops such as oats, wheat, legumes for forage, potatoes, or others. Further, this mountainous area seems ideally suited for certain fruits, sheep for meat and fiber and cattle. Over half of the arable land in this region lies idle each year for the lack of financial and administrative resources. The potential increase in cash flow from the land appears very high. According to Mr. Lathrop, the land owners are ready for any type of cooperation.

c. Tacambaro - the main crop in this area is avocado; corn, wheat, peaches, coffee, poultry and meat are also produced. Tacambaro is a unique place in that over the past fifteen years an active group of cooperatives have been formed to market, to provide credit and for other community services such as in the field of construction. There has been a marked increase in income and in productivity throughout the municipality. However, the next major gains in productivity and the introduction of some vertical integration which is clearly called for, demand capital and management resources far beyond the reach of these people. Preliminary discussions with leaders in Tacambaro indicate a complete receptivity to the idea of joint ventures with investors from outside the community.

### Market Analysis

23. Market analysis has been concentrated on corn. In addition, the first stages in an analysis of the general market for foodstuffs in Guadalajara have been started.

24. The primary objective of the study of the corn market is to provide precise and accurate figures upon which to base the cash flow generated by the introduction of a superior corn growing practice and the marketing of the surplus. The initial profitability of the proposed corporation will arise from this source.

Cost figures will be provided by the demonstration plantings to be made this coming season. Income data will be calculated from the results of the market analysis.

25. The field work covering corn marketing has been completed. Data analysis is under way. The final report will be available by May 1, 1967; it will be attached as an Appendix to the second progress report. Cooperating in making this study has been the Marketing Group in the Instituto Jalisciense de Promocion y Estudios Economicos. Copies of the questionnaires used and a description of the method of study will be included in the final report. One comment about the results may be worth noting at this time, namely: the data bear out the results of a preliminary examination made by the Principal Investigator in 1965 and all indications are that market conditions which exist during 1966 - 1967 will remain stable. The basic cause of stability is the government price support program aimed at maximizing the income of the small scale corn farmers throughout the corn belt. This program is now fundamental to the corn economy of Mexico affecting millions of people and is not likely to change in any major way in the foreseeable future.

26. The study of the market for foodstuffs in general, as represented by consumption patterns in Guadalajara, has the objective of defining the possibilities for diversification of the proposed corporate enterprise. As will be noted later in this report, preliminary findings relating to milk, beef and fresh vegetables already are sufficiently intriguing that feasibility studies have been initiated or are being planned covering the production of these items. It should be emphasized that only those foods are being studied which are producable in the area covered by the three valleys noted in paragraph 17, above.

#### Diversification Studies

27. Horizontal (producing more crops than corn) and vertical (processing raw materials on site) diversification are cornerstones in the design of the model investment enterprise under study. Earlier in the study it was thought that diversification would be developed after the new corn practice had been introduced and its economic impact felt. However, the first five months in the field

indicate that it may be profitable, timely and politically astute to integrate the change in corn practice with a diversification investment, at the outset.

28. For example, it has quickly become apparent that there is a serious shortage of milk in the area and that this shortage is a major concern of both the federal and state governments. Considerable study has been made on both small scale and large scale milk projects by Plan Lerma, the Banco Agropecuaria, the Banco Ejidal, the Banco Agricola and the Government of Jalisco, and a few projects have been implemented in the field with credit and some technical assistance. Much more is needed to be done and far more capital and management is going to be required. Because we are interested and because increasingly as our project becomes known people in the different public agencies are becoming interested in us, feasibility data covering milk production tied to corn production have been made available and are being analyzed. In this way, not only are we being led into what seems to be a profitable adjunct to improved corn production practice, but, as well, excellent relationships are being slowly and carefully matured with key local officials of national agencies. These relationships can become important to the success of our venture in various ways, e.g. ensuring political support, facilitating technical staffing, providing entry into sources of financing, among others.

