

# The Use of the Sustainable Development Multi-Indicators for Evaluating the Stabilization in some new Rural Communities in Desert Areas of Egypt

W.F. ERIAN

Faculty Of Agriculture, Soil Department,  
Cairo University - Egypt.

**Key words:** Land Reclamation, Sustainable Development, Sugar Beet Zone

## 1. Abstract

One of the most important indicators to illustrate the success of the emigration policy in Egypt, is the increase of new rural communities in the Egyptian desert. Accordingly, the population inclination to move from the overpopulated Nile valley to the Egyptian desert increases, developing it, creating more job opportunities and generating income for the individual.

The ability of the new rural communities to realize sustainable development and the self-reliance through measurable explicit indicators, which makes it easier to identify the positive and negative factors

The main indicators used in this study could be grouped under the following topics natural resources, protection of environment, and physical and socio-economic aspects. Geographic Information System capabilities facilitate the handling of such various indicators.

The villages of Zone III, The Sugar Beet Zone, were chosen for this study which confirm the stabilization and sustainable development of these villages compared with the villages of Zone II which were previously studied by Erian (1996).

## 2. Introduction

The necessity of reclaiming and cultivating new lands is one of the major characteristics of agriculture in Egypt. Many circumstances dictated it:

- The need to leave the narrow, limited Nile Valley to the desert, in order to re-distribute the population. This is the only solution to diminish the growing overpopulation and environmental pollution.
- The insufficient local production and steadily increasing imports.
- The government inclines now towards improving the national income by promoting the free economics, decreasing unemployment and encouraging investments.

The government began the policy of distributing lands and providing job opportunities in the agricultural field as methods by which unemployment can be reduced.

The goals of these policies could be summarized as follows:

- Forming agricultural communities in the new lands capable of using advanced technology to reach high production as well as the best methodology for cultivation.

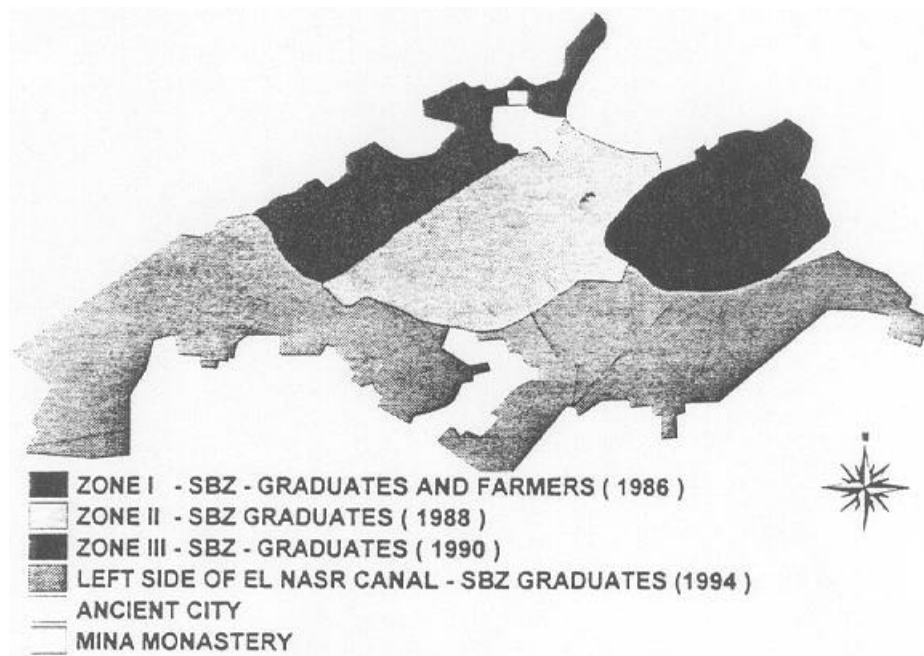
- Forming stable rural communities that may draw the population from the densely populated regions to the new lands where infrastructure and social services are provided to connect the new communities with the Nile Delta.

This study is concerned with Zone III villages, The Sugar Beet Zone, comparing it with Zone II which was evaluated previously by Erian (1996) the same methodology.

This study aims for an early evaluation of the development achieved by this 10 years community and examines how far the development is directed towards sustainability, which is indispensable for solving the problems that face this community.

### 3. General Characteristics of the Investigated Area

The Sugar Beet Zone (SBZ) is situated between latitudes 30°56'39" N and 30°41'49" N and longitudes 29°33'47" E and 29°51'48" E, covering an area of about 25000 ha. (59500 feddan). Map1 shows the main divisions of the SBZ area and its surroundings.

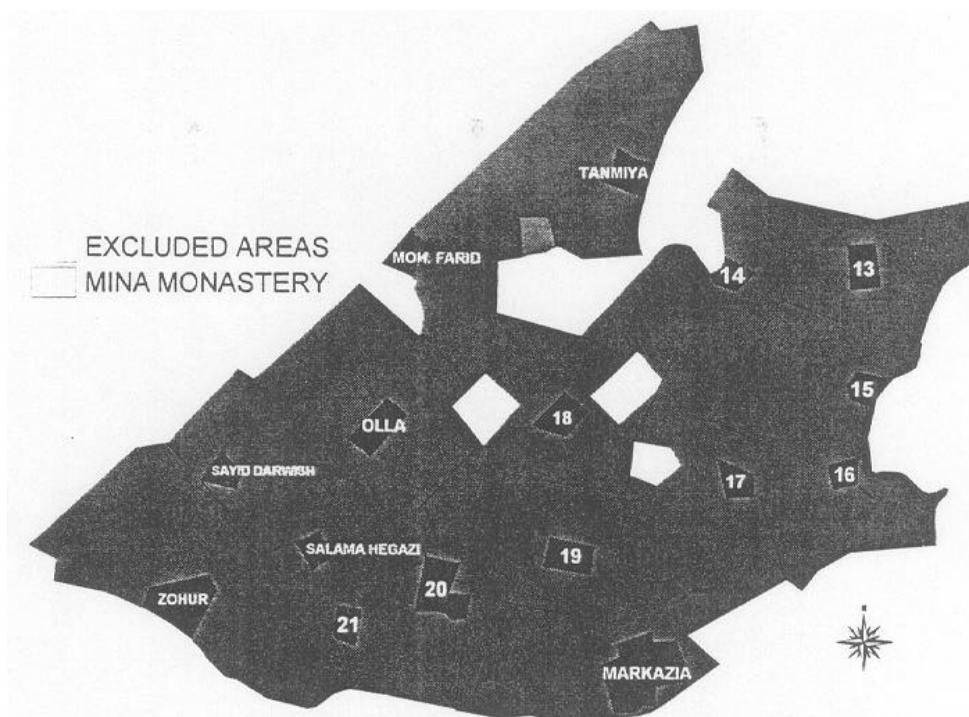


**Map 1. Main Divisions of the Sugar Beet Zone.**

The area has a Mediterranean climate, characterized by a rainy winter and a prolonged hot and dry summer. The annual rainfall sum is about 180 mm and most of the precipitation falls in winter between October and March. The mean annual temperature is 20.4°C. The maximum monthly temperature is 26.6°C in August and the minimum is 13.7°C in January. According to Erian (1988), most of the area is situated in the torric moisture regime, subdivision "Weak Aridic", except for some soils which are continuously saturated with water. These latter soils have an Aquic moisture regime and their soil temperature regime Thermic.

According to Hephny (1993) and Ezzat (1977), the investigated area has salty ground water that is unsuitable for irrigation, and Nile water pumped from the El Nubariya canal to El Nasr and Maryut.

The main villages of the Zone III In The Sugar Beet Area with its surroundings are illustrated in Map 2.



**Map 2. Villages Distribution in Zones II and III.**

**Table 1. Illustrates the Main Population Distribution in Zone III**

Village Name	Graduates			Wives				Workers			Relatives			Beneficiaries & Renters		
	M	F	T	Gr	Ben	Wo	T	M	F	T	M	F	T	M	F	T
Mohamed Farid	49	3	52	27	13	1	41	1		1	10	7	17	14		14
El Olla	138	15	153	94	41	13	148	13		13	47	31	78	44		44
El Tanmia	54	3	57	31	36	15	82	17		17	12	11	23	39		39
Sayed Darwish	21	9	30	9	6	4	19	6		6	7	3	10	4		4
Salama Hegazi	38	5	43	16	17	10	43	10		10	10	7	17	18		18
El Zohour	95	6	101	50	11	15	76	21		21	43	19	62	15		15
<b>TOTAL</b>	<b>395</b>	<b>41</b>	<b>436</b>	<b>227</b>	<b>124</b>	<b>58</b>	<b>409</b>	<b>68</b>	<b>0</b>	<b>68</b>	<b>129</b>	<b>78</b>	<b>207</b>	<b>134</b>	<b>0</b>	<b>134</b>

Village Name	Preschool				Total		School Age						Total		Grand Total
	0 - 4		4 - 6		M	F	Prim.		Prep.		Sec.		M	F	
	M	F	M	F			6 - 11		11 - 14		14 - 17				
	M	F	M	F	M	F	M	F	M	F	M	F			
Mohamed Farid	25	27	0	0	25	27	12	4	3	3	0	0	15	7	199
El Olla	70	54	27	23	97	77	45	37	8	2	4	1	57	40	707
El Tanmia	56	47	14	14	70	61	6	6	4	0	0	0	10	6	365
Sayed Darwish	12	22	3	3	15	25	9	7	1	3	0	0	10	10	129
Salama Hegazi	17	27	3	5	20	32	12	5	5	0	0	1	17	6	206
El Zohour	44	43	13	15	57	58	10	15	0	1	0	0	10	16	416
<b>TOTAL</b>	<b>224</b>	<b>220</b>	<b>60</b>	<b>60</b>	<b>284</b>	<b>280</b>	<b>94</b>	<b>74</b>	<b>21</b>	<b>9</b>	<b>4</b>	<b>2</b>	<b>119</b>	<b>85</b>	<b>2022</b>

M=Male; F = Female; Gr=Graduates; Wo=Women; T=Total  
 After, Caritas Integrated Development Center (1995).

