

**CHAPTER 5**

**IMPLEMENTATION PROGRAM  
AND PROJECT COST**

## CHAPTER 5: PROJECT COST AND IMPLEMENTATION PROGRAM

### 5.1 ESTIMATED PROJECT COST

The estimated project cost for this Master Plan reaches 48,185,395,000 Pesos, which is broken down in the following manner.

Sector	Programs/Projects	Cost (US\$1,000)			
		Short Term	Medium Term	Long Term	Total
Invigoration of Rural Society		<b>12,465</b>	<b>715</b>	<b>1,420</b>	<b>14,600</b>
	Activation of Rural Organization	145	145	290	580
	activation of Producer's Association	120	120	230	470
	Promotion of Producer's Association	300	300	600	1,200
	Promotion for Formation of Rural Women's Organization	340	0	0	340
	Strengthening of Vocational Education	11,560	150	300	12,010
Strengthening of Agriculture and Livestock Production System		<b>1,208,621</b>	<b>1,098,823</b>	<b>26,570,414</b>	<b>28,877,858</b>
	Strengthen of Crop Diversification Research	76,276	0	0	76,276
	Introducing of Crop Diversification	0	0	24,335,768	24,335,768
	Promotion for Sustainable Agriculture	544,440	533,352	1,066,705	2,144,497
	Promotion for Utilization of Natural Resources	124,532	47,471	94,941	266,944
	Strengthening of Agricultural Extension Services	12,091	0	0	12,091
	Improvement of Livestock Technologies	14,276	0	0	14,276
	Strengthen of Rural Finance	433,000	518,000	1,073,000	2,024,000
	Establishment of GIS System	4,006	0	0	4,006
Agricultural and Rural Infrastructure Development		<b>1,666,447</b>	<b>1,828,628</b>	<b>6,025,351</b>	<b>9,520,426</b>
	Improvement of Irrigation Facilities	25,188	0	430,640	455,828
	Drainage Improvement	1,065,540	1,405,340	5,034,490	7,505,370
	Road Improvement	571,628	407,843	523,122	1,502,593
	Improvement of Rural Water Supply	4,092	15,444	37,099	56,635
Improvement of Marketing System		<b>571,971</b>	<b>0</b>	<b>0</b>	<b>571,971</b>
	Improvement of Marketing Channel	14,986	0	0	14,986
	Participating of Small Farmers in Marketing Process	306,488	0	0	306,488
	Improvement of Slaughterhouse	249,145	0	0	249,145
	Promotion of Agro-industry	1,352	0	0	1,352

Sector	Programs/Projects	Cost (US\$1,000)			
		Short Term	Medium Term	Long Term	Total
Alleviation of Environmental Degradation		4,981,652	2,187,538	2,031,350	9,200,540
	Measures against Deforestation	529,184	440,711	881,422	1,851,317
	Measures against Water Pollution	539,482	1,631,789	919,852	3,091,123
	Environmental Upgrading at Ecological Reserve Area	160,327	103,950	207,900	481,177
	Institutional Strengthening of Agencies	43,659	11,088	22,176	76,923
	Disaster prevention Monitoring strengthen	700,000	0	0	700,000
	Disaster Prevention and Environmental conservation in Novillero River	3,000,000	0	0	3,000,000
	<b>Total</b>	<b>8,441,156</b>	<b>5,115,704</b>	<b>34,622,535</b>	<b>48,185,395</b>

The cost for programs/projects is calculated in line with the following parameters.

Items	Parameters for Cost Estimate
Construction Cost	The unit cost for calculation is based on the unit prices of Mexican public works, contractors' cost estimate, prevailing unit prices in the study area and similar projects executed in the past
Procurement Cost of Materials and Equipment	The procurement cost for vehicles, analysis equipment, operation and maintenance machinery etc. are calculated. The cost is at the site. The cost of heavy construction equipment is included in the unit cost of the construction works
Physical Contingency	10% of construction cost and procurement cost of materials and equipment is estimated
Engineering Cost	20% of construction cost and procurement cost of materials and equipment is calculated for engineering cost such as consultant services, topographic survey and design
Loan Interest	5 % of total cost is estimated as a cost for credit procedure
Land Acquisition	Generally necessary land for construction will be purchased, but land for canals passing through the field or land for irrigation and drainage facilities will be provided by beneficiaries'. Unit cost of land acquisition is \$20,000=US\$2,000/ha.
Others	Unit price and exchange rate were employed as of April 1999. The exchange rate is US\$1.00 = Mexican Peso 9.40 = Japanese Yen 120.00.

## 5.2 IMPLEMENTATION SCHEDULE

### (I) Basic Concept for Implementation Programming

Any project/program contemplated in the Master Plan is vital for the development of the Soconusco Region, but an implementation of all of these projects/program in parallel is not feasible under limited availability of financial resources to be earmarked to them and lack of human resources of the agencies in charge of project implementation. It is thus proposed that the project implementation period would be divided into three stages, e.g. short-term, medium-term and long-term so as to attain an equilibrium development of the region. The following factors have been taken into account in categorization of projects/programs in development phasing of the Master Plan.

Sector	Programs/Projects	Cost (US\$1,000)			
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Eligible projects/programs to be implemented in the short-tem period are those which (are):

- Needed to be implemented immediately for easing prevailing constraints confronting agriculture, livestock and rural sectors
- Related mutually with other projects and their prolonged implementation has substantial negative impact on other projects
- Smoothly implemented without requiring complicated skills for the project executing agency
- Compatible with financial and investment capability of the executing agency
- Produce direct benefits in shorter period
- Replicable easily Easy application to other regions with similar conditions
- Viable for implementation with less investment
- Produce substantial benefits in case of being implemented severally
- Sustainable in accordance with environmental conservation
- Contribute to capital formation of producers

Eligible projects/programs to be implemented in the medium-tem period are those which (are):

- Have major objective in expansion of agricultural and livestock production, strengthening of extension services and promotion of environmental reservation making better use of basic technologies and organizations
- Benefit a variety of social strata producing high social and economic benefits
- Produce greater synergy effect with combination of other project(s)
- Encourage participation of the private sector in investment
- Contribute to social development such as rectification of disparities among sub-regions

Eligible projects/programs to be implemented in the long-tem period are those which (are):

- To contribute to making agricultural and livestock production more solidly sustainable
- Indispensable for equilibrium development of the region, although their implementation priority is low
- Call for longer period in project preparation

In pursuance with above phasing methodology, the main targets to be prepared for respective term have been set as shown in the following table.

Target Term Year	Short Term 2000~2005	Medium Term 2005~2010	Long Term 2010~2020
Overall Target	<ul style="list-style-type: none"> <li>• Implementation of immediate projects/programs</li> <li>• Planning, design and budgetary arrangement of project</li> <li>• Commencement of environment-related projects</li> </ul>	<ul style="list-style-type: none"> <li>• Development of agricultural infrastructure to intensify land use</li> <li>• Strengthening of agricultural research and extension services</li> <li>• Implementation of environment-related projects</li> </ul>	<ul style="list-style-type: none"> <li>• Upgrading cropping intensity</li> <li>• Improvement of land productivity</li> <li>• Realization sustainable farming practice</li> <li>• Mitigation of natural disaster</li> <li>• Crop cultivation to comply with vocation of soils</li> </ul>
Invigoration of Rural Society	<ul style="list-style-type: none"> <li>• Empowerment and enlightening of rural associations</li> </ul>	<ul style="list-style-type: none"> <li>• Encouragement of production activities</li> </ul>	<ul style="list-style-type: none"> <li>• Transfer of project effects to other associations</li> </ul>

Target Term Year	Short Term	Medium Term	Long Term
	2000~2005	2005~2010	2010~2020
Strengthening of Agricultural Institutional Supporting Services	<ul style="list-style-type: none"> <li>• Planning, design and budgetary arrangement of project</li> <li>• Empowerment of manpower and procurement of equipment and facilities</li> </ul>	<ul style="list-style-type: none"> <li>• Implementation of project</li> <li>• Strengthening of extension services</li> <li>• Replication of newly developed technology</li> </ul>	<ul style="list-style-type: none"> <li>• Improvement of land productivity owing to newly developed technology</li> </ul>
Development of Agricultural and Rural Infrastructure	<ul style="list-style-type: none"> <li>• Planning, design and budgetary arrangement of project (High priority area)</li> <li>• Implementation of projects that seek for immediate implementation</li> </ul>	<ul style="list-style-type: none"> <li>• Implementation of priority area projects</li> <li>• Planning and design of project and procurement of necessary fund for intensification of land use</li> </ul>	<ul style="list-style-type: none"> <li>• Implementation of projects for intensification of land use</li> </ul>
Improvement of Marketing Systems	<ul style="list-style-type: none"> <li>• Implementation of projects oriented to empower small farmers</li> <li>• Planning, design and budgetary arrangement of project</li> </ul>	<ul style="list-style-type: none"> <li>• Promotion for effective use of completed projects</li> <li>• Implementation of other projects</li> </ul>	<ul style="list-style-type: none"> <li>• Improvement of productivity through development of niche business</li> </ul>
Environmental Conservation	<ul style="list-style-type: none"> <li>• Implementation of model projects</li> </ul>	<ul style="list-style-type: none"> <li>• Enlargement of projects implementation following model projects</li> </ul>	<ul style="list-style-type: none"> <li>• Implementation of sustainable farming practice</li> </ul>
	<ul style="list-style-type: none"> <li>• Measure against hazardous area</li> </ul>	<ul style="list-style-type: none"> <li>• Measure against less hazardous areas</li> </ul>	<ul style="list-style-type: none"> <li>• Measures against least hazardous areas</li> </ul>
	<ul style="list-style-type: none"> <li>• Basic arrangement for environmental conservation</li> </ul>	<ul style="list-style-type: none"> <li>• Implementation of environmental conservation activities</li> </ul>	<ul style="list-style-type: none"> <li>• Implementation of environmental monitoring system</li> </ul>
	<ul style="list-style-type: none"> <li>• Basic arrangement for environmental education</li> </ul>	<ul style="list-style-type: none"> <li>• Expansion of environmental education</li> </ul>	<ul style="list-style-type: none"> <li>• Upgrading environmental education</li> </ul>
	<ul style="list-style-type: none"> <li>• Basic arrangement for participation of local population in environmental conservation</li> </ul>	<ul style="list-style-type: none"> <li>• Vitalization of the activities</li> </ul>	<ul style="list-style-type: none"> <li>• Encouragement for more aggressive participation of local population</li> </ul>

## (2) Implementation Schedule

The implementation schedule of this Master Plan has elaborated in such manner that implementation of projects/programs in one sector shall work more efficiently over implementation of other sectors. The implementation schedule thus elaborated is shown in the following page.