29. To date, a careful review has been made of the feasibility data prepared by Plan Lerma, which, in turn, was derived from work done by the Banco Ejidal and Plan Jalisco (a program sponsored by the Government of Jalisco). The bases of these calculations are now being checked by interviewing among dairying, pasteurizing and marketing interests in Jalisco and in other parts of Mexico. It is also planned to evaluate recommended practice in Mexico against best practice in the U. S. where corn silage is important to milk production. At some point during the next several months, all information will be reduced to a dairying operation scaled to fit the size of the corn operation and the dynamics of the market which delimit the magnitude of the proposed model enterprise.

30. Within the past several weeks, the possibilities for port production, or at least raising pigs, have emerged as another

timely and potentially highly profitable operation, easily integrated with corn and milk. Data from the Banco Ejidal is being made available; as well, data from several large national distributors of mixed feed (La Hacienda, in which International Milling Company, Minneapolis, has a large investment; Api-Aba, which is controlled by Anderson Clayton and Company, Houston) have been offered to support a feasibility study. A detailed study will be made in the months ahead.

31. During March a study of the fresh vegetable market was started. Large tonnages of vegetables are trucked into Guadalajara every day, including a major quantity from long distances since this region of Jalisco produces very little onions, potatoes, tomatoes, carrots and so on. Water for truck gardening is not abundant here but two possibilities will be explored later on this year. One, in two of the valleys under study there are indications of a good supply of underground water. The reality of this will be examined with the help of Plan Lerma (whose major emphasis in regional planning is on the development of surface and underground water for farming) and the regional office of the Secretaria de Recursos Hidraulicos. If water is available, then the economic rationale of making it useable will be developed. Second, there are several nearby lakes, next to some very poor communities and surrounded by land not in profitable use, which might well serve as the location of commercial sized (15 to 20 acres) hydroponics farms. This would be an off-beat approach to food production and community development and, indeed, would probably be wholly separate from the corn-milk-meat enterprise being given primary attention. Still, the idea has exciting possibilities and will be treated seriously if the study of fresh vegetable markets reveals both a need and a price structure capable of supporting such a venture. One site on the shores of Lake Cajititlan, about 40 kilometers (about 25 miles) from Guadalajara has been examined several times. In addition, some data on yields, construction and operating costs have been obtained from Mr. S. R. Robins, Hydroponics Corporation of America, who designed and operated commercial hydroponics farms in Puerto Rico and Aruba.

32. Nothing of consequence has been done relative to meat production except to listen to many opinions that good meat is in short supply. All of the sites being studied contain unused areas, part of which could house corrals for static fattening and other parts which could be cleared and put into improved range. Quite a bit of research has been done demonstrating the feasibility of

land clearing and seeding to selected grasses. One particularly interesting study was made available by the local distributor of the Caterpillar Tractor Company pointing to the profitability of such an approach. The study was prepared by the Southwest Agricultural Research Instituto and submitted to Plan Lerma for implementation. No action has been forthcoming. It is intended to review the implications of the data with the Caterpillar representative in Guadalajara with the idea of adapting the large scale approach ( 200,000 hectares) to a limited area in the valley finally selected for the corn based enterprise.

#### Legal and Organizational Study

33. There is no particular progress to report at this time. Legal counsel has been advised that the realities of land use in Jalisco demand that ejiditarios as well as small scale land owners be embraced by the project. While there is no constitutional obstacle to this, it will, no doubt, add complications to the corporate charter.

#### Study of Potential Sources of Financing in Mexico

34. This study should get under full swing in April. It has been delayed but with no serious effect, by scheduling problems facing the consultant coming to Mexico from the U. S.

35. The Principal Investigator has made contact with a group of Mexican industrialists and businessmen who have formed a private agricultural credit organization called "Serpac".

Serpac is the first manifestation we are aware of anywhere in Latin America of a broad private sector concern for rural poverty. While the impact of Serpac is concentrated at the moment on two communities in the State of Michoacan, plans are to raise more capital and extend the program nationally. Serpac operates at no profit. It raises its funds (approximately 850,000 pesos, with a credit turnover of more than 1 million pesos, in the three years since operations began) by loans made against notes signed by members, through private banks. Officials of Serpac have become interested in the AID/IME project and the whole idea of building enough profit into agricultural development schemes that it becomes possible to attract more private capital and greatly expand impact. Arrangements have been made to present the feasibility results of our study to the Board of Directors of Serpac, when we are ready. This may prove to be one important means through which to attract joint venture capital into the model corporation.