**Table 2. The Production Rates for the Cultivation for the Cultivation Crops in Season 94/95- Zone III**

**a. Winter Crops:**

Village Name	Tot.. Ag. Vil.	Fruits Cult. Area/Fed	Production Rate per Feddan for the Different Crops												Uncult. Area Win		
			Wheat <sup>1</sup>				Broad Bean <sup>2</sup>				Clover					Winter Veg. <sup>*</sup>	
			1	2	3	4	1	2	3	4	1	2	3	4		1	4
El Tanmia	297	0	160	9	290	46400	29	3	98	2779	36	4	350	12600	11	3150	62
Said Darwish	121	0	76	8	236	17936	8	5	163	1219	26	4	350	8925	3	900	9
Mohammed Farid	261	0	180	13	668	120240	5	4	130	650	37	5	438	16188	1	300	38
Salama Hegazi	156	0	90	8	236	21240	12	4	114	1365	16	0	0	0	6	1650	33
El Olla	498	0	291	11	452	131532	44	4	130	5655	71	4	350	24850	10	3000	83
El Zohour	462	0	357	10	344	122636	18	9	293	5265	57	4	350	19950	4	1125	24
<b>TOTAL</b>	<b>1794</b>	<b>0</b>	<b>1154</b>		<b>2226</b>	<b>459984</b>	<b>115</b>		<b>926</b>	<b>16933</b>	<b>243</b>		<b>1838</b>	<b>82513</b>	<b>34</b>	<b>10125</b>	<b>247</b>

Village Name	Tot.. Ag. Vil.	Fruits Cult. Area/Fed	Production Rate per Feddan for the Different Crops										Uncult. Area Sum
			Corn <sup>3</sup>				Tomato				Summer Veg.		
			1	2	3	4	1	2	3	4	1	4	
El Tanmia	297	0	160	9	290	46400	29	3	98	2779	11	3150	62
Said Darwish	121	0	76	8	236	17936	8	5	163	1219	3	900	9
Mohammed Farid	261	0	180	13	668	120240	5	4	130	650	1	300	38
Salama Hegazi	156	0	90	8	236	21240	12	4	114	1365	6	1650	33
El Olla	498	0	291	11	452	131532	44	4	130	5655	10	3000	83
El Zohour	462	0	357	10	344	122636	18	9	293	5265	4	1125	24
<b>TOTAL</b>	<b>1794</b>	<b>0</b>	<b>1154</b>		<b>2226</b>	<b>459984</b>	<b>115</b>		<b>926</b>	<b>16933</b>	<b>34</b>	<b>10125</b>	<b>247</b>

Tot Ag Vil = Total Agricultural Village Areas  
 Cult. Area/Fed. = Cultivated Area/ Fed  
 Uncult. Area Win. = Uncultivated area in winter  
 Uncult. Area Sum. = Uncultivated area in summer

## 4. Materials and Methods

Indicators of successful development reflect specific changes that affect rural development.

**Such indicators are needed for several reasons:**

- They are important for assessing the impact of development efforts over time.
- They allow to identify possible development trade-offs for activities planned or taking place in a particular area.

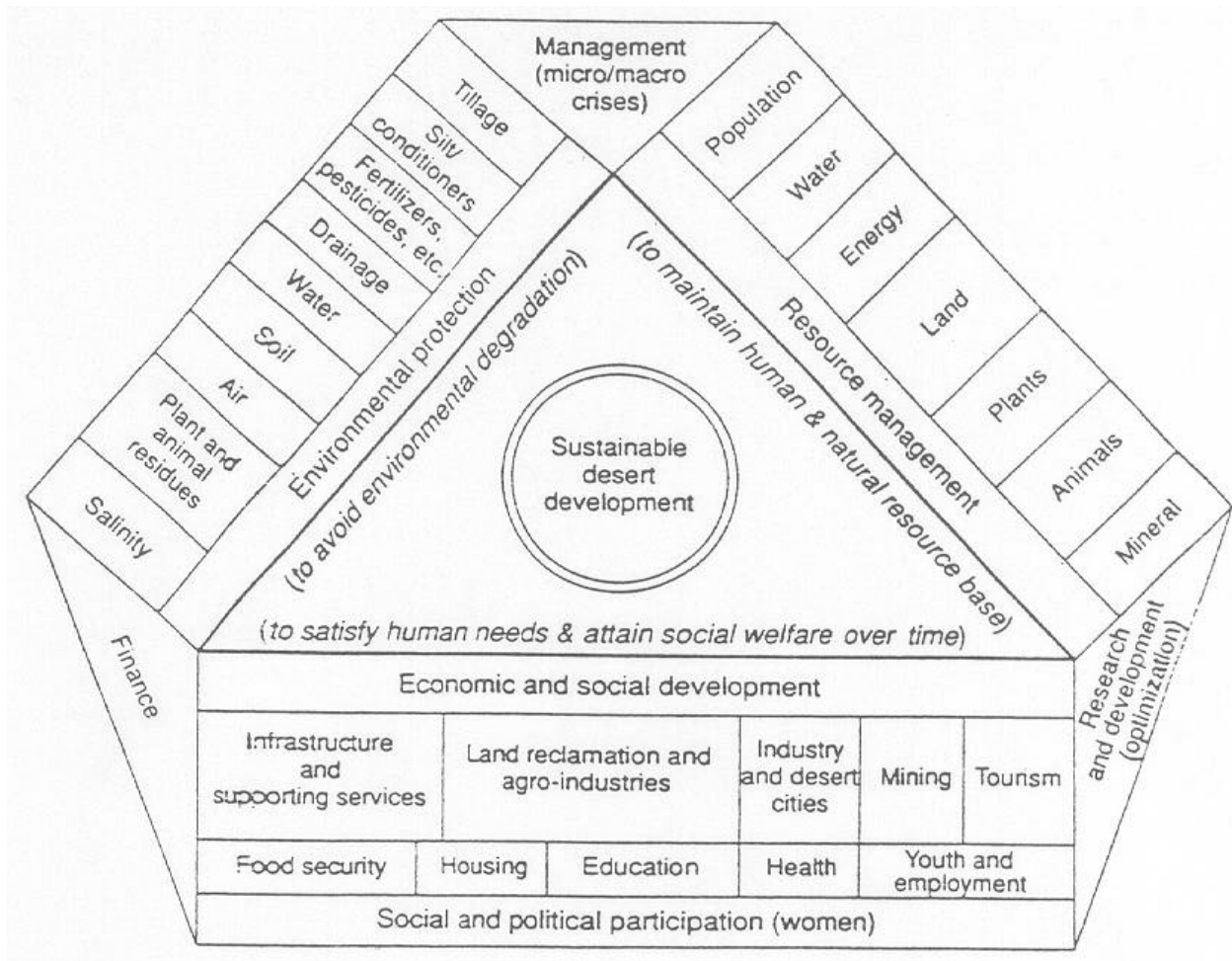
A well specified set of successful measures will allow planners to draw conclusions about the development strategy, activities and resources most appropriate for bringing about desired developmental change.

Since the rural communities are a recent experience, many strategies should be taken into consideration to guarantee the sustainability of these communities. Indicators used in this study as main parameters in sustainable development are shown in figure 1 (Bishay, 1993).

The stability of a recently formed rural community depends on many elements. Indicators could be grouped under six main headings as follows:

- Natural Resources.
- Environmental Problems
- Standard Of Living.
- Services Available.
- Production Limitations.
- Animal Production.

The main attributes, divisions of each of these main groups, are modified and shown in figure 2, (after Erian, 1996)



**Figure 1. Egypt Sustainable Desert Development, after Bishay (1993).**

**The methods used in this study can be broadly classified under the following headings:**

- Data collection and information extraction.
- Identifying evaluation criteria and their ratings
- The use of GIS capabilities for data input and data processing.
- Combination of analysis results using GIS and Integration of the main Sustainable Development Indicator groups in Raster maps to determine the most recommended strategic objectives and activities for sustainable development of the new rural communities.

#### **4.2 Data Collection**

Most of the socio-economic and environmental data were collected during the year 1995 through Caritas Integrated Development Center, CIDC, direct interviews with settlers the and Graduates Affairs Authority - GAA - Ministry of Agriculture. The data concerning land capability are presented after Erian (1996), and the data concerning available moisture are presented after Erian et al (1997).