Program/Project	Short Term					Middle Term					Long Term					After						
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		2015	2016	2017	2018	2019	2020
General Project																						
1 Invigoration of Rural Society																						
Rural Organization Activation																						
Producer's Association Activation																						
Producer's Association Promotion																						
Rural Women's Promotion																						
Vocational Training																						
2 Agriculture and Livestock Sector Strengthening																						
Strengthening of Crop Diversification and Mixed Farming																						
Temperate Region Fruits																						
Farming Diversification																						
Banana, Coffee and Cacao																						
Small and Medium Cattle																						
Paddy Field																						
Promotion of Sustainable Agriculture																						
Gradual Execution																						
Cashewnut, Pineapple, tropical flower and fruits																						
Promotion of Utilization of Natural Resources																						
Gradual Execution																						
Strengthening of Agricultural Extension and Services																						
Office equipment and personnel																						
Demonstration																						
Strengthening of Supporting System for Cattle Breeding																						
Strengthening of Animal Disease Center																						
Rural Finance Strengthening Plan																						
Improvement of FIRA credit access																						
Small scale credit																						
Auxiliary Veterinary Experimental Farm																						
GIS																						
Environmental Credit																						
3 Agricultural and Rural Infrastructure Development																						
Irrigation Improvement																						
Gradual Execution																						
Drainage Improvement																						
Gradual Execution																						
Road Improvement																						
Gradual Execution																						
Rural Water Supply Improvement																						
Gradual Execution																						
4 Marketing System Improvement																						
Marketing System Improvement																						
Centralization, information center, etc.																						
Introduction of Small Farmers to the Agroindustry																						
Mixed Agriculture/Livestock, Crop Agricultural Processing Facilities																						
Improvement of Slaughterhouse																						
Fund for Marketing Studies and for the Agricultural Processing Facilities																						
Agroindustry Promotion																						
5 Environmental Conservation																						
Measure Against Forest Resources Deterioration																						
Gradual Execution																						
Water Contamination Control																						
Gradual Execution																						
Environmental Protection Area																						
Strengthening of Environmental Institution																						
Strengthening of Disaster Monitoring																						
Study for Environmental Protection in Novillero river																						

Legend      ■ Project      ■ Preparation      ■ Execution      ■ Operation

Fig. 5.2.1 Project Execution Schedule

The contents and parameters of implementation of each program and project are as follows.

**(Short Term)**

Sector	Program	Contents of Implementation
Invigoration of Rural Society	Invigoration of Rural Organization	<ul style="list-style-type: none"> <li>• Establishment of farmers' association</li> <li>• Training and empowerment of association's leaders and boosting morale among rural population</li> <li>• Development of appropriate system for overcoming constraints.</li> </ul>
	Encouragement and Empowerment of existing Farmers Organization	<ul style="list-style-type: none"> <li>• Preparation and implementation of invigoration programs</li> <li>• Strengthening of marketing sector</li> </ul>
	Promotion for Farmers Association	<ul style="list-style-type: none"> <li>• Promotion of organization in priority areas</li> </ul>
	Promotion of Formation of Rural Women's Organization	<ul style="list-style-type: none"> <li>• Training and empowerment of leaders for women's association</li> <li>• Preparation and implementation of programs for organizing women's associations</li> <li>• Development of appropriate system for overcoming constraints</li> </ul>
	Strengthening of Vocational Education	<ul style="list-style-type: none"> <li>• Improvement of facilities for agricultural vocational schools</li> </ul>
Strengthening of Agriculture and Livestock Production System	Diversification and mixing of Farming Activities	<ul style="list-style-type: none"> <li>• Research and development of technologies for introduction of temperate fruits</li> </ul>
	Introduction of Mixed Farming	<ul style="list-style-type: none"> <li>• Program for renovation of aged cacao plantations through inter-cropping system with commercial trees and floors</li> <li>• Program for renovation of aged coffee trees through inter-cropping system with commercial trees</li> <li>• Introducing of mixed farming system of crops and medium and small animals</li> </ul>
	Promotion for Sustainable Agriculture	<ul style="list-style-type: none"> <li>• Project implementation at the most seriously eroded area</li> <li>• Implementation of model project</li> </ul>
	Promotion for Utilization of Natural Resources	<ul style="list-style-type: none"> <li>• Promotion for utilization of fishery resource at blackish water</li> <li>• Promotion for education on environment-oriented agriculture</li> <li>• Promotion for alternative crops for traditional ones</li> <li>• Promotion for raising existing animals</li> <li>• Construction of environmental center</li> </ul>
	Strengthening of Agricultural Extension Services	<ul style="list-style-type: none"> <li>• Increase in number of extension workers</li> <li>• Construction of office for extension services</li> <li>• Procurement of facilities and equipment</li> </ul>
	Improvement of Livestock Technologies	<ul style="list-style-type: none"> <li>• Procurement of facilities and equipment for animal health center</li> </ul>
	Rural Finance Strengthening Plan	<ul style="list-style-type: none"> <li>• Improvement of access to FIRA 's credit</li> </ul>
	Establishment of GIS System	<ul style="list-style-type: none"> <li>• Collection and processing of data and information</li> </ul>
Agricultural and Rural Infrastructure	Improvement Irrigation Facilities	<ul style="list-style-type: none"> <li>• Staged implementation</li> </ul>
	Drainage Improvement	<ul style="list-style-type: none"> <li>• Preparation stage</li> </ul>
	Road Improvement	<ul style="list-style-type: none"> <li>• Staged implementation</li> </ul>
	Improvement of Rural Water Supply	<ul style="list-style-type: none"> <li>• Staged implementation</li> </ul>



Sector	Program	Contents of Implementation
Improvement of Marketing System	Improvement of Marketing Channel	• Preparation stage
	Participation of Small Farmers for Marketing Process	• Construction of processing plants of agro-product under administration of associations
	Improvement of Slaughterhouse Promotion of Agro-industry	• Preparation stage • Preparation stage
Alleviation of Environmental Degradation	Measures against deforestation	• Small-scaled reforestation in deforestation area • Measures against forest fire • Promotion of agro-forestry at priority area • Promotion of environmentally friendly coffee plantation
	Measures against water Pollution	• Improvement of sewage treatment system at rural area • Improvement of water contaminated by discharge of industrial wastes • Establishment of water quality monitoring system
	Environmental Upgrading at Ecological Reserve Area	• Enlargement of ecological reserve area • Delimitation of environmental reservation area • Promotion for reserved forest • Strengthening of environmental monitoring system
	Institutional Strengthening of Agencies in charge of Environmental Conservation	• Procurement of facilities and equipment for observation center • Environment-related studies and compilation of information • Establishment of a special fund for promotion of environmental conservation
	Disaster Prevention	• Strengthening of Disaster Monitoring • Disaster Prevention and Environmental Conservation in Novillero River

**(Medium Term)**

Sector	Program	Contents of Implementation
Invigoration of Rural Society	Invigoration of Rural Organization	Operation and further development of project
	Encouragement and Empowerment of existing Farmers Organization	Operation and further development of project
	Promotion for Farmers Association	Operation and further development of project
	Promotion of formation of Rural Women's Organization	Operation and further development of project
	Strengthening of Vocational Education	Operation and further development of project
Strengthening of Agriculture and Livestock Production System	Diversification and mixing of Farming Activities	Introduction of paddy cultivating technology
	Introduction of Mixed Farming	Inter-cropping with cashew Inter-cropping with tropical flowers Inter-cropping with tropical fruits Inter-cropping with pineapple
	Promotion for Sustainable Agriculture	Continuation of project
	Promotion for Utilization of Natural Resources	Continuation of project
	Strengthening of Agricultural Extension Services	Operation and further development of project

Sector	Program	Contents of Implementation
	Improvement of Livestock Technologies	Upgrading of facilities and equipment for UNACH's experimental farm in Huehuetán
	Rural Finance Strengthening Plan	Establishment of micro-credit system Establishment of special fund for promotion of environmental conservation
Agricultural and Rural Infrastructure Development	Improvement of Small Irrigation Units	Staged implementation
	Development of Groundwater for Irrigation Unit	Staged implementation
	Drainage System Improvement	Staged implementation
	Road Improvement	Staged implementation
	Rural Water Supply	Staged implementation
Improvement of Marketing System	Improvement of Marketing Channel	Staged implementation
	Participation of Small Farmers for Marketing Process	Operation and further development of project
	Improvement of Slaughterhouse	Staged implementation
	Promotion of Agro-industry	Staged implementation
Alleviation of Environmental Degradation	Measures against Deforestation	Continuation of project
	Measures against Water Pollution	Continuation of project
	Environmental Upgrading at Ecological Reserve area	Continuation of project
	Institutional Strengthening of Agencies in charge of Environmental Conservation	Continuation of project

**(Long Term)**

Sector	Program	Contents of Implementation
Invigoration of Rural Society	Invigoration of Rural Organization	• Operation and further development of project
	Encouragement and Empowerment of existing Farmers Organization	• Operation and further development of project
	Promotion for Farmers Association	• Operation and further development of project
	Promotion of Formation of Rural Women's Organization	• Operation and further development of project
	Strengthening of Vocational Education	• Operation and further development of project
Strengthening of Agriculture and Livestock Production System	Diversification and mixing of Farming Activities	• Operation and further development of project
	Introduction of Mixed Farming	• Continuation of project
	Promotion for Sustainable Agriculture	• Continuation of project
	Promotion for Utilization of Natural Resources	• Continuation of project

Sector	Program	Contents of Implementation
	Strengthening of Agricultural Extension Services	• Operation and further development of project
	Improvement of Livestock Technologies	• Operation and further development of project
	Rural Finance Strengthening Plan	• Continuation of project
Agricultural and Rural infrastructure Development	Improvement of Small Irrigation Units	• Staged implementation
	Development of Groundwater for Irrigation Unit	• Staged implementation
	Drainage System Improvement	• Staged implementation
	Road Improvement	• Staged implementation
	Rural Water Supply	• Staged implementation
Improvement of Marketing System	Improvement of Marketing Channel	• Staged implementation
	Participation of Small Farmers for Marketing Process	• Operation and further development of project
	Improvement of Slaughterhouse	• Staged implementation
	Promotion of Agro-industry	• Staged implementation
Alleviation of Environmental Degradation	Measures against Deforestation	• Completion of project
	Measures against Water Pollution	• Continuation of project
	Environmental Upgrading at Ecological Reserve Area	• Continuation of project
	Institutional Strengthening of Agencies in charge of Environmental Conservation	• Continuation of project

### 5.3 IMPLEMENTING METHOD

#### (1) General Implementation Proposal

The programs/projects are classified into public sector-initiative ones and private sector-initiative ones judging from their components. The private sector-initiative programs/projects, in turn, will be further divided into two categories according with source of finance: those implemented with direct investment of beneficiaries and those implemented with finance of public sector. The public sector-initiative projects/programs, on the other hand, comprises two categories: those implemented with public finance but their operation and maintenance is transferred to beneficiaries (Quasi-public sector-initiative) and those have a nature of genuine public works (Public sector-initiative).