### Study of Cultural Problems

36. One key to success of the proposed corporation is, of course, the willingness of the campesinos to place their land and their practices under management (for those who may have forgotten no land ownership is contemplated in the model or in its adaptations around the world). Cardinal to gaining such cooperation will be financial incentives held out by the corporation, e.g. low cost credit, immediately available credit, cash at harvest among others in addition to the immediate increase in production and gross income. These incentives can not be held out until the corporation is formed and capitalized. Therefore, as a part of feasibility analysis, all that can be done is to study the backgrounds of the people in each valley under consideration, in the attempt to develop the most refined and sensitive estimate of the probability of cooperation.

37. To this end, a first look at the situation which was taken in March by consultants from the International Research Institute (IRI), an affiliate of the American Institutes for Research in the Behavioral Sciences. In preparation for their visit, a search was made to locate all national and international agencies working in Mexico to create change in rural communities. Roughly twenty such organizations were isolated (the number is larger if one includes every church related group; some have such small programs that they have been set aside for the present in our inquiry). During this preliminary examination, a half dozen organizations were contacted for a discussion of their experiences as change agents in rural Mexico; as well, the three valleys in Jalisco were visited, along with visits to four other sites, three in Michoacan, where major changes had taken place or had been attempted in the recent past.

38. The objective of this approach to cultural analysis and the prediction of cooperation is to assess past experience and current opinion, to the end of reducing further study on our part to a minimum. If general experience in Mexico suggests that cooperation, continuity of effort, integrity of relationships, respect for contracts, and so on are readily attainable, given certain conditions, then our research job is only one of determining whether or not these conditions apply in any or all of the valleys in Jalisco in which we might establish the corporation. This is a much simpler task than would be the case if nothing were known and if the conditions for cooperation had to be discovered. Our problem in trying to penetrate cultural issues is to avoid the temptation of elaborating the research to cover all that is unknown and subtle and yet do enough

investigating to feel secure in our estimate of the risk in seeking early and ongoing cooperation.

39. Reaction by the behavioral science team to its first look is being summed up and evaluated in terms of the next step in the inquiry. It is expected that field work will resume late in April.

#### Study of Political Issues

40. This inquiry has been delayed due to scheduling problems facing all three consultants from the U. S. who may be involved. It is hoped to resolve these problems in April. The key issue to be faced is this: agrarian reform and improved agricultural productivity are basic platforms of the Mexican revolution and are the responsibility of a large number of federal and state agencies: those to be helped are dominantly the ejiditario and the pequeno propietario and separate institutions have been created to work in the interests of each; thus, while the IMI project has official blessings both as an internationally oriented experiment and one whose success could be very important to Mexico, how do the political leaders and the heads of the institutions created to achieve the goals of rural prosperity really feel about the role of private investment, particularly foreign private investment. As with the resolution of cultural problems, a study of political issues can not hope to be quantitative. Rather, it is hoped that a perceptive appreciation of the stresses and strains affecting political action can be gained which, in turn, will permit a realistic estimate of the risk and direction of political interference...or the odds of support.

