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Communication for Technology Transfer in Agriculture
(AID/S&T Project 936-5826)

C T T A

ACTIVITY PLAN

for

Identification and Assessment of Stage of Readiness for
Diffusion to Farmers of Agricultural Technologies and
Technology Systems in Selected African Countries

Prepared by:

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Academy for Educational Development

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I. ACTIVITY TITLE

Identification and Assessment of Stage of Readiness for Diffusion of Agricultural Technologies and Technology Systems in Selected African Countries.

II. FUNDING

Funding is provided through a grant from the Small Activities Project of AID/S&T, supplemented with other CTTA Project funds.

III. PRINCIPAL INVESTIGATOR

Howard E. Ray, PhD
CTTA Project Director
Academy for Educational Development

IV. ACTIVITY PURPOSE

To survey agricultural technologies appropriate for farmer-managed systems of mixed farmers in selected African countries that are available from national, international and regional research institutions and programs, but that have not been adopted or are presently underutilized by those farmers. The objective will be to identify and categorize those that are:

1) Ready for diffusion

"Ready" technologies are those that could be adopted immediately and beneficially by farmers within their own constraints and the existing institutional framework. It is presumed that lack of adoption to date is due primarily to lack of information, understanding and/or motivation on the part of the farmers for whom they would be appropriate.

2) Almost ready for diffusion

"Almost ready" technologies are those that have been proven technologically, but that require some additional research to determine local adaptation and/or moderate modifications in institutions, institutional support and/or policies to enable farmers to adopt them beneficially. Technologies placed in this category should be limited to those

for which it is realistic to expect that they can be shifted to the "Ready" category within a period of two to four years.

3) Promising for the future

"Promising" technologies are those that will require substantive additional research and/or institutional modification before they can be adopted and used beneficially by farmers. Technologies in this category include those for which it is unrealistic to expect that they will be ready for widespread diffusion in less than four or five years.

The term "technologies" includes both single technologies and technology systems. For the purposes of the study, a single technology is defined as a specific practice or input into a single enterprise (e.g., control measures for a given pest, an improved crop variety, or seedbed preparation technique). A technology system is defined as multi-component series of interrelated actions, practices, etc. (e.g., a farming system, including mixed livestock/crop systems, alley cropping, the complete production cycle for a given crop).

V. COUNTRIES TO BE SURVEYED

Up to four African countries will be included in the survey. Those presently under consideration include:

Zambia	Senegal
Cameroon	Zimbabwe
Kenya	Niger
Zaire	Malawi

Other countries may also be considered during the country selection process. Final selection will be dependent upon USAID Mission interest.

VI. SURVEY STRUCTURE

A. Team Composition

The survey will be conducted by an interdisciplinary team of three to four senior scientists with extensive African experience selected by the Academy in consultation with the CTTA Project Manager and Co-Managers in the AID/S&T Offices of Education, Rural Development and Agriculture; and the Chief, Agricultural and Rural De-

velopment, AID/AFR/TR/ARD. Collectively, the team will represent expertise and experience in:

Agricultural Communications
Agricultural Research
Agricultural Economics
Social Sciences (sociology/behavioral science)
Agricultural Institutions

It is anticipated that a representative of AID/AFR/TR/ARD will be included on the survey team.

B. Data Collection

Information will be collected and recorded systematically to facilitate comparisons between factors relating to a given technology as well as between technologies, both within and between countries. (See Appendix A, Analytical Framework.)

The stage of readiness for diffusion (as defined in Section IV) to farmers of new or currently underutilized technologies will be assessed on the basis of three critical sets of criteria:

- 1) Agricultural factors (technological viability),
- 2) Socioeconomic factors (economic and risk viability, and farmer orientation),
- 3) Institutional factors (policy and infrastructural adequacy).

An illustrative list of factors to be considered under each of these sets is presented in Appendix A, Section VII.

VII. EXPECTED OUTCOMES

It is expected that the study will, within each country:

- identify and categorize new and presently underutilized technologies generated by national research systems, International Agricultural Research Centers (IARCs), other regional or international institutions and programs, and progressive farmers that have potential for increasing production and/or profits of farmers in specific eco-systems;
- provide information concerning current status of "almost ready" and "promising" technologies that can serve as a

basis for assessing progress over time in moving them to the "ready" stage;

- determine whether the present supply of "ready" technologies appropriate for farmers in a given region is adequate to justify establishment (if requested) of a CTTA communication pilot project in the country; and whether technologies in the pipeline can be realistically expected to sustain an improved communication support program.
- identify technological, institutional and socioeconomic constraints that must be addressed to move "almost ready" and "promising" technologies to the point of being ready for diffusion.
- provide recommendations for improving diffusion of technologies in the ready or almost ready categories.