Sector	Implementation Method
Private Sector-Initiative Project	<ul style="list-style-type: none"> <li>• Implementation and operation with direct finance of farmers/farm entrepreneurs</li> <li>• Implementation and operation with a loan of public or private finance</li> <li>• Implementation with a two-step loan system in which the government of Mexico will procure loan from foreign governments and/or international banking and finance it to farmers/farm entrepreneurs</li> </ul>
Quasi-public Sector-initiative Project	<ul style="list-style-type: none"> <li>• Implementation with responsibility of public sector including finance of project, but operation and maintenance is entrusted to beneficiaries</li> </ul>
Public Sector-initiative Project	<ul style="list-style-type: none"> <li>• Implementation and operation with budget of state and municipal governments</li> <li>• Implementation and operation with budget of the federal government</li> <li>• Implementation and operation with a loan from foreign governments and/or institutional banking</li> </ul>

Due to limited availability of financial resources from the part of federal and state governments to be earmarked to implementation of projects/programs contemplated in the Master Plan, it is proposed in principle to put these programs/projects into implementation under private sector-initiative, with an arrangement to be made for procurement of necessary fund. By contrast, public sector-initiative projects/programs shall be such ones as are considered to be difficult attract participation of beneficiaries in capital investment.

## (2) Implementation of Private Sector-initiative Programs/Projects

As cited before, private sector-initiative programs/projects are deemed to be implemented with own fund of proposed beneficiaries or with a financial assistance rendered by banking institutions. Taking an account of actual situations of farmers in the region, especially as for small farmers, a financial assistance plays an indispensable role in promoting programs/projects included in the Master Plan, the following proposal serving strengthening rural finance system is made.

1. Improvement for access to FIRA's credit
2. Establishment of Micro-Credit System
3. Creation of Environment-oriented New Credit Fund

The financial assistance (rural finance) is oriented in principle to procurement of fixed or semi-fixed assets and shall comprise, but not limited to, labor cost and construction cost to be done with own machinery of farmers within the components of overall project cost.

The role of federal and state governments are to undertake necessary arrangement and coordination for making agricultural and livestock production of the region more sustainable; specifically, to subsidize interest for rural finance, to support farmers in acquisition of credit, promotion for rural organization, strengthening of technical extension services, monitoring of environmental conservation activities, etc.

As each program/project is closely related with environmental preservation of the region and covers a variety of components, it is advisable that an action program should be elaborated prior to implementation of programs/projects. The following steps should be taken.

1. Arrangement of procurement of financial resources for projects
2. Detailed planning (cash flow of required loan, implementation method, scope of

- responsibility of the state government of Chiapas
3. Implementing of projects (agricultural credit and public investment)

**(3) Implementation of Quasi-public Sector-initiative Programs/Projects**

The programs/projects of this sphere do not envisage construction of public works but are to be implemented in response to social needs. Because proposed direct beneficiaries of these programs/projects are limited to a small number of producers, an exceptional arrangement is required in planning stage. Implementation of programs/projects covers the following steps.

1. Facilities planning
2. Study on procurement of financial resources
3. Detailed planning and design for construction works
4. Construction of civil works and procurement of materials and equipment
5. Implementation of programs/project
6. Transfer of completed works to beneficiaries

**(4) Implementation of Public Sector-initiative Programs/projects**

This category of programs/projects is to be put into implementation within government's budgetary arrangement for public investment taking the following steps.

1. Study on procurement of financial resources
2. Detailed planning and design for construction works
3. Construction of civil works and procurement of materials and equipment
4. Implementation of programs/projects

Prior to the commencement of programs/projects, it is required to prepare a detailed design and implementation schedule so as to undertake procurement of materials and equipment as well as construction of civil works as smoothly as possible.

As for financial arrangement for implementation of programs/projects, it is proposed to procure necessary resources from the state and the federal governments within context of their public investment program as well as from loan of foreign government(s) or international banking institutions.

**(5) Project Implementing Method**

The implementing method of each program/project is as follows.

	Private Sector	Semi-public Sector	Public Sector
Invigoration of Rural Society		<ul style="list-style-type: none"> <li>• Invigoration of Rural Organization</li> <li>• Encouragement and Empowerment of Existing Farmers' Association</li> <li>• Promotion of Producer's Association</li> <li>• Promotion for Formation of Rural Women's Organization</li> </ul>	<ul style="list-style-type: none"> <li>• Strengthening of Vocational Education</li> </ul>
Strengthening of Agriculture and Livestock Production System	<ul style="list-style-type: none"> <li>• Introduction of Mixed Farming System</li> <li>• Introduction of Civil Works for Mitigation of Soil Erosion</li> <li>• Introduction of Cropping Technologies for Mitigating Soil Erosion</li> <li>• Introduction of Sustainable Farming Practice</li> <li>• Promotion for Raising of Small and Medium Animals</li> </ul>	<ul style="list-style-type: none"> <li>• Promotion of Alternative Crops for Traditional Ones</li> </ul>	<ul style="list-style-type: none"> <li>• Diversification and Mixing of Farming Activities</li> <li>• Introduction of paddy cultivating technology</li> <li>• Monitoring for Discharge of Agro-industrial Wastewater</li> <li>• Promotion of Utilization of Fisheries Resources at Blackish Water</li> <li>• Promotion for Education on Environment-oriented Agriculture</li> <li>• Promotion of Raising of Existing Animals</li> <li>• Installation of Environmental Center</li> <li>• Strengthening of Agricultural Extension Services</li> <li>• Strengthening of animal health center</li> <li>• Upgrading of facilities and equipment for UNACH's experimental farm in Huehuetán</li> <li>• Strengthening of Rural Finance</li> <li>• Establishment of GIS System</li> </ul>
Agricultural and Rural Infrastructure Development		<ul style="list-style-type: none"> <li>• Improvement of Small Irrigation Units</li> <li>• Development of Groundwater for Irrigation Use</li> </ul>	<ul style="list-style-type: none"> <li>• Drainage System Improvement</li> <li>• Road Improvement</li> <li>• Upgrading of Road Maintenance Machinery</li> <li>• Rural Water Supply</li> </ul>
Improvement of Marketing System	<ul style="list-style-type: none"> <li>• Improvement of Marketing Channel</li> <li>• Construction of Coffee Fruits Processing Plant</li> <li>• Improvement of Cacao Fermentation Facilities</li> </ul>	<ul style="list-style-type: none"> <li>• Expansion of Grains Storage Silos</li> <li>• Improvement of Slaughterhouse</li> </ul>	<ul style="list-style-type: none"> <li>• Establishment of Rural Commercial Center</li> <li>• Establishment of Marketing Information Center</li> <li>• Establishment of Fund Promotion of Agro-industry</li> </ul>

	Private Sector	Semi-public Sector	Public Sector
Alleviation of Environmental Degradation	<ul style="list-style-type: none"> <li>• Measure against Forest Fire</li> <li>• Introduction of Agro-forestry</li> <li>• Promotion for Saving in Use of Agrochemical and Fertilizer</li> </ul>		<ul style="list-style-type: none"> <li>• Small-Scaled Re-forestation in Deforestation Area</li> <li>• Environmentally Friendly Coffee Cultivation</li> <li>• Rural Sewerage System Improvement</li> <li>• Establishment of Monitoring System of Discharge of Industrial Wastes</li> <li>• Establishment of Water Quality Monitoring System</li> <li>• Promotion for Reserved Forest</li> <li>• Delimitation of Environmental Reservation Area</li> <li>• Enlargement of ecological Reserve Area</li> <li>• Strengthening of Monitoring System</li> <li>• Strengthening of IHN and INE</li> <li>• Environment-related Studies and Compilation of Information</li> <li>• Strengthening of Disaster Monitoring</li> <li>• Disaster Prevention and Environmental Conservation in Novillero River</li> </ul>

#### (6) Implementing Organization

Various spheres are envisaged in components of programs/projects and these may be integrated in three major categories: infrastructure development, encouragement and promotion for beneficiaries' participation and consolidation for strengthening of technical extension services. On the other hand, according with project's scale and technical sophistication, they may be categorized into two groups: those to be implemented under the sponsorship of the state and federal governments and those to be implemented under the initiative of beneficiaries with a support to be rendered by municipal government; as for the former, SAGAR, SAG, INIFAP, CNA, DIF shall be proposed as project implementation agencies, although it is subject to substantial modification under transition process of responsibilities and missions from the federal government to the state government (Refer to Chapter 6 for implementation agency for respective program and project). In any case, it is recommended that new organization to take charge of coordination for overall implementation of the Master Plan should be established to annex to as an affiliated organization with SAG.