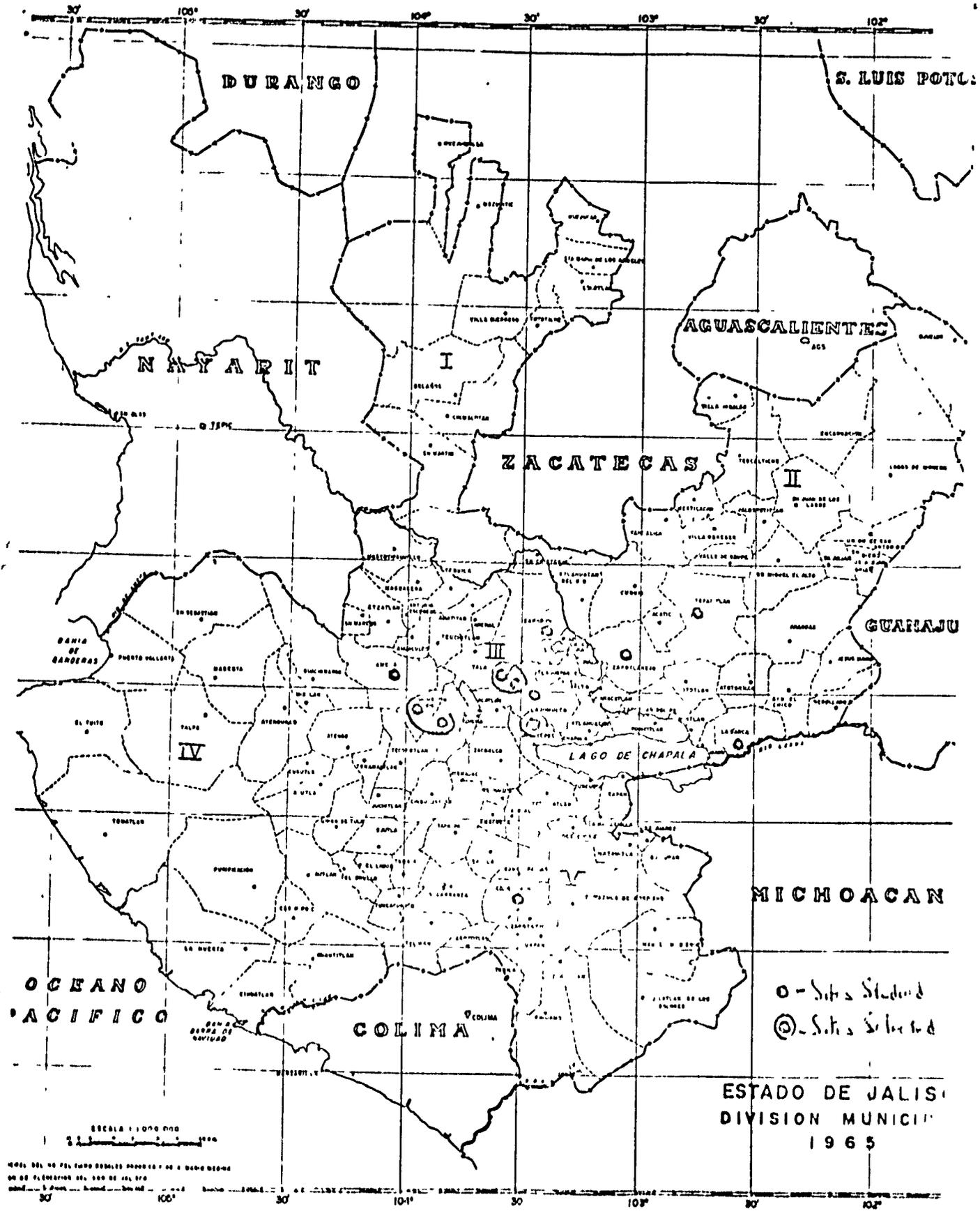
#### Study of Technical Resources

41. In addition to seeking out agencies at work in Mexico which relate closely to community development and the study of changes as a cultural phenomenon, we are attempting to locate all agencies providing technical assistance in the field of agriculture and in the total system of food supply. Over thirty have been identified and it is planned to contact each one to inventory its

field of work, the kind of information and staff available, the magnitude of the enterprise and anything else which during interviewing seems of value in ensuring the success of the INI project. Each such organization is potentially a source of specialized information and expertise to draw upon; each may have ideas for investment projects elsewhere in Mexico than Jalisco; each may be helpful or antagonistic to the extent that we are able to achieve understanding of our goals and how we can support each other.

### Conclusion

42. The original research proposal to AID implied that the method of study leading to the design of a model investment project would involve a non-mathematical systems approach, in which all of the relevant lines of inquiry would be followed simultaneously but with different starting points, in time. Each line of inquiry would, it was argued, draw upon all others, all constantly influencing the direction of each. Constant integration of results and reshaping the plan of study, it was felt, would gradually build a solid structure under the model, until what was built would anticipate every critical demand made upon its functionalism by investors. This method of inquiry is being followed with encouraging results. It will be continued in the months ahead.



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