While in the field, the survey team will make at least preliminary assessments of technologies identified; but it is unrealistic to expect the team to examine all relevant factors and issues adequately. In such cases, issues requiring additional study and analysis will be identified to facilitate future studies.

Results of the survey will provide the basis for later in-depth studies by CTTA of the technologies, farmers and institutions in countries with which CTTA ultimately collaborates. Such investigations are essential to obtaining the information and understandings needed for developing localized, farmer-oriented communication strategies and programs that effectively support extension and other technology transfer programs.

VIII. METHODOLOGY

A. Selection of Countries to be Surveyed

1. AFR/TR/ARD will call selected USAID Missions to explain the activity purpose and approach and to solicit Mission interest in participating in the study.
2. The S&T/ED CTTA Project Manager will follow up by sending the Activity Plan and information on CTTA to Missions that have expressed interest.
3. The final selection of countries to be included will be made by the Principal Investigator in consultation with AFR/TR/ARD

and the S&T Project Manager and Co-Managers.

B. Pre-survey Preparation

1. USAID Missions and national agricultural research programs in the selected countries, IARCs, and U.S. information sources (e.g., AFR/TR/ARD, Devres institutional analysis study, World Bank, INTSORMIL) will be contacted to obtain reports and other documentation relevant to each country concerning:
 - Potentially appropriate, but underutilized, agricultural technologies and technology systems;
 - Input availability situation;
 - Small farmer agriculture--characteristics, constraints, potential;
 - Climate, weather, and ecological zones;
 - Demographic, cultural and social characteristics;
 - Agricultural institutions and general infrastructure;
 - Agricultural policies that impact on technology adoption;
 - National research and extension institutions and systems;
 - Regional and international research programs;
 - National technology diffusion institutions and systems;
 - Major constraints to agricultural development;
 - Higher education in agriculture;
 - Other issues relevant to technology identification and diffusion.

Sets of appropriate documents received will be provided to survey team members for review prior to their departure to the field.

2. The secondary data obtained through the above research will be used to:
 - a) Prepare "country profiles" for the countries to be surveyed (see Appendix A, Sections III and IV).
 - b) Make a preliminary assessment and selection of institutions and locations to be contacted by the survey team in-country (see Appendix A, Section IV).
 - c) Develop a preliminary list of potentially appropriate, but presently underutilized, technologies that should be investigated by the survey team (see Appendix A, Section V).
3. The preliminary list of institutions and locations to be contacted will be referred back to the Missions for review and modification as appropriate, and cooperation of the Missions

will be solicited for arranging survey team in-country schedules and identifying host country counterparts.

4. The survey team will spend approximately three days in Washington for orientation and final planning prior to their departure for Africa.

C. The Survey in the Field

1. The survey will be conducted in collaboration with designated professionals in each country.
2. The survey team will spend a maximum of two weeks in each of the selected countries for data collection, observation and interaction with USAID and Host Country functionaries and farmers. (Missions will be requested to cover all or a portion of travel and related expenses of host country counterparts. If this cannot be arranged, such expenses will be covered by the Activity.)
3. Data and observations will be recorded in a standard format (see Appendix A) to facilitate analysis, cross-site comparisons and report writing.

IX. ANALYSIS AND REPORTING

A. In Country

A preliminary report of results and recommendations will be presented orally, and submitted to the Mission and relevant Host Country professionals before leaving a country.

B. Analyses of Findings

Findings will be largely subjective and interpretive, rather than quantitative; but will be expressed in quantitative terms where appropriate.

C. Comprehensive Report

A comprehensive report of survey findings and recommendations, for which the Field Team Leader and Principal Investigator will have primary responsibility, will be submitted to S&T/ED, S&T/AGR, S&T/RD, AFR/TR/ARD and the cooperating Missions within ninety days of completion of work in the field. The report will be organized approximately as follows:

Executive summary

- I. **Activity description**
- II. **General conclusions and recommendations**
- III. **Lessons learned**
- IV. **Technology identification and assessment in _____.** (Same format for each country)
 - A. **Background and situation**
 - B. **Relevant national, regional and international institutions and programs**
 - C. **Agricultural technology assessment**
 1. **Presently underutilized technologies ready for diffusion**
 2. **Technologies almost ready for diffusion**
 3. **Technologies promising for the future**
 - D. **Issues requiring additional study and analysis**
 1. **Technical**
 2. **Policy**
 3. **Institutional**
 4. **Socioeconomic**
 5. **Other**
 - E. **Conclusions and recommendations**
 1. **Stage of readiness of technologies**
 2. **Improving diffusion process**
 - F. **Appendices**
 1. **Team composition and itinerary**
 2. **Principal contacts**
 3. **Country identification sheet**
 4. **General information**
 5. **Relevant national, regional and international institutions and programs data sheets**
 6. **Agricultural technology assessment data sheets**
 - 7- . **Others as appropriate**

D. Seminar

A one-day seminar, with interdisciplinary participation similar to that in the 8/20/86 Planning Meeting, will be organized to review the report critically in relation to the expected outcomes projected in Section VII (participants will be provided copies for their review in advance of the seminar) before using it in CTTA site development and pilot project implementation activities.

X. FOLLOW-UP

A. Report Distribution

The final report will be distributed broadly to AID Regional Bureaus and S&T, USAID Missions, IARCs, other relevant AID-supported international and regional projects, and the CTTA network of international and domestic projects and institutions.

B. In the CTTA Project

Findings and recommendations will be used in the CTTA site development process for selection of the African countries to be considered for CTTA pilot projects. In the countries selected, they will provide the basis for identification and assessment of the specific technologies to be used in CTTA communication interventions.

XI. PROJECTED IMPLEMENTATION SCHEDULE

A.	Selection of survey team members	1-3/87
B.	Country selection	2-3/87
C.	Pre-survey preparation	2-5/87
D.	Data and information collection in field	6-8/87
E.	Submission of survey report	11/87
F.	Report review seminar	11/87

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C T T A

APPENDIX A

ANALYTICAL FRAMEWORK

for

Identification and Assessment of Stage of Readiness for
Diffusion to Farmers of Agricultural Technologies and
Technology Systems in Selected African Countries

Prepared by:	Dr. Ans Burgett	-	AID/AFR/TR/ARD
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Revised by H. Ray to incorporate additional suggestions received
subsequently from participants in the Planning Meeting for Agri-
cultural Technology Systems Identification for Africa.

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APPENDIX A
ANALYTICAL FRAMEWORK

for

Identification and Assessment of Stage of Readiness for
Diffusion to Farmers of Agricultural Technologies and
Technology Systems in Selected African Countries

The analytical framework for the survey is structured around the following basic sets of elements critical to the identification and determination of stage of readiness for diffusion of appropriate agricultural technologies:

- 1) Agricultural
- 2) Institutional
- 3) Socioeconomic

Approximately one hundred critical agricultural, institutional and socioeconomic elements were identified and assessed in relation to three potentially appropriate technology sets (drought resistant crops, response farming, alley cropping) at a multidisciplinary planning meeting organized by the Academy. The insights and conclusions gained from that discussion, plus additional suggestions received later from meeting participants and others, served as the basis for developing the framework to be used for the survey.

The analytical framework, presented on the pages which follow, is organized into:

- I. General guidelines (p. A-2)
- II. Identification Sheet (p. A-3)
- III. General Information (pp. A-4-6)
- IV. Relevant National, Regional, and International Institutions and Programs (pp. A-7-9)
- V. Agricultural Technology Assessment (pp. A-10-11)
- VI. Summary of Agricultural Technologies identified, by Stage of Readiness Category (pp. A-12-14)
- VII. Illustrative List of Agricultural, Institutional and Socioeconomic Factors to be Considered in Assessing Technologies (pp. A-15-19)

Agricultural Technology Identification and Assessment
Africa

I.

GENERAL GUIDELINES

- A. Assessment and classification of technologies identified must ultimately be farmer-based--what farmers need; what they want; benefits to be derived; practical feasibility; management skills required; risk factors.
- B. Both private and public sector institutions are to be considered with respect to technology generation, constraints to or facilitators of technology adoption, and actual or potential diffusion channels.
- C. Classification of technologies for a given country is to be done on a country- and region-specific basis, although the technologies may not always be indigenous.
- D. Time will not be sufficient to analyze all factors in depth. Therefore, in addition to making preliminary assessments based on available information, it is critically important that issues requiring additional study and analysis be identified.
- E. A collection of plans, reports, documents, organizational charts and other information (referenced as appropriate on the data forms) relevant to the survey in each country is to be assembled for reference during final report preparation.
- F. Factors such as time likely to be required to achieve significant farmer adoption and possibilities for incremental introduction of complex technologies or technology systems are to be considered in developing recommendations for improving diffusion.
- G. The illustrative list of agricultural, institutional and socioeconomic factors to be considered in assessing technologies provides a "checklist" of elements to be considered in assessing the constraints relevant to each potentially appropriate technology identified.