#### 5.4 EVALUATION OF THE MASTER PLAN

The Soconusco region, which is endowed with a variety of and abundant natural resources, has a advantageous external circumstances such as existence of public entities responsible for research and investigation and of advanced agricultural technologies and relative development of transport infrastructure. Despite these favorable conditions, the agricultural sector of the region confronts prolonged stagnation stemmed from a number of constraints inherent to rural societies and, as a consequence, the regional economy tends to decelerate because the agricultural sector can not in a position to find measures to get rid of such depressed situation. Under the circumstances, the master plan study for integrated agricultural, livestock and rural development project has been formulated in view of breaking the prevailing stagnated situation of the regional agricultural sector and to play the role of impetus for the sector to gain nes energy for development as well as to make the fruits to be obtained sustainable to next generations.

The present Master Plan consists of five programs: 1) Amelioration of rural society, 2) Strengthening of institutional supporting services, 3) Development of agricultural and rural infrastructure, 4) Marketing system improvement, and 5) Deceleration of environmental degradation.

Each program, in turn, contains various sub-programs and /or projects, which are expected to produce the following economic and social benefits as well as secondary synergy effects.

Sector Development Plans	Direct Benefits		Secondary Synergy Effects
	Economic	Social	
Invigoration of rural society	<ul style="list-style-type: none"> <li>• Increase in farm income attributable to raising of small animals and vegetables at farm-gate</li> </ul>	<ul style="list-style-type: none"> <li>• Major participation of local population at development activities</li> <li>• Invigoration of rural organization</li> <li>• Improvement of rural women's status</li> <li>• Improvement of nutritive conditions among rural population</li> <li>• Acquisition of farming technologies</li> <li>• Improvement of literate rate</li> </ul>	<ul style="list-style-type: none"> <li>• Expansion of agricultural production</li> <li>• Improvement in agricultural marketing</li> <li>• Reinforcement in technical assistance services</li> <li>• Invigoration of rural society</li> <li>• Improvement and extension of farming technologies</li> </ul>
Strengthening of agriculture and livestock production system	<ul style="list-style-type: none"> <li>• Increase in farm income due to mixed farming operation</li> <li>• Elimination of production decrease owing to maintenance of soil fertility</li> <li>• Increase in farm income with participation in post-harvest business</li> <li>• Cost reduction because of joint procurement of farm inputs</li> <li>• To eliminate decrease in production with implementation of soil conservation measures</li> <li>• Increase in farm income with introduction of agroforestry</li> </ul>	<ul style="list-style-type: none"> <li>• Progress in research and development of agricultural technologies</li> <li>• To flourish rural organizations</li> <li>• Improvement in extension services</li> <li>• Decrease in disease among animals</li> <li>• Enhancement of livestock technologies</li> <li>• To facilitate access to rural finance</li> <li>• Immediate issuance of certificate for land ownership</li> <li>• Amelioration of regional environment</li> <li>• Alleviation of environmental degradation owing to reduction in use of agro-chemicals</li> </ul>	<ul style="list-style-type: none"> <li>• Increase and diversification of agricultural productions contributes to development of related markets and agro-industry</li> <li>• Decrease in imports</li> <li>• Realization of sustainable farming owing to maintenance of land fertility</li> <li>• To elevate land productivity</li> <li>• Improvement in quality of meat to be brought about by upgrading animal health services</li> <li>• Extension of animal breed suited to local conditions</li> <li>• Development of environment-oriented and sustainable farming</li> <li>• Generation of job opportunities</li> </ul>



Sector Development Plans	Direct Benefits		Secondary Synergy Effects
	Economic	Social	
Agricultural and rural infrastructure development	<ul style="list-style-type: none"> <li>• Increase in agricultural production owing to expansion of arable land as well as elevating land productivity</li> <li>• Reduction in cost relevant to transportation of agricultural products and alleviation in damage of these products as a consequence of improvement of rural road network</li> </ul>	<ul style="list-style-type: none"> <li>• To promote marketing of agricultural products</li> <li>• Decease of epidemics among rural people</li> </ul>	<ul style="list-style-type: none"> <li>• To enjoy more amenity rural life</li> </ul>
Marketing system improvement	<ul style="list-style-type: none"> <li>• To elevate farm income derived from post-harvest business</li> <li>• Decrease in post-harvest loss</li> <li>• Profit in operation of agroindustry</li> </ul>	<ul style="list-style-type: none"> <li>• To generate new job opportunities</li> </ul>	<ul style="list-style-type: none"> <li>• To invigorate regional economic activities</li> <li>• To expand exports of agro-products</li> </ul>
Alleviation of environmental degradation	<ul style="list-style-type: none"> <li>• To mitigate natural resources-related damages</li> <li>• Income in farm income with introduction of organic coffee production</li> <li>• To alleviate reduction of agricultural products due to improvement of water quality</li> <li>• Cost reduction by saving input of agricultural chemicals and fertilizers</li> </ul>	<ul style="list-style-type: none"> <li>• To mitigate air pollution by preventing forest fire</li> <li>• To enjoy more favorable natural scene with increase in coverage of vegetation</li> <li>• Environmental amenity and supply of more purified water owing to improvement of water quality</li> <li>• To raise consciousness of local population in terms of environmental conservation</li> <li>• To protect biodiversity</li> <li>• To promote ecotourism</li> </ul>	<ul style="list-style-type: none"> <li>• Diffusion of farming practice leading to environmental conservation and sustainability of land resources</li> <li>• Environmental improvement of the region as a whole and enhancement and raising amenity of living circumstances of local population</li> <li>• To create natural scene to coordinate with the regional conditions.</li> </ul>

The afore-mentioned economic and social benefits and secondary synergy effects of the Master Plan, in turn, may be summarized in the following manner.

#### **Economic benefits**

- ◆ Increase in farm income due to diversification and intensification of cropping activities
- ◆ Operation profits and agroindustry and marketing activities
- ◆ Elimination of decrease in production owing to soil conservation and sustainable farming practice
- ◆ Cost reduction to be realized in relation with environmental conservation farming system
- ◆ Alleviation of post-harvest loss due to improvement of marketing system
- ◆ Cost saving and reduction of products' damage in the process of transport as a consequence of development of road network

### Social benefits

- ◆ Generation of job opportunity resulting from an expansion of farming activities and development of marketing and agroindustrial activities
- ◆ Invigoration of rural society's activities with promotion of rural organizations
- ◆ Enhancement of institutional supporting services (extension services, rural finance, etc.) to farmers
- ◆ Decrease of epidemics owing to improvement of water quality
- ◆ Deceleration of environmental degradation
- ◆ Protection of biodiversity
- ◆ Improvement of natural scene as a result of upgrading environmental circumstances
- ◆ Rise in consciousness of regional population in terms of environmental conservation

### Secondary synergy effects

- ◆ Increase in crops and livestock production as well as elevated quality of these products to be stemmed from strengthening of institutional supporting services
- ◆ Invigoration of regional economic activities
- ◆ Expansion of agricultural exports and decrease in imports of grains
- ◆ Diffusion of environment-oriented and sustainable farming practice
- ◆ Upgrading environmental circumstances of the region

Bringing about above-mentioned benefits and effects, the implementation of agriculture, livestock and rural development is anticipated to lead to expansion of agricultural products and upgrading of these products, which, in turn, contribute to expansion of marketing services of agro-products and development of agroindustry. In sum, the project shall give the regional economy an impetus to getting rid of the prevailing blockade. In particular, the social impact of the project shall be significant because the major target beneficiaries of the development plan is small and marginal farmers represented by *ejidatarios* who are socio-economically handicapped at present. In addition, a number of measures relevant to basis environmental conservation shall serve establishment of basis for promoting environmental improvement of the region, and putting into force of environment-oriented and organic farming shall become catalyst for making natural resources of the region sustainable so that some generations in the future could also make use of them. As a consequence, the Soconusco Region will become flagship region in the State of Chiapas in the fields of diversification of agricultural production and environmental conservation and will play central role in raising social and economic status of converting the State of Chiapas from one of the least development states to medium-development state.

## 5.5 EVALUATION OF EIA

This objective of the Master Plan is to upgrade the living standard and to attain the stabilization of farming economy of small-scale farmers, vitalizing regional economy through the efficient utilization of potentials of natural resources. In this Master Plan, as a measure for the promotion of efficient utilization of natural resources, the Plan were formulated followings 5 sectors; social improvement, strengthening of Agricultural Supporting system, improvement of agriculture and rural infrastructure and marketing system and Environmental Preservation were established.

There are 2 (two) objectives of the IEE, which are 1) settlement of items for environmental study and 2) preparation for Environmental Impact Assessment (EIA) in the next stage. Appraisal items of IEE are examined on the basis "Environmental Guideline for JICA's

Development Study on Agricultural and Rural Development Projects”.

**5.5.1 Methodology of IEE**

There are 58 items which are used for IEE as shown in the Table and these items are evaluated according to the following classification:

Grade A: Significant Environmental Impact is identified or expected,

Grade B: Possible Environmental Impact is identified or expected

Grade C: No Environmental Impact is recognized

Grade D: No Data Available

(1) Socioeconomic Issues	4. Biological and Ecological Issues
<p>1) Social Issues</p> <ul style="list-style-type: none"> <li>a. Planned agricultural settlement</li> <li>b. Involuntary resettlement</li> <li>c. Substantial change in way of life</li> <li>d. Conflict among communities and people</li> <li>e. Former inhabitant</li> <li>g. Others</li> </ul> <p>2) Demographic Issues</p> <ul style="list-style-type: none"> <li>a. Population increase</li> <li>b. Drastic change in population sector</li> <li>c. Others</li> </ul> <p>3) Economic Activities</p> <ul style="list-style-type: none"> <li>a. Relocation of bases of economic activities</li> <li>b. Occupational change, and loss of opportunities</li> <li>c. Increase in income disparities</li> <li>d. Others</li> </ul> <p>4) Instructional and custom related to Issues</p> <ul style="list-style-type: none"> <li>a. Adjustment and regulation of water or fishing right</li> <li>b. Changing in social and institutional structure</li> <li>c. Changing in existing institutions and custom</li> <li>d. Others</li> </ul>	<ul style="list-style-type: none"> <li>f. Encroachment of Tropical Forest</li> <li>g. Destruction or Degradation of Mangrove Forest</li> <li>h. Degradation of Coral Reef</li> <li>i. Others</li> </ul> <p>5. Soil and Land Resources</p> <p>(1) Soil</p> <ul style="list-style-type: none"> <li>a. Soil Erosion</li> <li>b. Soil Salinization</li> <li>c. Deterioration of Soil Fertility</li> <li>d. Soil Contamination</li> <li>e. Others</li> </ul> <p>(2) Land</p> <ul style="list-style-type: none"> <li>a. Devastation of Soil Fertility</li> <li>b. Devastation of Hinterland</li> <li>C. Land Subsidence</li> <li>d. Others</li> </ul>
<p>(2) Health and Sanitary Issues</p> <ul style="list-style-type: none"> <li>a. Increased Use of Agrochemistry</li> <li>b. Out Break of Endemic Disease</li> <li>c. Prevalence of Endemic Disease</li> <li>d. Residual Toxicity of Agrichemistry</li> <li>e. Increase in Domestic and Other human Waste</li> <li>f. Other</li> </ul>	<p>6. Hydrology, Air and Water Quality</p> <p>(1) Hydrology</p> <ul style="list-style-type: none"> <li>a. Changes in Surface Water Hydrology</li> <li>b. Change in Ground Water Hydrology</li> <li>c. Inundation and Flooding</li> <li>D. Soil Sedimentation</li> <li>e. River Degradation</li> <li>f. Independence of Inland Navigation</li> <li>g. Other</li> </ul> <p>(2) Water Quality and Temperature</p> <ul style="list-style-type: none"> <li>a. Water Contamination and Deterioration of Water Quality</li> <li>b. Water Eutrophication</li> <li>c. Sea Water Intrition</li> <li>d. Change of Water Temperature</li> <li>e. Others</li> </ul>
<p>3. Culture Property Issues</p> <ul style="list-style-type: none"> <li>a. Impairment of Historic Remains and Cultural Asset</li> <li>b. Damage to Aesthetic Sites</li> <li>c. Other</li> </ul>	<p>(3) Atmosphere</p> <ul style="list-style-type: none"> <li>a. Atmospheric Pollution</li> <li>b. Others</li> </ul>
<p>4. Biological and Ecological Issues</p> <ul style="list-style-type: none"> <li>a. Deterioration or Degradation of Vegetation</li> <li>b. Negative Impacts to Important or Indigenous Fauna and Flora</li> <li>c. Degradation of Ecosystem with Bio diversity</li> <li>d. Proliferation of Exotic and/or Hardardous Species</li> <li>e. Encroachment of Wet Land</li> </ul>	

## 5.5.2 Initial Environmental Examination

In an implementation of the Master Plan, the sector, which will have environmental impact, is the part of agriculture and rural infrastructure improvement. In a Planning of the mentioned sector, the consideration to the environmental aspect is necessary. In following Table, the result of the examination is shown.

	Socio Economic Issues	Health and Sanitary Issues	Cultural Property Issues	Biological and Ecological Issues	Soil and Land Resources	Hydrology, Air and Water Quality
Invigoration of Rural Society	Good Impact	-	-	-	-	-
Strengthening of Agriculture and Livestock Production System	Good Impact	-	-	-	Good Impact	-
Agriculture and Rural Infrastructure Development	Possible Impact	Possible Impact	Possible Impact	Possible Impact	Good Impact	Possible Impact
Improvement of Marketing System	Possible Impact	-	-	-	Good Impact	-
Alleviation of Environmental Degradation	Good Impact	Good Impact	Good Impact	Good Impact	Good Impact	Good Impact

Detailed consideration for each sector is as follows.

### (1) Invigoration of Rural Society

The sector of Rural Society Improvement has an objective to activate rural organization and to promote the participation of rural women in order to improve the rural condition, habit, demographics issues and existing regulation in rural area. However, in a planning to take consideration for that the drastic change in custom and habit will not be occurred, is necessary.

### (2) Strengthening of Agriculture and Livestock Production System

The sector of the Agriculture and Livestock Supporting System will be implemented in order to promote the diversified farming adequate for their climate and soil conditions, through the strengthening of research and extension service attended specially for small scale farmers, objecting to stabilize the economical condition of small farmers. The direct environmental negative impact will not be occurred, because of the contents of this sector is formulated by the part of institutional strengthening. However, considering that the result of this sector will have a great influence in an environmental aspect, especially in vegetation, in a planing to put on an emphasis in an introduction of sustainable agriculture is required, in order to attain the sustainable development harmonized with environmental preservation.

### (3) Agriculture and Rural Infrastructure Development

To put on careful consideration for the environmental impact is basic concept for the formulation of the plan, because this sector will accompany the superficial development. Specially, in a plan of drainage improvement, to carry out detailed environmental study in a swamp area is required. Considering the future demographic increase and regional development

in the Study Area accompanied the increase of agricultural production and exported volume, invasion of agricultural land in a swamp area is inevitable, if the adequate land use planning is not exist. For these reasons, the formulation of plan for long term considered future economic trend is required, in order to exploit the land resources in adequate form, giving an emphasis to the environmental preservation aspect. In a planning, following consideration will be required.

Project	Considerable Item
Improvement for Irrigation Facility in Small Scale Farm	To give attention the influence to the aquifer, if utilize a groundwater Influence for downstream, if utilize surface water Impact of transformation for agricultural land Impact for Ground Water Quality
Drainage Improvement	Change of Water Quality and Quantity in a Reserved Swamp Area Impact for Reserved Area caused by the change of river mouth Impact for Existing Fauna
Road improvement	Soil Sedimentation caused by construction and change of river condition
Rural Water Supply Improvement	Water pollution caused by the increased waste water

#### (4) Marketing System Improvement

Considering the marketing system improvement sector accompany the construction, in a planing, giving the environmental consideration is required, in order to minimize the environmental impact.

Project	Considerable Item
Improvement of Marketing System	Environmental problems accompanied the construction
Incentives for Incorporation to Marketing System by Small Scale Farmer	Measure for wastewater of politely production Measure for wastewater form processing facilities
Improvement of Slather House	Wastewater

#### (5) Alleviation of Environmental Degradation

Basically, the environmental preservation sector will be implemented for the improvement of deteriorated resources. However, the following consideration will e required.

Project	Considerable Item
Measure against Forest Resources Deterioration	No cause radical impact for existing flora by the forestation
Water Pollution Control	No cause radical discrepancy of living standard for different community
Environmental Preservation	Minimum impact for Community in proposed reserved area
Strengthening of Environmental Institution	Nil
Disaster Prevention	Nil

	Rural Society Improvement	Diversified farming	Extension Strengthening	Livestock Development	Rural Credit	Agricultural Infrastructure	Rural Infrastructure	Marketing System Improvement	Participation of Small Farmer	Slather House Improvement	Agroindustry	Measure for Land Degradation	Measure or Forest Gradation	Water Contamination	Participation of Community	Environmental Preservation	Strengthening of Institution
1. a. Planned Agricultural Settlement	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
1. b. Involuntary Resettlement	C	C	C	C	C	B	B	C	C	C	C	C	C	C	C	C	C
1. c. Substantial change in way of life	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
1. d. Conflict among communities and peoples	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
1. e. Former inhabitant	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
2. a. Polulation Increase	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
2. b. Dastic change in population sector	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
3. a. Relocation of base of economic activities	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
3. b. Occupational change, and loss of opportunities	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
3. c. Increase in income disparities	C	C	C	C	B	C	C	C	C	C	C	C	C	C	C	C	C
4. a. Adjustment and regulation of water or fishing right	C	C	C	C	C	B	C	C	C	C	C	C	C	C	B	C	C
4. b. Changing in social and institutional structure	C	C	C	C	C	B	B	C	C	C	C	C	C	C	C	C	C
4. c. Changing in existing institution and custom	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
a. Increased use of agrochemistry	C	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
b. Outbreak of endemic disease	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
c. Prevalence of endemic disease	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
d. Residual toxicity of agrochemistry	C	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
e. Increase in domestic and the human waste	C	C	C	C	C	C	C	C	C	C	B	C	C	C	C	C	C
a. Impairment of historic remains and cultural assets	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
b. Damage to aesthetic sites	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
A. Deterioration or degradation of vegetation	C	C	C	C	C	C	C	C	C	C	C	C	B	C	C	C	C
b. Negative impact to important or indigenous fauna and flora	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
c. Degradation of ecosystem with biodiversity	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
d. Proliferation of exotic and/or hazardous species	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
e. Encroachment on wet land	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C

	Rural Society Improvement	Diversified farming	Extension Strengthening	Livestock Development	Rural Credit	Agricultural Infrastructure	Rural Infrastructure	Marketing System Improvement	Participation of Small Farmer	Slather House Improvement	Agroindustry	Measure for Land Degradation	Measure or Forest Gradation	Water Contamination	Participation of Community	Environmental Preservation	Strengthening of Institution
f. Encroachment of tropical forest	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
g. Destruction or degradation of mangrove forest	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
h. Degradation of coral reef	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
1. a. Soil erosion	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
1. b. Soil Salinization	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
1. c. Deterioration of soil fertility	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
1. d. Soil contamination	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
2. a. Devastation and desertification of land	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
2. b. Devastation of hinterland	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
2. c. Land subsidence	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
1. a. Changes insurance water hydrology	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
1. b. Change in groundwater hydrology	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
1. c. Inundation and flooding	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
1. d. Soil sedimentation	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
1. e. River degradation	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
1. f. Independent of inland navigation	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
2. a. Water contamination and deterioration of water quality	C	C	C	C	C	C	C	C	C	B	B	C	C	C	C	C	C
2. b. Water eutrophication	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
2. c. Sea water intrusion	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
2. d. Change of water temperature	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
3. a. Atmospheric pollution	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
3. b. Other	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C

**CHAPTER 6**

**SELECTIN OF PRIORITY PLANS  
FOR PRE-FEASIBILITY STUDY**



## CHAPTER 6: SELECTION OF PRIORITY PLANS FOR PRE-FEASIBILITY STUDY

### 6.1 PRINCIPLES FOR SELECTION OF ELIGIBLE PROGRAMS/PROJECTS

The Soconusco region, the target area of the present Study, is one out of nine economic regions of the State of Chiapas. Despite the fact that the State is generally characterized by a high marginal level within the United States of Mexico, this region of the Soconusco has achieved a relatively advanced development due to the flourishing in the production of tropical fruits (banana, papaya, mango etc.) and oleaginous crops (soybeans, oil palm, sesame, etc.) making better use of the comparative advantages of the in the realm of climate and topographic conditions. However, the productive area of the above mentioned crops is concentrated in the area located from the plain at the foot of mountain range to the coastal plain, whilst the mountain side area, is covered with traditional crops (coffee, cocoa, maize, etc.) being cultivated under subsistence farming system in limited farm size; the farmers engaging production of these crops are alienated from capital formation and thus are not in a position to get rid of actual poverty. Under the circumstances, the social-economic disparity between the commercial crop farmers and those of subsistence farming is evident and it is feared that such disparity worsens with the transformation of external factors as well as with the change in governmental agricultural policies (deregulation, encouragement of privatization and a free market-oriented economy, elimination of subsidies, etc.) as well as the implementation of NAFTA. It becomes clear that the rural sector of the Soconusco, constituted mainly by farmers of subsistence farming, will give an impetus to invigoration of rural society finding measures to relax prevailing stagnated situation.