#### **4.3 Identifying Evaluation Criteria and their Classes**

The main attributes and their classes were described by Erian (1996). Some modifications are presented in table 3.



#### 4.4 The Use of the GIS for Data Input and Data Processing

A geographic database is a tool for the capture, storage, processing and display of data and information generated by surveyors from original sources. Displayed information represents an aggregated value based on to primary data.

The Integrated Land and Watershed Information System (ILWIS) developed at ITC, Enschede, The Netherlands, version 2.02, has been used as the main software for this study.

Figures 2a, b, c, d, e, f. Divisions of each of the main groups.

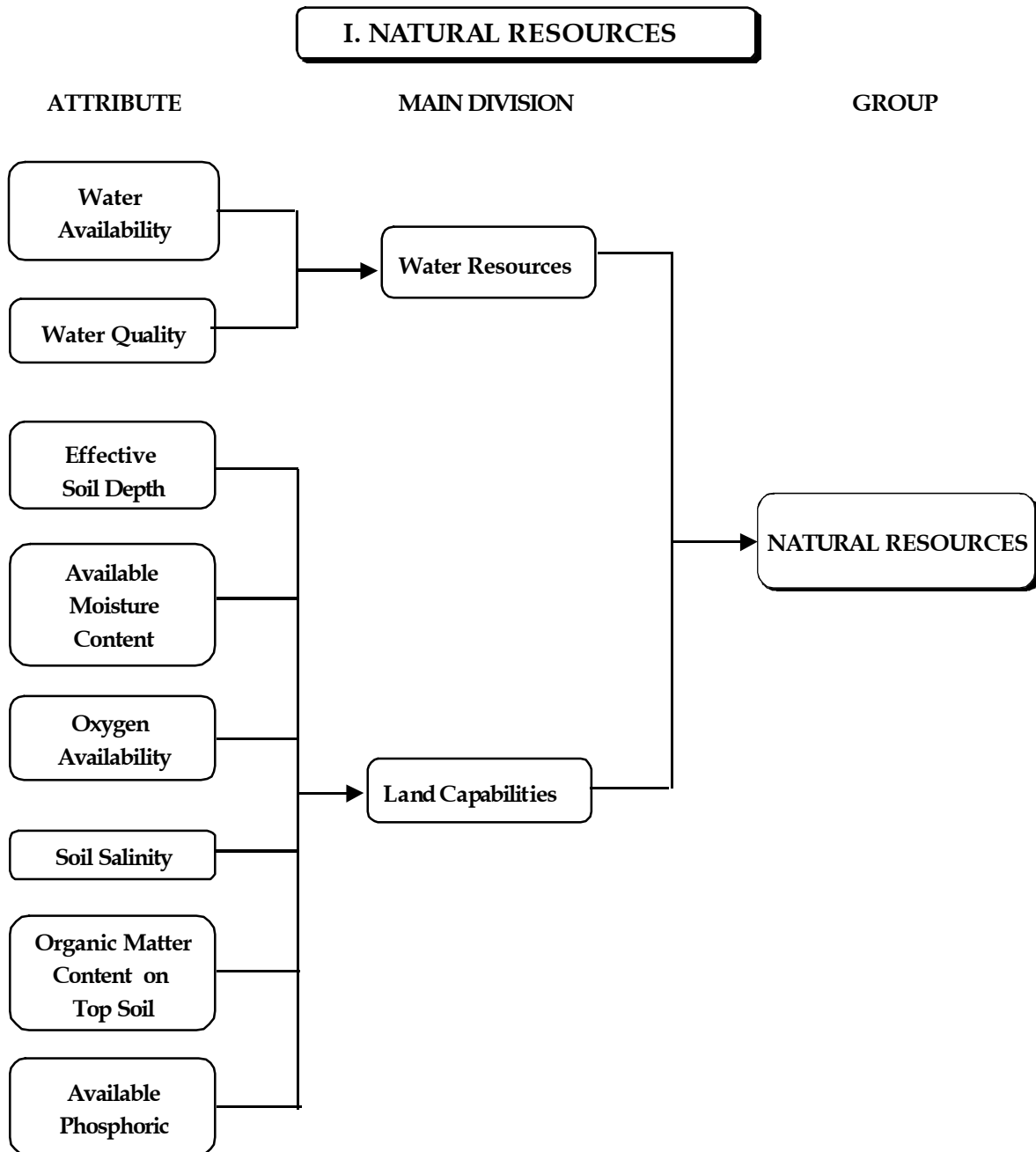
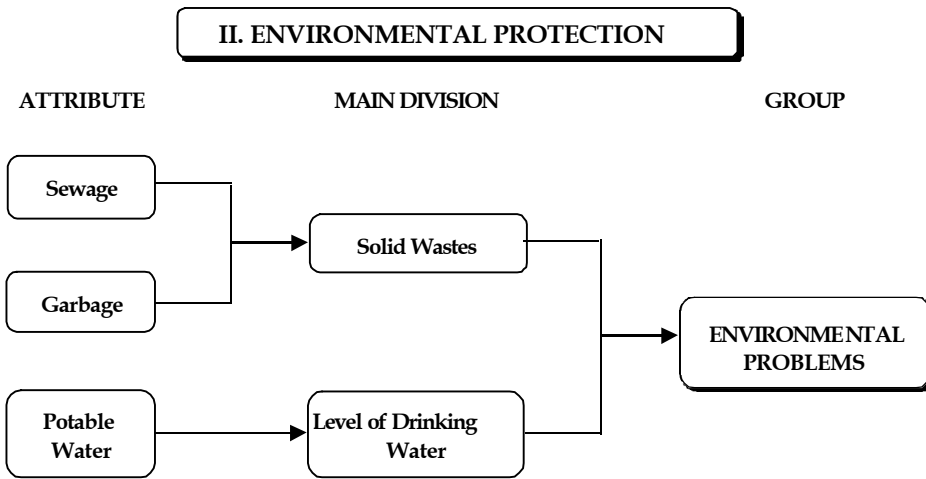
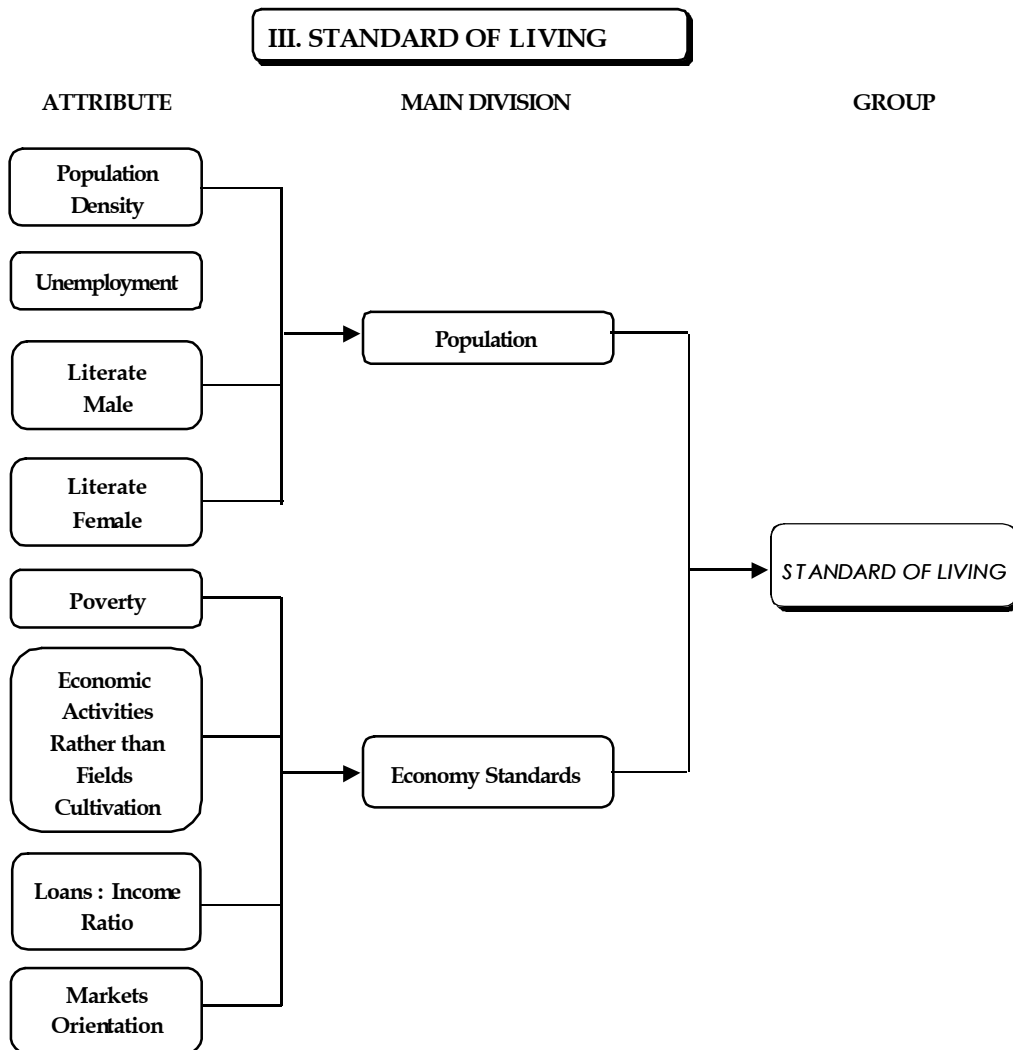