Agricultural Technology Identification and Assessment
Africa

II.

IDENTIFICATION SHEET

Country:

Date of Survey:

Survey Team:

Principal USAID Mission contact(s): (Name and position)

Principal Host Country Institution(s) and Staff Collaborating
in Survey: (Institution, person, address)

In-country locations visited:

Survey Team Leader:

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Africa

III.

GENERAL INFORMATION

(To be developed insofar as possible during pre-survey preparation stage, and compiled in a "country profile" format)

Country: _____

A. Population Data

1. Total population
2. Rural population
3. No. farm families
4. Rate of population growth
 - a. Total
 - b. Rural
5. Rural family size

B. Land Use (Indicate trends)

1. Total area
2. Area under cultivation
3. Range area
4. Forested area
5. Wasteland

C. National Agricultural Production (Indicate trends)

1. Principal crops
 - a. Area
 - b. Production
 - c. Use
2. Livestock
 - a. Class
 - b. Numbers
 - c. Use
3. Forest, including tree crops
 - a. Area
 - b. Production
 - c. Use
4. Fish culture
 - a. Area
 - b. Production
 - c. Use

5. Other
 - a. Area
 - b. Production
 - c. Use

- D. **Ecological zones** (attach map)
(For each ecological zone)
 1. Rainfall
 - a. Annual
 - b. Distribution
 - c. Variability
 2. Temperatures
 - a. Mean minimum and maximum by month
 - b. Variability

- E. **Land characteristics by ecological zone**
 1. Topography
 2. Soils

- F. **Agricultural characteristics by ecological zone**
(Indicate trends as appropriate)
 1. Area under cultivation
 - a. Rainfed
 - b. Irrigated
 2. Farm size distribution
 3. Principal crops
 - a. Area
 - rainfed
 - irrigated
 - b. Planting and harvest periods
 - c. Yield (mean and range)
 - d. Use
 - e. Present and potential economic viability
 - f. Major cropping patterns
 - g. Impact of drought and pests
 4. Principal livestock enterprises
 - a. Class
 - b. Production cycle
 - c. Use
 - d. Present and potential economic viability
 - e. Crop/livestock interactions
 5. Other agricultural enterprises
 6. Major technologies introduced and widely adopted during last five to ten years
 - a. Where adopted and extent of use
 - b. Constraints to their adoption
 - c. Time required to achieve significant adoption
 - d. Persistence of use by farmers

G. Major constraints to agricultural development

1. National
 - a. Technological
 - b. Institutional
 - c. Socioeconomic

2. By ecological zone
 - a. Technological
 - b. Institutional
 - c. Socioeconomic

H. Information sources

Agricultural Technology Identification and Assessment
Africa

IV.

RELEVANT NATIONAL, REGIONAL AND INTERNATIONAL
INSTITUTIONS AND PROGRAMS

(Provisional compilation to be made during pre-survey
preparation stage for verification and amplification
during survey)

Country: _____

A. Agricultural Research Institutions/Programs

1. National (public and private sector)

- a. Name
- b. Affiliation
- c. Location(s)
- d. Facilities
- e. Organizational structure
- f. Areas of research activity
- g. Relevance of research to small and medium farmers
- h. Scientific staff
 - i. Name(s)
 - ii. Position
 - iii. Training and experience
- i. Research technician staff
- j. External donor support (source/amount/purpose)
- k. Method of determining research priorities
- l. Extent of on-farm research
- m. Linkages with other research institutions/programs
- n. Linkages with technology diffusion institutions/programs
- o. Linkages with input and service providers
- p. Major research contributions in last decade

2. Regional (public and private sector)

- a. Name
- b. Affiliation/funding source
- c. Date of establishment
- d. Ongoing or limited duration (estimated termination date in case of latter)
- e. Affiliations with national institutions/programs
- f. Location(s) in-country and elsewhere
- g. Facilities
- h. Areas of research activity

- i. Relevance of research to small and medium farmers in country
- j. Scientific and technician staff
- k. Method of determining research priorities
- l. Extent of on-farm research
- m. Linkages with other regional and international research institutions/programs
- n. Linkages with technology diffusion institutions/programs
- o. Linkages with agrosupport sector (inputs, services, markets)
- p. Major research contributions in last decade relevant to small and medium farmers in country