On the other hand, it prevails in the region degradation of soil resources such as the loss of fertility due to continuous single cropping system and the advance of erosion on the slope lands as well as pollution of environment as a consequence of excessive use of fertilizers and agrochemical, are prevailing. If such situation remains without taking necessary measures for its rectification, the productive activities of the region shall have no other option but to be led to recession, and the sustainability of farming activities will be damaged accordingly. Furthermore, because of the advance of deforestation, water pollution, forest fires produced by crop burning, etc., the standard of living among rural population would be subject to deterioration, and natural disasters stemmed from degradation of natural resources can not be ignored.

Taking into account the above mentioned points, priority plans for the pre-feasibility study will be selected among programs/projects contemplated in the short term implementation schedule of the Master Plan in accordance with their compatibility with objectives of the present Master Plan, convenience for implementation including availability of finance, contribution to environmental conservation, etc. The criteria for eligibility of candidate programs/projects for the pre-feasibility study are as given hereinafter.

#### **A. Expectations of local society**

A-1 The Local society expectations, shown in the rural sociological research (Strengthening of extension services, improvement on access to rural financing system, construction of irrigation system, improvement of the marketing system, etc.)

### **B. Compatibility with the Study objective.**

- B.1 Increase in productivity and improvement of living standard among subsistence small farmers
- B.2 Encourage a sustainable farming
- B.3 To Contribute to the rational use of natural resources such as water, land, etc.
- B.4 To alleviate environmental degradation.

### **C. Convenience for implementation and operation**

- C.1 Convenience in the operation and maintenance by the beneficiaries.
- C.2 Feasibility for putting into implementation, including procurement of necessary budget
- C.3 Demonstrative effect to promote the fruits to other similar condition areas.
- C.4 To eliminate the negative impact on the environment.
- C.5 To promote the participation of beneficiaries in project planning and to favor their self-operation and maintenance of the completed projects.

## **6.2 IDENTIFICATION OF ELIGIBLE PROGRAMS/PROJECTS**

Ranking of the programs/projects contemplated in the short-term implementation schedule of the Master Plan, was made in respect to each item of the eligibility criteria (up to the tenth place of each component) and the score of the programs/projects categorized was fulfilled using a different weight for each category (twice for category A, 1.5 times for category B and no additional weight for group C) The result of this pondering is shown in the following chart.

Ranking and scoring of short term programs/projects

Programs/Projects	Pondering of each component (First ten places)										Global Scoring	Ranking
	A-1	B-1	B-2	B-3	B-4	C-1	C-2	C-3	C-4	C-5		
Invigoration of Rural Organization						3			10	3	16	15
Encouragement and Empowerment of Existing Farmers' Association	10	8				5			9	2	23.5	12
Promotion for Formation of Farmers' Association	9	5				4	3	8	7	1	45	7
Promotion of Formation of Rural Women's Association						6				4	12	16
Strengthening of Vocational Education						7					4	18
Research on Agricultural Diversification and Mixed Farming Activities	8	7	7	8	10		9	7			30	11
Introduction of Mixed Farming activity	5	1	2	2	7			2			66	4
Promotion for Sustainable Agriculture	7	10	1	5	2	9	2	3	3	7	78	2
Promotion for Utilization of Natural Resources	3	9	3	1	6	10	1	4	6	6	94	1
Strengthening of Extension Services	1	2	5	4	8	2	7	5			66.5	3
Technological Support to the Livestock Sector	6	6	6	7		8		9			36	10
Improvement of Access to the Rural Finance System	2	3	8		9	1		6		9	45.5	6
Improvement of GIS system				10					8		4.5	17
Promotion for participation of Small farmers in the Agro-Industry	4	4		9			10	1		5	44.5	8
Measures against Water Contamination			4	3	3		4		2	8	53.5	5
Measures Against Deforestation			9	6	1		8	10	1		39.5	9
Adequate Administration of Protected Natural Reserves				5			5		4	10	21.5	14
Institutional Strengthening of Agencies in charge of Environmental Conservation			10		4		6		5		23	13

Note: The scoring method is performed in such manner as to the program/project taking the first place, wins 10 points and decreases according to the inferiority of the place: after that, it is assigned with a different weight for each of each different category (twice for category A, 1.5 times more for category B, and no additional weight for category C)

In spite of the fact that all programs/projects listed in the short-term implementation schedule in the Master Plan are considered to be indispensable for the Sconusco region in order to achieve a healthy development of the agriculture and rural sectors, in harmony with the environment, the following eight (8) programs/projects, which are ranked in the first eight places above, have been identified as eligible programs/projects, considering the experience and ability in the execution of the public sector development projects and the budget availability for financing of public investment. Etc.

- Promotion for utilization of natural resources
- Promotion for sustainable agriculture
- Strengthening of extension services
- Agricultural diversification and introduction of mixed farming activity
- Measures against deforestation
- Improvement of access to rural finance system
- Promotion for participation of small farmers in the agroindustry
- Measures against water contamination
- Promotion for formation of farmers' association

### 6.3 IMPLEMENTATION OF THE PRE-FEASIBILITY STUDY

Eligible programs/project for the pre-feasibility study have the following profiles.

Programs/Projects	Profile
Promotion for Utilization of Natural Resources	Promotion of rational use of the region's natural resources by introducing alternative crops to those traditionally used, intensive use of water resources, etc.
Promotion for Sustainable Agriculture	Fight the soil resources degradation and as a consequence, to achieve the practice of a more sustainable cropping thanks to the introduction of the agrological method and engineering against erosion, motivation for a larger use of organic fertilizers and materials.
Strengthening of Extension Service	Strengthening of the technical assistance system and extension of farming technology, which are in process of becoming federal by being transferred from the SAGAR to the SAG with the purpose of increasing farm productivity among marginal and survival level producers.
Agricultural Diversification and Introduction of Mixed Farming Activities	Foreseen as to elevate the farm income level, to introduce alternated cropping in the coffee grounds, coca grounds and corn land, with crops such as commercial trees, flowers, cashew, as well as mixed livestock-farming activity.
Measures Against Deforestation	Promotion of reforestation in small scale, prevention of forest fires, agroforestry, environmentally friendly coffee crops in order to recover the vegetal coverage in the mountain area.
Improvement of Access to the Rural Finance System	To amiliate the bottleneck in the access to the rural financing system to help producers to start product processing.
Promotion for Participation of Small Farmers in the Agro-Industry	To make easier for the organized coffee and cocoa producers to create by own initiative, processing plants for their products.
Measures against Water Contamination	To propose the improvement of the sewage system in the rural area, industrial wastewater treatment etc. And to strengthen the water quality monitoring system.
Promotion for Formation of Farmers' Association	To promote the organization of coffee producers at the survival level by putting an emphasis in their leaders' training.

By analyzing the content of the programs/projects, it is concluded that these programs/projects are classified into two categories; one related to the increase in farm productivity and improvement of the quality of life among farmers engaging subsistence farming and the other in adequate management and conservation of the environment. In this context, the pre-feasibility study will be carried out regarding the following two plans which comprise the program/projects with similar contents and objectives:

**A. Agricultural Productivity Improvement Plan for the Subsistence Farmers:**

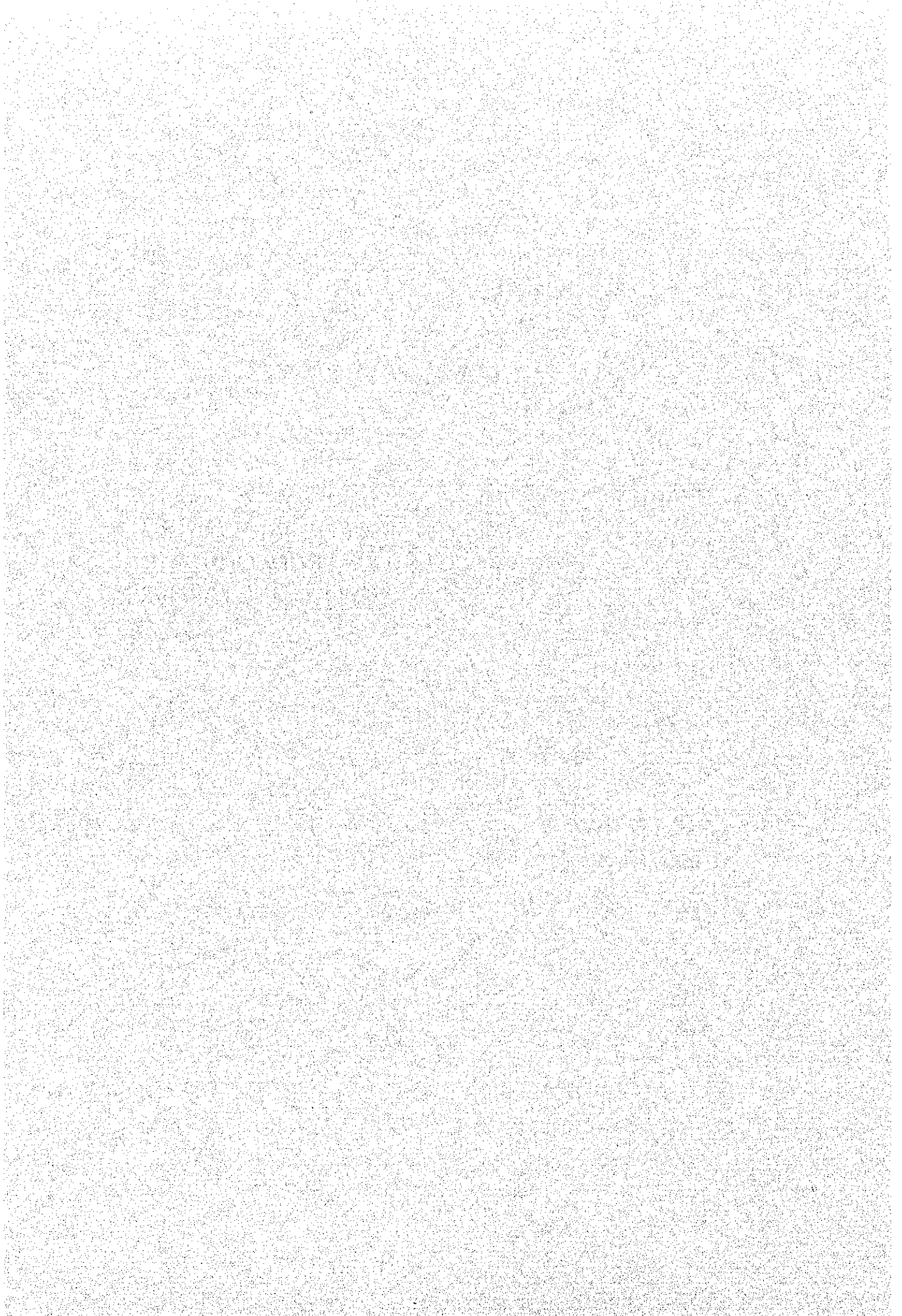
(Programs/Projects comprised: Strengthening of Extension Services, Agricultural Diversification and Introduction of Mixed Farming Activities, Improvement of Access to the Rural Finance System and Promotion for Formation of Farmers' Association)

**B. Environment-oriented Agricultural and Rural Development Plan:**

(Programs/Projects comprised: Promotion for Sustainable Agriculture, Measures Against Deforestation, Promotion for Utilization of Natural Resources, and Measures against Water Contamination).

## **PART C: PREFEASIBILITY STUDY**

CHAPTER 7	COMPREHENSIVE PROJECT FOR THE IMPROVEMENT OF AGRICULTURAL AND LIVESTOCK PRODUCTIVITY OF LOW INCOME FARMERS
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## **CHAPTER 7: COMPREHENSIVE PROJECT FOR THE IMPROVEMENT OF AGRICULTURAL AND LIVESTOCK PRODUCTIVITY OF LOW INCOME FARMERS**

### **7.1 OBJECTIVE OF THE PROJECT**

The objective of the project is to increase productivity and therefore achieve the improvement of the level of well being for low-income farmers without the need of a considerable investment. In order to achieve this objective, a variety of proposals are shown for agricultural diversification and the realization of agriculture combined with cattle raising so these farmers can improve their current situation. In this sense, more emphasis will be given to the formulation of a model scheme for field management both feasible and practical for its execution without confronting obstacles. Consequently, special attention will be provided so that low-income farmers can initiate the proposed plans immediately.

The most important component of the project will be to increase the productivity of the crops handled by low-income farmers in the subproject areas and in a complementary manner, it will propose to diversify the planting activity, introducing a combined agriculture with cattle raising of minor species that would serve as a model scheme which could be duplicated in other areas of similar agro-climatic and socioeconomic conditions. Since the development of an area cannot be reached with only one agronomic component, besides the agricultural and livestock development plan, the project will also undertake the following plans: hydro-agricultural development to improve agricultural yields; improvement of the commercialization system to facilitate the movement of agricultural and livestock products and the agroindustrial development; strengthen extension services as an effective link between public institutions and producers; improvement of the rural financing system to promote a better access of the producers to financial credit; and strengthen rural organization in order to enjoy the common benefits amongst those affiliated.

In the past, the organizations used to organize themselves with the exclusive purpose to have access to agricultural credits, without aiming to improve the marketing system of the members' crops. As a result, commercialization becomes an obstacle for the producers since it prevents the improvement of their well being. This project, by means of strengthening rural organization, pretends to overcome the critical situation where the farmers of the area are found. This implies the strengthening of farmers' organization not only in planting and harvesting, but most importantly in the commercialization process that would allow them as a group, to substantially improve the prices they are now receiving for their products.

### **7.2 SELECTION OF PRE-FEASIBILITY TARGET AREAS**

#### **7.2.1. Selection of Target Crops**

The production zone for the crops in Soconusco region is well defined consistently with the climatic and topographic conditions. Therefore, when the pre-feasibility target areas are selected, it is necessary to identify the crops to which more attention will be provided.

One of Soconusco Region's strengths is the coffee-growing zone, whose production suffered substantial losses during 1998, due to the extraordinary draught which occurred during the months of April and May. Additionally, one of the factors why coffee used to be so profitable was the inexpensive labor of Guatemalans, which is harder and harder to obtain, since they tend to go towards Honduras and Nicaragua for a higher pay. The most affected are the coffee growers

located below 800m, due to the fact that the areas are not adequate for quality coffee. It is expected to improve coffee productivity in such a way as to contribute to increase the farmers' income of the area.

On the other hand, in the grain producing area, the problem of commercialization related to CONASUPO exists, since it has stopped operating as an organism for the direct purchase of products. It has been said that the activities carried out by CONASUPO will be delegated to the State government, nonetheless the state government politics on this matter are not yet clear. CONASUPO carried out the purchase at guaranteed prices, up to their storage, but upon disappearing it will cause uncertainty amongst corn growers. Even now, in the Study Area, some farmers have protested and they have even taken some of CONASUPO's facilities. The guarantee prices paid by CONASUPO were almost double the price of the international markets and upon disappearing, the deterioration of the level of corn producers is inevitable. Therefore, a reconversion is urgent through the diversification and combination of agricultural products in order to strengthen the agricultural base.

From the above, it is suggested to carry out the pre-feasibility study in the zones where coffee and corn predominate since these constitute the representative crops of the region with the highest concentration amongst low-income farmers and at the same time, they require urgent measures to prevent their adapting to the change of the market conditions.

#### **7.2.2 Selection of the Development Area**

##### **Condition of the Selection**

In order to carry out the pre-feasibility study, the areas to be selected will have the following conditions so they have the best possibility of establishing crop diversification and combination with cattle raising.

- a. Where a group of low-income farmers exist, who understand and agree with the plan objectives, and who have a great interest in improving their agriculture.
- b. Where there is a majority of ejido producers and small-scale private low-income farmers exist.
- c. That there is possibility of receiving technical assistance from SAG, SAGAR and INIFAP.
- d. That the area can be duplicated in other regions with similar conditions (with access and easy to arrive from other regions).

##### **(2) Eligible Areas**

The following areas were selected since they are representative of the target crops for the Study. The weight for grading was given in the following manner, in order of importance: Producers desires 2, concentration of small-scale, private farmers 1.5, and others 1.0 with a maximum grade of 10.

1) **Coffee Production Area**

Municipality	Interest of Farmer	Existence of Low-Income Farmers	Technical Support	Demon-strational Effect	Result of Evaluation	Order
Unión Juárez	9	10	9	7	49.0	2
<b>Cacahoatán</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>55.0</b>	<b>1</b>
Tapachula	7	7	10	9	43.5	3
Huixtla	5	10	7	4	36.0	5
Escuintla	8	7	7	5	38.5	4
Tuzantán	3	8	6	5	29.0	9
Huehuetán	4	8	6	4	30.0	8
Villa Comaltitlán	6	8	6	3	33.0	7
Acacoyagua	6	8	6	4	34.0	6
Mapastepec	3	8	5	3	26.0	10

2) **Corn Production Area**

Municipality	Interest of Farmer	Existence of Low Income Farmers	Technical Support	Demon-strational Effect	Result of Evaluation	Order
<b>Frontera Hidalgo</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>55.0</b>	<b>1</b>
Metapa	9	10	8	8	49.0	2
Tuxtla Chico	9	10	7	8	48.0	3
Tapachula	6	7	10	10	42.5	4
Huehuetan	5	6	7	6	32.0	8
Huixtla	3	7	10	8	34.5	7
Mazatán	6	6	8	6	35.0	6
Escuintla	5	8	7	7	36.0	5
Acapetahua	5	5	8	5	30.5	9
Mapastepec	3	4	6	3	21.0	10

According to this evaluation, the following two (2) areas were selected as the most eligible since they fulfill the above conditions.

- **Coffee Production Area**

Ejido Mixcum is located at the Municipality of Cacahoatán, to the north of Tapachula, in an area between 550 and 700 meters above sea level, with an approximate surface of 400ha. Most of the producers are ejido growers who belong to a producer' association.

- **Corn Production Area**

Cantón de Santa Cruz is located to the east of Tapachula toward the border with Guatemala, near the Suchiate River, in the municipality of Frontera Hidalgo, with an approximate surface of 500ha. Most of the producers are ejido growers and small-scale, low-income, private farmers who carry out activities within producers' organizations.

### 7.3 CONSIDERATION OF THE CROPS AND LIVESTOCK TO BE INTRODUCED FOR AGRICULTURAL DIVERSIFICATION

#### 7.3.1 Crops

In the selected two regions, the types of crops with possibilities to be introduced will be considered.

##### (1) Climatic Conditions of the Areas

The climatic conditions in each of the areas are indicated in the following table:

Areas	Altitude (m)	Temperature (°C)	Precipitation Annual (mm)	No. of Months Evaporation > Precipitation	Precipitation Dec-Mar (mm)
Frontera Hidalgo	60	27.5	1,903	5	39.7
Cacahoatán	660	26.7	3,904	4	184.9

Source: CNA

In Frontera Hidalgo, precipitation is 1,900mm, however, there are 5 months where evapo-transpiration is higher than precipitation and strongest dry season is from December to March with a precipitation of only 40mm. On the other hand, in the municipality of Cacahoatán where Ejido Mixcum belongs to, there are 4 months where evapo-transpiration is higher than precipitation and during the dry season, which is between December and March, precipitation is 185mm, higher than Frontera Hidalgo.