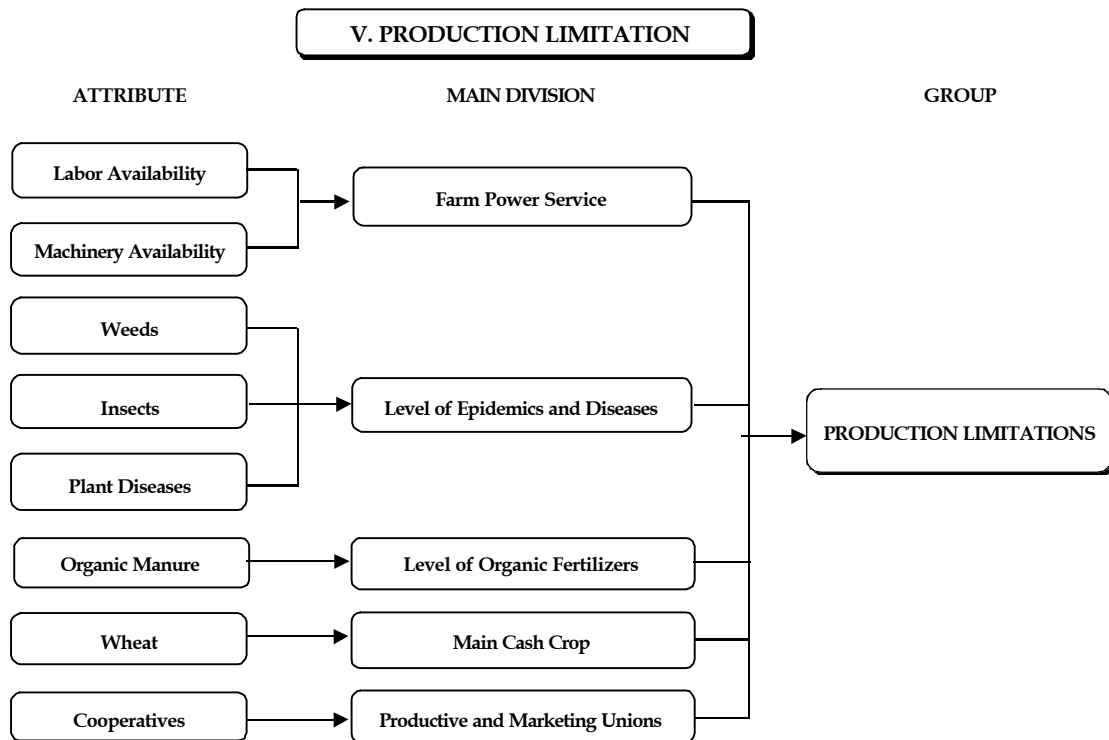
Figure 2a.