3. International (public and private sector)

- a. Name
- b. Affiliation/funding source(s)
- c. Date of establishment
- d. Areas of research activity
- e. Relevance of research to small and medium farmers in country
- f. Nature and extent of in-country activity
- g. Linkages and collaboration with national programs (Research, Extension, other)
- h. Linkages with agrosupport firms and institutions operating in country
- i. Methods of determining research priorities
- j. Extent of on-farm research
 - i. in country
 - ii. under similar ecological and farmer conditions
- k. Major research contributions in past decade relevant to country
- l. International networking and diffusion mechanisms and programs

B. **National Extension and other technology transfer institutions and programs (public and private sector)**

- 1. Name
- 2. Affiliation
- 3. Location(s) (include map if appropriate)
- 4. Facilities
- 5. Organizational structure
- 6. Staff (names, positions, training and experience)
- 7. Methodology
 - a. Program planning
 - b. Information dissemination
 - i. planning and use of communication media/channels
 - c. Technical backstopping
 - d. Feedback and networking
 - e. Training

- f. Evaluation
 - 8. Current program content
 - 9. External donor support (nature and extent)
 - 10. Linkages with research institutions/programs
 - 11. Linkages with other technology diffusion institutions/programs
 - 12. Linkages with agrosupport sector
- C. **National agricultural technology generation and transfer system**
 - 1. System diagram
 - a. Line and staff relationships
 - b. Information flow (two-way) relationships
 - c. Linkages with regional and international programs
 - 2. Areas of strength and apparent weakness

Agricultural Technology Identification and Assessment
Africa

V.

AGRICULTURAL TECHNOLOGY ASSESSMENT
By
INDIVIDUAL TECHNOLOGY OR TECHNOLOGY SYSTEM

(Preliminary identification and assessment to be made during pre-survey preparation stage for verification and additions in the field)

Country: _____

- A. Descriptive title
- B. Source(s) of information
- C. Source of the technology or technology system
- D. Description of technology or technology system
- E. Existing situation or problem it could alleviate
- F. Extent to which problem is recognized by farmers
- G. Conditions under which adapted and potentially appropriate (ecological zones and farmer situations)
- H. Potential positive consequences from its use
- I. Potential negative consequences from its use

- J. Relationship to existing practice/system
- K. Degree of confidence in local adaptation and how determined
- L. Possibilities for incremental adoption
- M. Extent of present usage of technology or technology system by subsistence, subsistence/commercial and commercial farmers
- N. Constraints to increased adoption
1. Agricultural
 2. Institutional
 3. Socioeconomic
- O. Observations
- P. Factors/issues requiring further study and analysis
- Q. Stage of readiness for diffusion to farmers
- R. Estimated time likely to be required for achieving widespread adoption
- S. Recommendations for improving diffusion
- T. Assessment made by: _____
Date: _____

Agricultural Technology Identification and Assessment
Africa

VI.

SUMMARY OF AGRICULTURAL TECHNOLOGIES IDENTIFIED, BY STAGE OF READINESS CATEGORY*

Country: _____

Technology/technology system	Source	Adaptation		Major con- straints	Complexity of tech.	Poss. incre. adoption	Est. diff. time
		Zones	Farmers				
A. <u>Ready for diffusion</u>							
B. <u>Almost ready for diffusion</u>							
C. <u>Promising for the future</u>							

* See following page for explanations and codes

Col. 6 Codes:

Input level

1._._	None
2._._	Low
3._._	Medium
4._._	High

Similarity to existing practices
and level of management/husbandry
skill problems anticipated.

.1.	similar to existing practice; no serious mgmt./skill problems.
.2.	Moderate practice change; some management/skill problems.
.3.	Major practice change; serious management/skill problems.

Individual vs. group or community action

..1	Can be adopted individually by farmer.
..2	Requires group or community action for adoption.

Col. 7. Possibility for incremental adoption

Codes:	1	-	Yes, entirely feasible to adopt in stages.
	2	-	Possible to adopt in stages under some circumstances.
	3	-	No, must be adopted in its entirety.

Col. 8. Estimated diffusion time

Record estimated number of years required to achieve widespread farmer adoption.

Agricultural Technology Identification and Assessment
Africa

VII.