To the west of Ejido Mixcum, in Santo Domingo at an altitude of 820m, annual precipitation is up to 4,670mm and therefore precipitation in Ejido Mixcum is much larger than in Frontera Hidalgo. Judging from the mildew on the rocks of the area, we assume that there are few probabilities that the crop will suffer from lack of water. Besides, in the area of Ejido Mixcum there are rivers in the central area and in the eastern side with heavy flows during rainy season and even during dry season since there is enough night fog, humidity conservation on the soil is relatively high.

##### (2) Lineament for the Crops to be Introduced with Small and Medium Scale Producers

In order to introduce new crops and promote diversification in the areas of Santa Cruz and Ejido Mixcum, crops are required to fulfill the following requirements:

- a. To have relative ease to be placed in the market by the producers.
- b. Generate good utilities even in limited surfaces.
- c. They should be able to be carried out parallel to corn and coffee.
- d. Crop period should not be concentrated in a particular season and labor can be distributed.
- e. That it produces constant income.
- f. That it has few problems of pests and disease.
- g. That it takes advantage of the meteorological conditions of the region and that it has vision towards the North American market through NAFTA.
- h. That it does not require large investments in infrastructure construction.

**(3) Considerations from the Commercialization Point of View**

The problem and the possibility of commercialization of the products cultivated in the region under the influence of the target areas are shown in the following pages.

PERSPECTIVES FOR COMMERCIALIZATION OF THE MAIN  
AGRICULTURAL PRODUCTOS IN SOCONUSCO

PRODUCT	PROBLEMS IN THE PRESENT MARKET	PRESENT MARKET	FUTURE MARKET	PROFITABILITY
Corn	In 1999, CONASUPO stop operating in the grain market and guarantee prices for corn were eliminated. Tortilla subsidy was removed. Market behavior is unknown with this situation.	The region has corn deficit. 104,000 ton were harvested in 1997, importing 39,000 ton mainly corn flour for dough and tortilla industry.	Demand is estimated at 168, 000 ton for 2005 and 185,000 ton in 2010.	Low
Sorghum	7,000 ton of grain sorghum were produced. The region has a deficit of 8,000 ton.	There are poultry farms for broiler and bovine cattle ranches. This market produces 15,000 annual ton.	Demand in 2005 will be 20,000 ton and 30,000 in 2010.	Low
Soybean	9,200 ton are being produced and sent to Puebla to be processed as soy paste.	The consumers are the plants for livestock balanced feed. The demand for soy paste is 5,000 ton.	For 2005, demand will be 7,000 ton and for 2010 it will be 10,000 ton.	Low
Sesame	4,700 ton are being produced, part is used as cattle feed and part is commercialized outside of the region.	There are local plants for balanced feed and national oil plants.	The regional market will grow slowly as opposed to the rapidly growing national market.	Medium
Banana	The region is the main producer in Mexico. In 1997 it produced 447,000 ton. The export market depends on the competition of the regional production, which is very integrated. The national market is growing	United States and the national market.	United States, Canada with the possibility to enter into Japan, and the national market.	High
Mango	The region is the main producer in Chiapas. 8% of its production is being exported. 51,000 ton were produced in 1997. Intermediaries dominate commercialization of the national market. International market is carried out through packing plants with hydrothermic equipment.	United States, Canada and the national market.	United States, Canada, Africa and the national market.	High
Cashew	The production is industrialized in the region, part is being exported and the rest is sold at national market. Industry pays low prices to the producer discouraging them and therefore the processing plant operates below capacity.	The industrialized fruit is commercialized in the United States and in the national market	It would be the same as the present market, if there were sufficient production.	Medium
Cacao	In 1997, 4,350 tons were produced in the region and they were commercialized in the national market through intermediaries and commercializing companies with FIRA's support.	National market.	National market.	Medium
Coffee	The coffee market has been freed and its price is fixed at	Soconusco is the highest	Future production will be	Medium

PRODUCT	PROBLEMS IN THE PRESENT MARKET	PRESENT MARKET	FUTURE MARKET	PROFITABILITY
	international level with daily variations. Mexico participates in the most competitive market.	coffee-producing region in Chiapas. 45,000 tons were produced in 1996 and 80% was exported.	destined to the same present markets.	
Pineapple	Soconusco's production is 50 annual tons sold to the local market, with growing demand.	Local market.	Local market.	High
Tropical flowers (ginger)	National production is concentrated in Chiapas. It has a growing demand in the national and international market, but quality has to be improved.	National market, west coast of the United States and Canada.	United States, Canada and the national market.	High
Timber yielding trees	Cedar, mahogany, primavera, conacaste and oak are being produced. Cedar and mahogany have demand in the national market and the others are very fine woods with low demand.	Cedar, mahogany and oak have a high demand in the national market. Primavera and conacaste have a limited market.	Wide market for cedar, mahogany and oak and limited for primavera and conacaste.	High
Chamaedor Palm	It was irrationally exploited at national level and just recently the commercial exploitation started due to its wide national and international market.	National market.	National and international market	High

#### (4) Selection of the Crops to be Introduced

As a result of these considerations, in order to diversify corn, tropical flowers or pineapple were selected and in order to diversify coffee, tropical foliage and timber producing trees will be introduced.

#### (5) Selection of Tropical Flowers

The tropical flowers that are cultivated in the surroundings of Tapachula are shown in the following table:

Ornamental Plants	Scientific name	Altitude	Irrigation facilities	Shipments/year
<b>Flowers</b>				
- Hawaiiana (Ginger)	<u>Alpinia purpurata</u>	600-700>	Required, irrigation by furrow	All year round
- Heliconia	<u>Heliconia spp</u>	600-700>	Required, irrigation by furrow	Once a year
- Anthuriums	<u>Anthurium adreanum</u>	>1,000	Required, hydroponics	All year round
<b>Foliages</b>				
- Chamaedor Palm	<u>Chamaedora metallica</u>	>600-700	If available, production stabilizes	All year round
- Red Cordyline	<u>Cordyline terminalis</u>	>600-700	If available, production stabilizes	All year round

#### 1) Flowers

Considering the altitude of the target regions, the introduction of Anthuriums is difficult. In the case of Heliconias, since they only produce flower once a year, different types will have to be planted in order to prepare the deliveries all year round. On the other hand, Ginger has the advantage of producing all year long and could be introduced in the subproject area of Frontera Hidalgo.

#### 2) Foliages

The tropical flowers have long stems and the flowers are shipped without foliage, but when the florists make floral arrangements, they require foliage, thus the considerable demand for them. Amongst these are Chamaedor Palm (*Chamaedora metallica*) and 'bandera' (*Cordyline terminalis*). Bandera is commonly utilized in Ejido Mixcum to define properties and Chamaedor Palm grows wild in the Sierra Madre de Chiapas and both species can be grown in Ejido Mixcum.

#### (6) Introduction of Shade Trees for Coffee Plantations

In order to grow tropical flowers and foliage, trees providing shade are required to protect them from the damages caused by the intense solar rays. When introducing shade, one could take advantage of the several heights of the trees during its growth period as part of the diversification. Dominican Banana could be planted for shade since they reach a good height and they are already being vastly cultivated for shade near the subprojects. Also red cedar (*Cedrela odorata*), which has a great demand and is grown vastly in the areas around the subproject area, will be introduced as a timber yielding tree.



### **7.3.2 Species to be Introduced for Agriculture Mixed with Cattle Raising**

At present, few minor species of cattle can be seen in both target areas for the pre-feasibility study. In Santa Cruz sector, there are few crops dedicated to animal feed and the knowledge of the inhabitants of the region on animal husbandry for small and medium species is limited. Meanwhile, Mixcum presents the problem that since it is mainly a coffee region, it is difficult to grow grains destined as animal feed. Apparently, a swine Cholera outburst and Aujeszky disease that occurred in 1993 left a deep scar amongst the producers of the region. It is believed that presently, both diseases have been eradicated completely.

The cattle species to be introduced in the target areas will be determined if they are consistent with the following criteria:

#### **(1) Bovine cattle raising**

Bovine cattle raising starts with stock and after crossbreeding, it requires 3 years for the calf to be born and the expenses during this time are very high. In the selling process of the fattened livestock, the appearance of middlemen is inevitable and lately, because of the increase of smuggled cattle, the calf and livestock prices have decreased. The desire from the producers of raising this kind of cattle is low.

#### **(2) Swine raising**

In the case of swine, especially for meat consumption, there is the advantage that it only takes 4 months after birth to be able to commercialize them, making cash flow a lot faster. Also, in the region there is a great demand for this type of meat and the price is high. For raising swine only small pigpens are required and women carry out the feeding and cleaning. During commercialization there is the advantage that middlemen are different from those involved in cattle, and since the middlemen are mainly for slaughtering meat and processing, and they are local people, they will rarely decrease the prices.

#### **(3) Poultry raising**

As for poultry, in Cacahoatán there are several large-scale producers of Broiler type who produce their own feed and sell directly visiting their clients. Due to the massive entry of eggs from other states, there is no commercial advantage unless the eggs are Creole. In fact, in the surrounding areas of the Study, there are broiler producers who have closed their businesses since it is not profitable to depend from purchasing outside feed. Both Creole eggs and chicken are commercialized at high prices, but if this is not carried out in an organized manner, the benefits are being utilized for consumption and they will not become a real source of income.

With the above diagnosis, it is judged as most convenient and effective to promote swine raising and breeding in the region. It should be mentioned that the ideal would be to bring the stock from outside in order to accelerate the process and to increase the number of animals progressively. After carrying out the fattening process for several years, and upon acquiring more experience, if there is an increase in the interest from the producers the introduction of piglet raising and swine for reproduction could be thought of, in the future. However, this type of activity is not as easy as raising them for meat, and the risk is higher. Therefore, first a more formal technical assistance has to be established and there has to be an interest from the producers, limiting this activity to special producers who can carry out such activities jointly and in an organized manner.