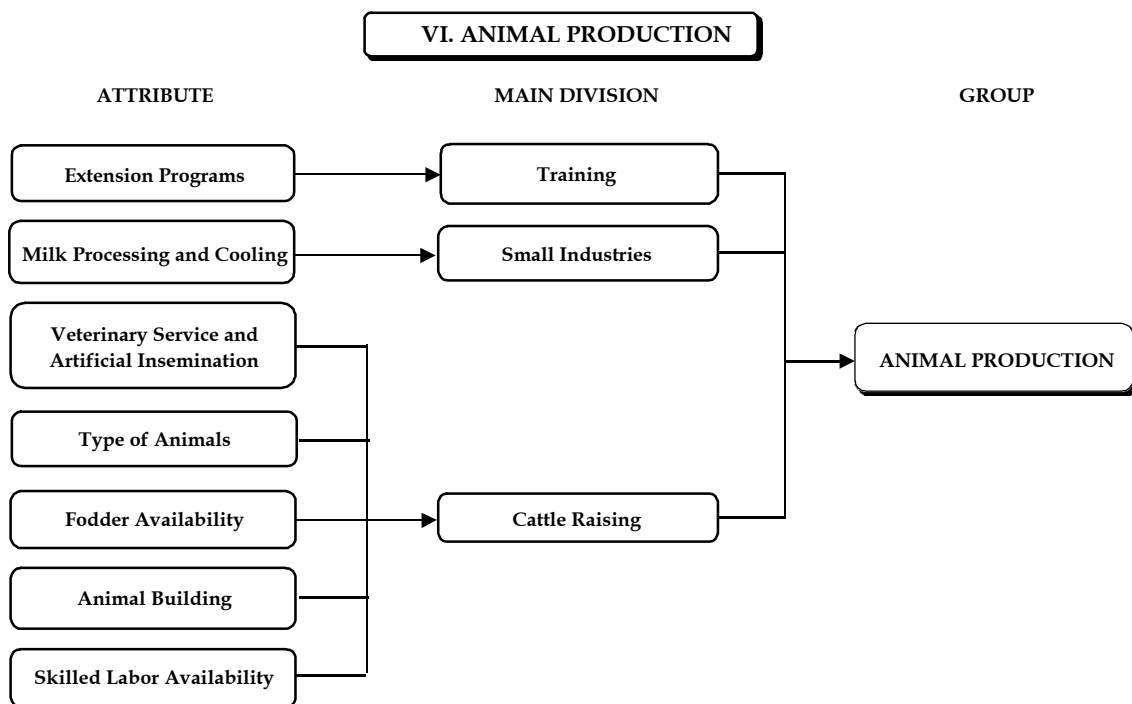
**Figure 2b.**



**Figure 2c.**



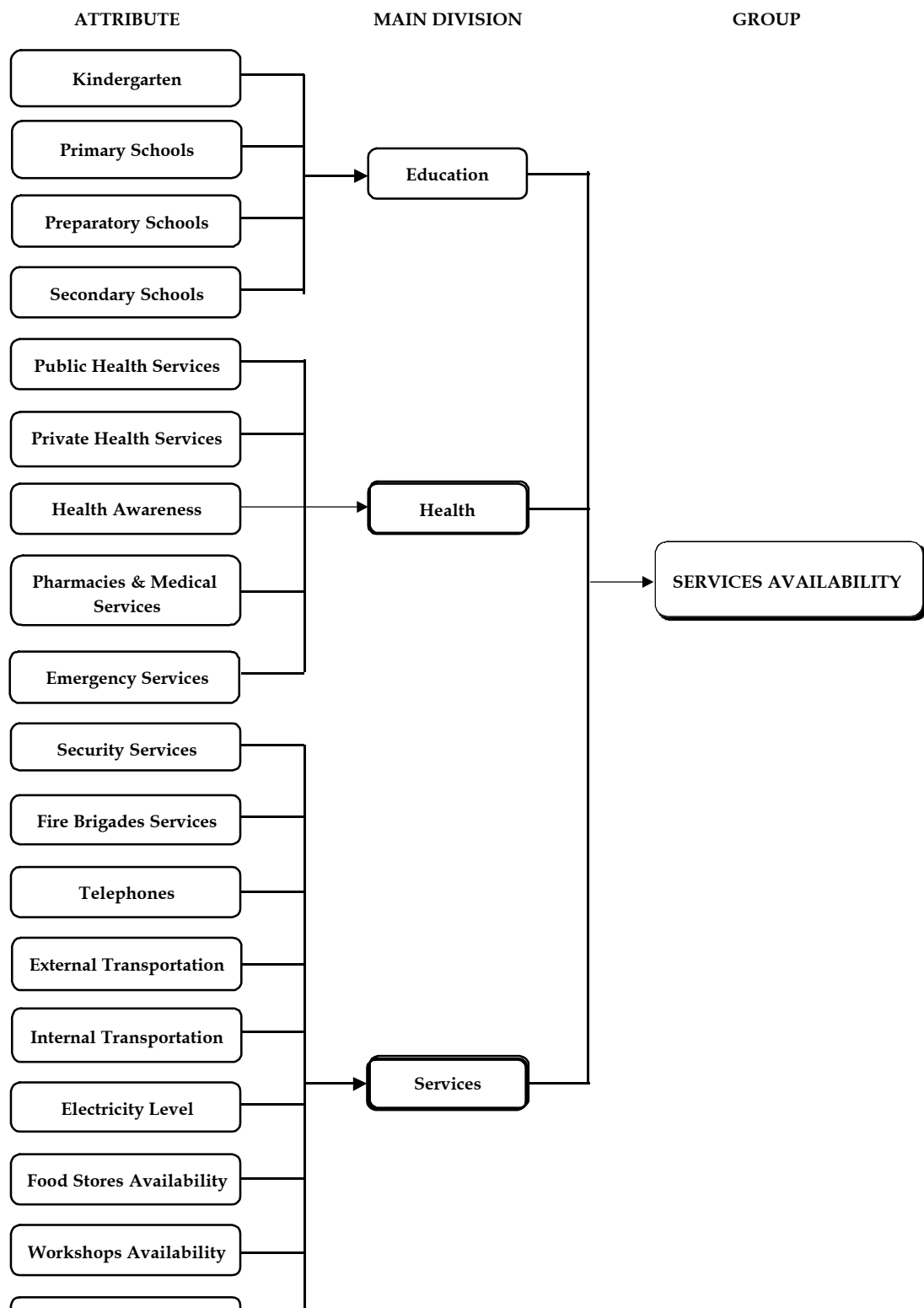
**Figure 2d.**



**Figure 2e.**



**IV. SERVICES AVAILABLE**



**Figure 2f.**

**Table 3. Classes of Attributes (Attributes Ratings)**

**GROUP: Natural Resources**

	Class Value	Water Availability %	Water Quality	Available Moisture * in mm	Electric Soil Depth * Depths of Petrocalcic or limestone	Soil Salinity * EC ds/m 250C	Organic Moisture * 30 cm.	Available Phosphoric * ppm (Olsen)
1	100	< 15	Very high suitability for irrigation. (Salinity < 1 EC)	160 - 250	Very deep profile (> 120 cm depth) with out any hard pans.	< 2	> 3	20
2	80	15 – 25	High suitability for irrigation. (Salinity 1- 2 EC)	120 - 160	Deep profile (100 - 120 cm depth) Hard pans are mainly Petrocalcic or/and petrogypsic.	2 - 4	15 - 3	15 - 20
3	60	25 - 40	Moderate suitability for irrigation. (Salinity 2 - 3 EC)	80 - 120	Moderate depth (100 - 60 cm depth). Hard pans are mainly Petrocalcic or/and petrogypsic.	4 - 8	8 - 15	10 - 15
4	40	40 - 50	Low suitability for irrigation. (Salinity 3 - 5 EC)	40 - 80	Shallow depth (30 - 60 cm depth). Hard pans are mainly petrocalcic or/and petrogypsic.	8 - 16	0.5 - 0.8	5 - 10
5	20	> 50	Not suitable for irrigation. (Salinity > 5 EC)	< 40	Very shallow depth (> 30 cm depth). Rock outcrop, mainly lime stone.	> 16	< 0.5	< 5

\* After Erian (1996)

**GROUP: ENVIRONMENTAL PROBLEMS**

	Class Value	Sewage	Garbage	Potable Water
1	100	A sewage system, connected to a main net and a treating station in order to benefit from the wastes and recycle it, is available.	A company collects, separates and recycles all of the garbage's components	Pure potable water is available through a water net. It reaches all the houses in the villages regularly and constantly.
2	80	No sewage system is available and the wastes are collected by cars equipped for special areas, by which the wastes will be treated and recycled.	Making use of most of the garbage wastes, recycling it and getting rid of the rest of it in certain areas prepared for it.	Pure potable water is available through a water net. It reaches all the houses in the villages regularly but it stops for some times.
3	60	Biogas units are available in each house to recycle wastes and, with the presence of regular servicing.	The garbage are collected in certain places and some of its components are recycled.	Adequate water purification stations are present, organized by the government and reaches all the houses.
4	40	Tranches are available, they are cleaned and wastes are thrown in certain areas.	The garbage are collected in certain areas and recycling process takes place.	The water reaches the houses from the purification stations in public taps, it does not reach houses and it does not stop for long periods.
5	20	Tranches are cleaned and the wastes are thrown away randomly.	garbage are got rid off by burning or by being thrown randomly.	The water reaches the houses from the purification stations in public taps, it does not reach houses but it stops for long periods.

**GROUP: STANDARD OF LIVING**

**MAIN DIVISION: Population**

	Class Value	Literate Male in %	Literate Female in %	Unemployment in %	Population Density Person/Km2, optimum; 200/Km2
1	100	> 90	> 90	< 5	125 - 200
2	80	70 - 90	70 - 90	5 - 10	100 - 125
3	60	50 – 70	50 - 70	10 - 15	75 - 100
4	40	30 – 50	30 - 50	15 - 20	50 - 75
5	20	< 30 Very Low	< 30 Very Low	> 20 Very high	< 50

**MAIN DIVISION: Economic Standards**

R	Class Value	Poverty Annual \$US/person village inhabitants	Loans : income Ratio Village Inhabitants/person in %	Econ. Activities rather than Field Cultivation Work ratio of projects : number of residence in %	Markets Orientation
1	100	> 8000	< 20	> 30	The presence of good roads. The presence of near markets (<10 Km.) A Sorting and canning system. A marketing company and producers unions.
2	80	4000 - 8000	20 - 35	15 - 30	Good roads The markets are from 10 - 30 Kms away.
3	60	1600 - 4000	35 - 50	30 - 10	Good roads. Markets are from 30 - 40 Km. Away. The presence of a group marketing / local markets to show to the merchants.
4	40	400 - 1600	50 - 65	10 - 5	Mod. Roads The markets are more than 70 - 120 Km. away. No local marketing system
5	20	< 400	> 65	< 5	Unpaved roads. The markets are more than 120 Km. away. No group marketing system is present.

**GROUP: SERVICES AVAILABILITY**

**MAIN DIVISION: Education**

	Class Value	Kindergarten	Primary Schools	Preparatory Schools	Secondary Schools
1	100	A furnished kindergarten is available in a suitable area including playgrounds, hobbies rooms and trained supervisors. The distance to reach it is not more than 300 m.	There is a school in each village, and can be reached on foot. It has qualified teachers, suitable illustrating materials, libraries, play grounds, lab, computer lab, and it teaches at least one foreign language	There is a school in each village, and can be reached on foot. It has qualified teachers, suitable illustrating materials, libraries, play grounds, lab, computer lab, and it teaches at least one foreign language	There is a school in each village. It has qualified teachers, suitable illustrating materials, libraries, play grounds, lab, computer lab, and it teaches at least one foreign language, it is located in a distance is < 2 Km.
2	80	A furnished kindergarten is available in a suitable area including playgrounds, hobbies	There is a school in each village. It has qualified teachers, suitable illustrating materials, libraries,	There is a school in each village. It has qualified teachers, suitable illustrating materials, libraries, play	There is a school in each village. It has qualified teachers, suitable illustrating materials, libraries,

		rooms and trained supervisors. The distance to reach it is 3 - 1 Km.	play grounds, lab, computer lab, and it teaches at least one foreign language. It is located in a distance of 1- 2 Km.	grounds, lab, computer lab, and it teaches at least one foreign language. It is located in a distance of 1- 2 Km.	play grounds, lab, computer lab, and it teaches at least one foreign language. It is located in a distance of 2 - 3 Km.
3	60	A furnished kindergarten is available in a suitable area including playgrounds, hobbies rooms and trained supervisors. The distance is 1 - 2 Km, but transportation is available.	The school can be reached on foot, but it lacks certain basics of the right educational method.	The school can be reached on foot, but it lacks certain basics of the right educational method.	The school can be reached on foot, but it lacks certain basics of the right educational method, it is located in a distance of 3 - 5 Km, there are regular transportation means.
4	40	A furnished kindergarten is available in a suitable area including playgrounds, hobbies rooms and trained supervisors. The distance is 1 - 2 Km, but there is no transportation available.	The school is located in a distance of 1- 2 Km., but it lacks certain basics of the right educational method.	The school is located in a distance of 1- 2 Km., but it lacks certain basics of the right educational method.	The school is located in a distance of 3 - 5 Km., but it lacks certain basics of the right educational method, there are no regular transportation means.
5	20	No Kindergartens > 2 Km.	No Schools are available in an area of > 2 Km.	No Schools are in an area of > 2 Km.	No Schools in more than 5 Km, no means of transportations are available.

## MAIN DIVISION: HEALTH

	Class Value	Public Health Service	Private Health Service	Health Awareness <sup>2</sup>	Pharmacies & Medical Services	Emergency Services
1	100	A public hospital in the range of 2.5 beds / 1000 persons (and at least 20000 persons in the an area of 30 Km. An equipped health unit, a resident doctor in each village (1 - 2 Km.)	A specialized health center including an analytical lab to serve an area of 5 - 8 Km., residing in it 10000 persons.	> 60	There is a pharmacy in an area of not more than 1 - 2 Km.	An emergency center, an equipped ambulance car, a doctor and a first aid man in an area of 5 - 10 Km.
2	80	A moderately equipped health unit and a resident doctor in each village to serve an area of 2 - 5 Km.	A specialized clinic working most of the week and serving a period of 1 - 2 Km.	30 - 60	There is a pharmacy in an area of 2 - 3 Km.	An equipped ambulance car, a doctor and a first aid men in an area of 10 - 20 Km.
3	60	A moderately equipped health unit, a non resident doctor to serve an area of 2 - 5 Km.	A specialized clinic working certain days of the week and serve a period of 2 - 5 Km.	10 - 30	There is a pharmacy an area of 3 - 5 km.	An equipped ambulance car, a doctor and a first aid men in a circle of a radius of 10 - 20 Km, and the presence of first aid equipped centers in an area of 1 - 2 Km.