ILLUSTRATIVE LIST OF AGRICULTURAL, INSTITUTIONAL AND
SOCIOECONOMIC FACTORS TO BE CONSIDERED IN ASSESSING
TECHNOLOGIES

A. AGRICULTURAL ELEMENTS

1. Weather

- a. Macro- and micro-climatic factors which influence feasibility of the technology in a given region
- b. Range of variability

2. Soil Factors

- a. Nutrient status, acidity
- b. Water holding capacity
- c. Drainage
- d. Erosion, erodability
- e. Slope

3. Agronomic Factors

- a. Yield potential (crop, fuel, forage, stakes, other by-products)
- b. Varieties
- c. Planting material
- d. Establishment system
- e. Planting geometry
- f. Existing cropping systems
- g. Effects on soil and water conservation, and wind and water erosion

4. Livestock

- a. Appropriate species
- b. Breeding stock
- c. Use (draft, slaughter, transportation, etc.)
- d. Nutrition
- e. Crop/livestock interactions

5. Pests (insects, pathogens, nematodes, weeds, animals, animal diseases)

- a. Relative importance and severity of the different pests
- b. Extent and nature of loss from pests

- c. Will use of the technology (e.g., alley cropping) increase or decrease the severity of pest problems on the crops and animals in the farming system?
 - d. Are tree species free of pest problems?
6. Long term ecological effects
 - a. Potential benefit
 - b. Potential harm
 7. Farming system management
 - a. Knowledge and skills
 - b. Resources
 8. Uses of new vs. existing crops
 - a. Increase food production
 - b. Improve human and animal nutrition
 - c. Prevent erosion
 - d. Minimize purchased inputs (e.g., fertilizer)
 - e. Provide forage for animal production
 9. Potential for building on existing systems and technologies
 - a. Selection of target area
 - b. Careful evaluation of current situations
 - c. Crop combinations
 - d. Cultural practices
 - e. Incremental introduction (by stages)
 10. Short and long term effects
 - a. Positive
 - b. Negative

B. INSTITUTIONAL ELEMENTS

1. Input delivery systems
 - a. Trees/seeds/tubers
 - b. Machines/tools
 - c. Credit
 - d. Private/public sector interface
2. Production objective
 - a. Subsistence
 - b. Subsistence/market economy
 - local food security

- domestic sale and consumption
 - export
 - c. Commercial
 - d. Improved nutrition
 - Vitamin A
3. Land tenure/traditional rights
- a. Property ownership
 - b. Potential technology impact on land tenure arrangements
 - c. Tree tenure
 - d. Animals - migratory
4. Market infrastructure
5. Infrastructure for technology diffusion
- a. Organizations (farmers, other private and public sector)
 - what
 - where
 - purpose
 - how they relate
 - formal/informal
 - b. Communication infrastructure (e.g., radio)
6. Organizational interest in technologies
- a. Government
 - institutional incentives
 - rules/regulations
 - b. Private
 - c. Educational
 - d. Traditional (e.g., tribal)
7. Incentives
8. Risk protection
9. Magnitude of impact
- a. Technical capability to generate impact
 - b. Size of audience for which technology is suitable
 - c. Cost effectiveness of a communication program
10. Hierarchical messages (macro--->micro flow)
- a. Components of the technology with broad application
 - b. Highly location-specific components
 - c. National-regional-local media use and applicability
 - d. Amenability to mass communication approaches

11. Short and long term goals (including educational)

- a. Societal goals
- b. Individual goals
- c. Incremental development

C. **SOCIOECONOMIC ELEMENTS**

1. Economic factors

- a. Prices (input:output ratios)
- b. Profit (enterprise analysis)
- c. Labor profiles
 - use (time/activity)
 - price (time/activity)
- d. Risk (wealth/utility)
 - individual assets
 - stability of production
- e. Economic management
- f. Resource base identification

2. Non-economic values

- a. Cultural
- b. Religious
- c. Social
- d. Political
- e. Traditional
- f. Quality of life

3. Similarity of new to existing or earlier systems

- a. Existing vs. new behaviors
- b. Relationship of technology or existing system to household gardens
 - practice/crop analysis
 - institutional support

4. Incentives

5. Societal goals

6. Realistic expectations relative to degree of change resulting from a new technology or system

- a. Short term
- b. Medium term
- c. Long term

7. Consequences of adopting new technology

- a. Cost
- b. Positive consequences
 - immediate
 - intermediate
 - long term
- c. Reinforcers for adoption
 - temporary (artificial)
 - permanent (environmental, habitual)
- d. Negative consequences

8. Vectors of change