2. The percentage of the villages' adults who have medical awareness and some who had first aid basics.

4	40	A non resident doctor in health unit, (2 - 3 times weekly).	A general practitioner clinic residing in the village and serving an area of 1 - 2 Km.	5 - 10	There is a pharmacy in an area of 5 - 8 Km.	An equipped ambulance car, a doctor and a first aid men in a circle of a radius of > 30 Km, and the presence of first aid equipped centers in an area of 2 - 5 Km.
5	20	No health units exist in the area of > 5 Km.	A clinic of a non residential general practitioner and serve an area of 2 - 5 Km.	< 5	There are no pharmacies.	There are no any emergency services.

## MAIN DIVISION: SERVICES

	Class Value	Security Services	Fire Brigades Services	Tele-phones	External Transportation	Internal Transportation	Food Store 3	Works hops 4
1	100	An equipped police station with mobile patrols covering an area of < 5 Km <sup>2</sup> .	An equipped fire combating station, and a fire engine working 24 hours a day in an area of 10 Km <sup>2</sup> . It is preferable if 20 - 30 % of the residents are trained to extinguish fires.	A telephone net that can be extended to all the villages' houses.	Bus lines that pass regularly through all the villages and reach at least the nearest 3 cities all the week.	Public or domestic transportation lines that pass regularly in all the roads and work 18 hours daily.	> 80	> 60
2	80	An equipped police station with mobile patrols covering an area of 5 - 10 Km <sup>2</sup> .	An equipped fire combating station, and a fire engine working 24 hours a day in an area of 25 Km <sup>2</sup> . It is preferable if 10 - 20 % of the residents are trained to extinguish fires.	There is a public telephone central working all the weak and at least 18 hours daily.	Bus lines that pass regularly in certain places in central villages and reach at least 3 cities, all the week.	Public or domestic transportation lines that pass regularly in all the roads and work 12 hours daily.	60 - 80	40 - 60
3	60	An equipped police station with mobile patrols covering an area of 10 - 20 Km <sup>2</sup> .	A fire combating station, serving an area of 50 Km <sup>2</sup> . Simple fire extinguishers are distributed in the village. At least 5 - 10% of the residents are trained to extinguish fires.	There are 2 or more telephone lines working for the public in a place that is easily reached and for at least 18 hours daily.	Bus lines that pass regularly in certain places in central villages and reach at least 3 cities, but not all the week..	Public or domestic transportation lines that pass regularly in all the roads and work 12 hours daily.	40 - 60	20 - 40

3. Area of the shops per village are in m<sup>2</sup>, average area of the village is equal to 3 Km<sup>2</sup> the average inhabitants are 500 person.
4. Area of the workshops per village are in m<sup>2</sup>, average area of the village is equal to 3 Km<sup>2</sup>, the average inhabitants are 500 person.

4	40	An equipped police station with mobile patrols covering an area of 20 - 30 Km <sup>2</sup> .	Simple fire extinguishers are available. At least 5% of the residents are trained to extinguish fires.	One telephone lines works for the public in a place that is easily reached and for at least 12 hours daily.	Bus lines that pass regularly in certain places and reach the nearest city.	No Transportation line but irregular taxicabs that do not work at night.	20 - 40	10 - 20
5	20	There are no police stations in an area of > 30 Km <sup>2</sup> .	There are no fire stations, equipment or school teams to interfere if any fire started.	There are no telephone lines.	No bus lines are working in the area.	There are no any means of transportation.	< 20 - nil	< 10

#### GROUP: PRODUCTION LIMITATION

	Class Value	Labor Availability (per hectar) Man power for traditional irrigated agriculture .	Machinery Availability	Weeds, Insects & Plant Diseases % of spread of weeds insects and diseases.	Organic Manure Organic fertilizers added in relation to annual needs %	Cooperatives	Wheat Actual yield in relation to optimum crop yield %
1	100	> 10	An equipped agriculture mechanism station and specialized in the cultivating process to serve an area of 5 Km <sup>2</sup> , with high efficiency.	< 25	100 - 85	An active Agricultural Cooperative is present in each village, with an elected director. It will activate the agricultural roles in providing the production, marketing, training and extension with very high efficiency.	100 - 85
2	80	6 - 10	An equipped agriculture mechanism station with specialists in the cultivating process to serve an area of 5 Km, with moderate efficiency.	25 - 50	85 - 75	An active Agricultural Cooperative in each village, with an elected member of boards and a specialized director. It will activate the agricultural roles in providing the production, marketing, training and guidance, with moderate efficiency.	85 - 75
3	60	4 - 6	a moderately equipped mechanism station with a technician of a moderate training to serve an area 5 Km <sup>2</sup> . with low efficiency.	50 - 65	75 - 65	An active Agricultural Cooperative is present in each village, with an elected member of boards and a specialized director. It will activate the agricultural roles in providing the production, marketing, training and guidance, with low efficiency.	75 - 65
4	40	2 - 4	a moderately equipped mechanism	65 - 85	65 - 50	It will have a limited number of activities as	65 - 50

			station a technician of a moderate training to serve an area of 5 Km2 with very low efficiency.			providing the production manufacturing and marketing, with very low efficiency.	
5	20	< 2	No agriculture mechanism	> 85	< 50	They are not present or their role is nil	< 50

## GROUP: ANIMAL PRODUCTION

	Class Value	Veterinary Service & Artificial Insemination	Type of Animals	Fodder Availability	Animal Buildings	Skilled Labor Availability	Extension Programs	Milk Processing & Cooling
1	100	A permanent available specialized veterinarians with excellent experience on AI5.	Healthy animals from known breeding, in suitable size and have high productivity .	The green fodder is available the whole year, besides the concentrates and the right nutrition supervised by a specialized technician.	Health barns with scientific systems and areas suitable for the animals to have the right environment	High technical workers are available. They can deal with the animals, take care of it and the barns, and make sure that they get their needs.	The training programs, knowledge transfer and latest information are available in an organized, regular method.	Mechanical milking, collecting, , cooling and gauging units are available in an area of not more than 500 m., besides the presence of units for processing milk, cheese and butter or a cooling cars for collecting milk.
2	80	Temporary available specialized veterinarians with experience on AI.	Healthy animals from known breeding, in suitable size and have moderate productivity .	The green fodder is available the whole year, it is compensated by dry fodder and concentrates , supervised by a specialized technician.	Health barns with scientific systems and areas suitable for the animals to have the right environment but the water stops in the farm and the it is difficult for the animals to get their complete needs	The workers are moderately trained	The training programs, knowledge transfer and latest information are available in a moderate method.	Mechanical milking, collecting, , cooling and gauging units are available in an area of not more than 1- 2 Km., besides the presence of units for processing milk, cheese and butter or a cooling cars for collecting milk.
3	60	Temporary available veterinary without good experience on AI.	The animals are in good size but has some diseases which can be treated, it has moderate productivity	The green fodder is available some times during the year, it is compensated by the dry fodder, concentrates , there is no specialized technical	The cattle barns are moderately valid, they are (interlacing? ) with the residing areas.	The workers have moderate to poor training.	The training programs, knowledge transfer and latest information are available in a moderate - poor method.	Mechanical milking, collecting, , cooling and gauging units are available in an area of not more than 2 - 5 Km., besides the presence of units for processing milk, cheese



				supervisor.					and butter or a cooling cars for collecting milk.
4	40	Permanently recently graduated veterinarians with low experience	Animals with poor to moderate productivity and have some diseases that can be treated.	There is green fodder, but the fodder lacks during a long period in the year, besides there is no technical supervision.	The cattle barns are in moderate to poor condition and they interlace with the residential areas.	The workers have poor training	The training programs, knowledge transfer and latest information are available in a poor method.	The area is > 5 Km, and there is no good method to collect the milk.	
5	20	Temporary / not available recently graduated non experienced veterinarians .	Weak and sick animals with very poor productivity .	There is no right nutrition plan and the fodder are not easily available in the area.	The available cattle barns are not valid at all for any animal activity (production).	No workers are available	The training programs, knowledge transfer and latest information are not available.	No milking units are available.	

## 5. Results and Discussion

The first step in working with a GIS was to transform maps of the different indicators from analog to digital form by digitizing these maps and converting them to vector format. They are then polygonized and transformed into raster maps, applying geometric correction and adding the coordinates to enable to superimpose them. The MCALG and Tab CALC transformation programs were used to obtain thematic maps.

A set of decision rules was applied to the results to divide them in classes. The main results are represented as in tables 4, 5, 6, 7, 8, 9

**Table 4. Evaluation of Natural Resources**

	Village Name	Water Availability	Water Quality	Available Moisture	Effective Soil Depth	Soil Salinity	Organic Manure %	Available Phosphoric (Olsen) PPM	Oxygen Availability	Rating Value	Classes	Limitations
		NR <sub>1</sub>	NR <sub>2</sub>	NR <sub>3</sub>	NR <sub>4</sub>	NR <sub>5</sub>	NR <sub>6</sub>	NR <sub>7</sub>	NR <sub>8</sub>			
Zone III	El Tanmia	80	100	60	80	100	80	80	100	85	I	
	Mohamed Farid	60	100	40	60	100	80	60	100	75	II	NR <sub>3</sub>
	El Olla	60	100	40	80	100	80	80	100	80	II	NR <sub>3</sub>
	Sayed Darwish	100	100	40	60	100	80	60	100	80	II	NR <sub>3</sub>
	Salama Hegazi	20	100	60	60	100	80	60	100	72.5	II	NR <sub>1</sub>
	El Zohour	60	100	40	60	100	80	80	100	77.5	II	
Zone II	13	60	100	40	60	100	80	20	100	70	II	NR <sub>7</sub> , NR <sub>3</sub>
	14	20	100	60	80	80	60	20	100	65	IV	NR <sub>1</sub> , NR <sub>7</sub>
	15	40	100	60	100	100	100	80	100	85	I	NR <sub>1</sub>
	16	40	100	40	60	100	60	100	100	75	II	NR <sub>1</sub> , NR <sub>3</sub>
	17	60	100	60	100	100	80	80	100	85	I	
	18	80	100	60	60	100	80	100	100	85	I	
	19	100	100	60	100	100	80	60	100	87.5	I	
	20	100	100	40	80	100	80	40	100	80	II	NR <sub>3</sub> , NR <sub>7</sub>
	21	40	100	40	80	100	80	60	100	75	II	NR <sub>1</sub> , NR <sub>3</sub>
	Markazia	80	100	60	80	100	80	80	100	85	I	

**Table 5. Evaluation of the Environmental Problems**

	Village Name	Sewage	Garbage	Drinking Water	Rating Value	Class	Limitations
		EP <sub>1</sub>	EP <sub>2</sub>	EP <sub>3</sub>			
Zone III	El Tanmia	30	20	30	26.67	V	EP <sub>2</sub> , EP <sub>1</sub> , Ep <sub>3</sub>
	Mohamed Farid	30	20	30	26.67	V	EP <sub>2</sub> , EP <sub>1</sub> , Ep <sub>3</sub>
	El Olla	30	20	20	23.33	V	EP <sub>2</sub> , EP <sub>3</sub> , Ep <sub>1</sub>
	Sayed Darwish	30	20	30	26.67	V	EP <sub>2</sub> , EP <sub>1</sub> , Ep <sub>3</sub>
	Salama Hegazi	30	20	30	26.67	V	EP <sub>2</sub> , EP <sub>1</sub> , Ep <sub>3</sub>
	El Zohour	30	20	20	23.33	V	EP <sub>2</sub> , EP <sub>3</sub> , Ep <sub>1</sub>
Zone II	13	20	20	40	26.67	V	EP <sub>1</sub> , EP <sub>2</sub> , Ep <sub>3</sub>
	14	20	20	40	26.67	V	EP <sub>1</sub> , EP <sub>2</sub> , Ep <sub>3</sub>
	15	20	20	40	26.67	V	EP <sub>1</sub> , EP <sub>2</sub> , Ep <sub>3</sub>
	16	20	20	40	26.67	V	EP <sub>1</sub> , EP <sub>2</sub> , Ep <sub>3</sub>
	17	20	20	40	26.67	V	EP <sub>1</sub> , EP <sub>2</sub> , Ep <sub>3</sub>
	18	20	20	40	26.67	V	EP <sub>1</sub> , EP <sub>2</sub> , Ep <sub>3</sub>
	19	20	20	40	26.67	V	EP <sub>1</sub> , EP <sub>2</sub> , Ep <sub>3</sub>
	20	20	20	40	26.67	V	EP <sub>1</sub> , EP <sub>2</sub> , Ep <sub>3</sub>
	21	20	20	40	26.67	V	EP <sub>1</sub> , EP <sub>2</sub> , Ep <sub>3</sub>
	Markazia	60	20	40	40.00	V	EP <sub>2</sub> , EP <sub>3</sub>

**Table 6. Evaluation of the Standard of Living**

	Village Name	ECONOMY STANDARDS				POPULATION				Rating value	Classes	Limitations
		Ec. Activities rather than Field Cultivation	Poverty	Loans : Income	Markets & Roads	Literate Male	Literate Female	Unemployment	Pop. density			
		SL <sub>1</sub>	SL <sub>2</sub>	SL <sub>3</sub>	SL <sub>4</sub>	SL <sub>5</sub>	SL <sub>6</sub>	SL <sub>7</sub>	SL <sub>8</sub>			
Zone III	El Tanmia	60	20	20	40	80	60	20	40	42.5	IV	SL <sub>2</sub> , SL <sub>3</sub> , SL <sub>7</sub> , SL <sub>4</sub> , SL <sub>8</sub> ,
	Mohamed Farid	20	40	40	40	80	60	20	20	40	IV	SL <sub>1</sub> , SL <sub>7</sub> , SL <sub>8</sub> , SL <sub>2</sub> , SL <sub>3</sub> , SL <sub>4</sub>
	El Olla	40	20	20	40	80	60	40	100	50	IV	SL <sub>2</sub> , SL <sub>3</sub> , SL <sub>1</sub> , SL <sub>4</sub> , SL <sub>7</sub> ,
	Sayed Darwish	40	40	40	40	80	60	60	20	47.5	IV	SL <sub>8</sub> , SL <sub>1</sub> , SL <sub>2</sub> , SL <sub>3</sub> , SL <sub>4</sub> ,
	Salama Hegazi	60	40	40	40	80	60	100	20	55	III	SL <sub>8</sub> , SL <sub>2</sub> , SL <sub>3</sub> , SL <sub>4</sub> ,
	El Zohour	60	20	20	40	80	60	60	40	47.5	IV	SL <sub>2</sub> , SL <sub>3</sub> , SL <sub>4</sub> , SL <sub>8</sub> ,
Zone II	13	40	20	20	20	40	40	20	40	30	V	SL <sub>2</sub> , SL <sub>3</sub> , SL <sub>4</sub> , SL <sub>7</sub> , SL <sub>1</sub> , SL <sub>5</sub> , SL <sub>6</sub> , SL <sub>8</sub>
	14	60	40	40	20	80	80	20	20	45	IV	SL <sub>4</sub> , SL <sub>7</sub> , SL <sub>8</sub> , SL <sub>2</sub> , SL <sub>3</sub> ,
	15	60	20	20	40	80	60	80	80	55	III	SL <sub>2</sub> , SL <sub>3</sub> , SL <sub>4</sub> ,
	16	60	40	20	20	100	80	100	20	55	III	SL <sub>3</sub> , SL <sub>4</sub> , SL <sub>2</sub> ,
	17	60	20	20	20	80	60	60	60	47.5	IV	SL <sub>2</sub> , SL <sub>3</sub> , SL <sub>4</sub> ,
	18	40	20	20	20	60	60	20	60	37.5	V	SL <sub>2</sub> , SL <sub>3</sub> , SL <sub>4</sub> , SL <sub>7</sub> , SL <sub>1</sub>
	19	60	40	60	20	80	60	60	20	50	IV	SL <sub>4</sub> , SL <sub>8</sub> , SL <sub>2</sub> ,
	20	80	40	60	40	80	40	20	20	47.5	IV	SL <sub>8</sub> , SL <sub>2</sub> , SL <sub>4</sub> , SL <sub>6</sub> ,
	21	60	40	60	20	40	20	60	20	40	IV	SL <sub>4</sub> , SL <sub>6</sub> , SL <sub>8</sub> , SL <sub>2</sub> , SL <sub>5</sub>
	Markazia	60	40	80	20	80	60	20	40	50	IV	SL <sub>4</sub> , SL <sub>7</sub> , SL <sub>2</sub> , SL <sub>8</sub> ,

**Table 7. Evaluation of the Services Availability**

	Village Name	EDUCATION				HEALTH					SERVICES			
		Pre.	Prim.	Prep	Sec.	Public Health services	Private Health services	Health Awareness	Pharma-cies & Medical services	Emer-gency services	Security services	Fire brigade services	Commun-ications Tele-phones	Ext Trans-portion
		E <sub>1</sub>	E <sub>2</sub>	E <sub>3</sub>	E <sub>4</sub>	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	H <sub>4</sub>	H <sub>5</sub>	S <sub>1</sub>	S <sub>2</sub>	S <sub>3</sub>	S <sub>4</sub>
Zone III	El Tanmia	0	20	20	20	40	20	40	20	20	40	20	40	60
	Mohamed Farid	0	20	20	20	20	20	20	20	20	40	20	40	60
	El Olla	0	20	20	20	40	40	60	20	20	40	20	40	60
	Sayed Darwish	0	20	20	20	20	20	20	20	20	40	20	40	60
	Salama Hegazi	0	20	20	20	20	20	20	20	20	40	20	40	60
	El Zohour	0	20	20	20	20	60	20	20	20	40	20	40	60
Zone II	13	20	40	20	20	20	40	20	20	20	40	20	20	80
	14	20	40	20	20	60	20	40	20	20	20	20	20	80
	15	100	60	20	20	100	60	20	20	20	100	20	40	80
	16	20	40	20	20	20	40	40	20	20	40	20	20	80
	17	20	60	20	20	20	20	20	20	20	20	20	20	80
	18	20	40	20	20	20	20	20	20	20	20	20	20	80
	19	20	20	40	40	40	40	40	60	20	20	20	20	80
	20	20	20	20	20	20	40	20	20	20	20	20	20	80
	21	20	20	20	20	20	40	40	20	20	20	20	20	80
	Markazia	100	60	60	60	20	60	60	80	20	20	20	60	80

	Village Name	SERVICES						Rating Value	Clas s	Limitations
		External Trans-portion	Internal Transpor-tation	Electricit y Level	Food Stores Availa-bility	Work-shops Availa-bility	Petrol Station			
		S <sub>4</sub>	S <sub>5</sub>	S <sub>6</sub>	S <sub>7</sub>	S <sub>8</sub>	S <sub>9</sub>			
Zone III	El Tanmia	60	40	100	40	40	100	37.78	V	E <sub>2</sub> , E <sub>3</sub> , E <sub>4</sub> , H <sub>2</sub> , H <sub>4</sub> , H <sub>5</sub> , S <sub>2</sub> , H <sub>1</sub> , H <sub>3</sub> , S <sub>1</sub> , S <sub>3</sub>
	Mohamed Farid	60	40	100	40	40	100	35.56	V	E <sub>2</sub> , E <sub>3</sub> , E <sub>4</sub> , H <sub>1</sub> , H <sub>2</sub> , H <sub>3</sub> , H <sub>4</sub> , H <sub>5</sub> , S <sub>2</sub> , S <sub>1</sub> , S <sub>3</sub> , S <sub>5</sub> , S <sub>7</sub> , S <sub>8</sub>
	El Olla	60	40	100	40	40	100	40.00	IV	E <sub>2</sub> , E <sub>3</sub> , E <sub>4</sub> , H <sub>4</sub> , H <sub>5</sub> , S <sub>3</sub> , H <sub>1</sub> , H <sub>2</sub> , S <sub>1</sub> , S <sub>3</sub> , S <sub>5</sub> , S <sub>7</sub> , S <sub>8</sub>
	Sayed Darwish	60	40	100	40	40	100	35.56	V	E <sub>2</sub> , E <sub>3</sub> , E <sub>4</sub> , H <sub>1</sub> , H <sub>2</sub> , H <sub>3</sub> , H <sub>4</sub> , H <sub>5</sub> , S <sub>2</sub> , S <sub>1</sub> , S <sub>3</sub> , S <sub>5</sub> , S <sub>7</sub> , S <sub>8</sub>
	Salama Hegazi	60	40	100	40	40	100	35.56	V	E <sub>2</sub> , E <sub>3</sub> , E <sub>4</sub> , H <sub>1</sub> , H <sub>2</sub> , H <sub>3</sub> , H <sub>4</sub> , H <sub>5</sub> , S <sub>2</sub> , S <sub>1</sub> , S <sub>3</sub> , S <sub>5</sub> , S <sub>7</sub> , S <sub>8</sub>
	El Zohour	60	40	100	40	40	100	37.78	V	E <sub>2</sub> , E <sub>3</sub> , E <sub>4</sub> , H <sub>1</sub> , H <sub>3</sub> , H <sub>4</sub> , H <sub>5</sub> , S <sub>2</sub> , S <sub>1</sub> , S <sub>3</sub> , S <sub>5</sub> , S <sub>7</sub> , S <sub>8</sub>
Zone II	13	80	40	80	40	20	20	32.22	V	E <sub>1</sub> , E <sub>3</sub> , E <sub>4</sub> , H <sub>1</sub> , H <sub>3</sub> , H <sub>4</sub> , H <sub>5</sub> , S <sub>2</sub> , S <sub>3</sub> , S <sub>8</sub> , S <sub>9</sub> , E <sub>2</sub> , H <sub>2</sub> , S <sub>1</sub> , S <sub>5</sub> , S <sub>7</sub>
	14	80	40	80	40	20	20	33.33	V	E <sub>1</sub> , E <sub>3</sub> , E <sub>4</sub> , H <sub>2</sub> , H <sub>4</sub> , H <sub>5</sub> , S <sub>1</sub> , S <sub>2</sub> , S <sub>3</sub> , S <sub>8</sub> , S <sub>9</sub> , E <sub>2</sub> , H <sub>3</sub> , S <sub>5</sub> , S <sub>7</sub>
	15	80	40	80	100	40	40	53.33	IV	E <sub>2</sub> , E <sub>3</sub> , H <sub>3</sub> , H <sub>4</sub> , H <sub>5</sub> , S <sub>2</sub> , S <sub>3</sub> , S <sub>5</sub> , S <sub>8</sub> , S <sub>9</sub>
	16	80	40	80	40	20	60	35.56	V	E <sub>1</sub> , E <sub>3</sub> , E <sub>4</sub> , H <sub>1</sub> , H <sub>4</sub> , H <sub>5</sub> , S <sub>2</sub> , S <sub>3</sub> , S <sub>8</sub> , E <sub>2</sub> , H <sub>2</sub> , H <sub>3</sub> , S <sub>1</sub> , S <sub>5</sub> , S <sub>7</sub>
	17	80	40	80	40	20	60	33.33	V	E <sub>1</sub> , E <sub>3</sub> , E <sub>4</sub> , H <sub>1</sub> , H <sub>2</sub> , H <sub>3</sub> , H <sub>4</sub> , H <sub>5</sub> , S <sub>1</sub> , S <sub>2</sub> , S <sub>3</sub> , S <sub>8</sub> , S <sub>5</sub> , S <sub>7</sub>
	18	80	40	80	40	20	40	31.11	V	E <sub>1</sub> , E <sub>3</sub> , E <sub>4</sub> , H <sub>1</sub> , H <sub>2</sub> , H <sub>3</sub> , H <sub>4</sub> , H <sub>5</sub> , S <sub>1</sub> , S <sub>2</sub> , S <sub>3</sub> , S <sub>8</sub> , E <sub>2</sub> , S <sub>5</sub> , S <sub>7</sub> , S <sub>9</sub>
	19	80	40	80	40	20	80	40.00	IV	E <sub>1</sub> , E <sub>2</sub> , H <sub>5</sub> , S <sub>1</sub> , S <sub>2</sub> , S <sub>3</sub> , S <sub>8</sub> , E <sub>3</sub> , E <sub>4</sub> , H <sub>1</sub> , H <sub>2</sub> , H <sub>3</sub> , S <sub>5</sub> , S <sub>7</sub>
	20	80	40	80	40	20	60	32.22	V	E <sub>1</sub> , E <sub>2</sub> , E <sub>3</sub> , E <sub>4</sub> , H <sub>1</sub> , H <sub>3</sub> , H <sub>4</sub> , H <sub>5</sub> ,

										S <sub>1</sub> , S <sub>2</sub> , S <sub>3</sub> , S <sub>8</sub> , H <sub>2</sub> , S <sub>5</sub> , S <sub>7</sub>
	21	80	40	80	40	20	20	31.11	V	E <sub>1</sub> , E <sub>2</sub> , E <sub>3</sub> , E <sub>4</sub> , H <sub>1</sub> , H <sub>4</sub> , H <sub>5</sub> , S <sub>1</sub> , S <sub>2</sub> , H <sub>2</sub> , H <sub>3</sub> , S <sub>5</sub> , S <sub>7</sub>
	Markazia	80	40	80	60	20	100	55.56	III	H <sub>1</sub> , H <sub>5</sub> , S <sub>1</sub> , S <sub>2</sub> , S <sub>8</sub> , S <sub>5</sub>

**Table 8. Evaluation of the Production Limitations**

	Village Name	Labor Availability	Machinery Availability	Weeds, Insects & Plant Diseases	Manure Level	Cooperative	Wheat Productions of Area Optium	Rating Value	Class	Limitations
		PL <sub>1</sub>	PL <sub>2</sub>	PL <sub>3</sub>	PL <sub>4</sub>	PL <sub>5</sub>	PL <sub>6</sub>			
Zone III	El Tanmia	40	20	20	80	40	80	46.67	IV	PL <sub>2</sub> , PL <sub>3</sub> , PL <sub>1</sub> , PL <sub>5</sub>
	Mohamed Farid	20	20	20	80	40	100	46.67	IV	PL <sub>1</sub> , PL <sub>2</sub> , PL <sub>3</sub> , PL <sub>5</sub>
	El Olla	50	60	20	100	60	100	65.00	III	PL <sub>3</sub> , PL <sub>1</sub>
	Sayed Darwish	40	20	20	80	20	60	40.00	IV	PL <sub>2</sub> , PL <sub>3</sub> , PL <sub>5</sub> , PL <sub>1</sub>
	Salama Hegazi	40	20	20	80	20	60	40.00	IV	PL <sub>2</sub> , PL <sub>3</sub> , PL <sub>5</sub> , PL <sub>1</sub>
	El Zohour	20	50	20	90	50	80	51.67	IV	PL <sub>1</sub> , PL <sub>3</sub> , PL <sub>2</sub> , PL <sub>5</sub>
Zone II	13	40	20	40	80	40	80	50.00	IV	PL <sub>2</sub> , PL <sub>1</sub> , PL <sub>3</sub> , PL <sub>5</sub>
	14	20	20	20	80	20	80	40.00	IV	PL <sub>1</sub> , PL <sub>2</sub> , PL <sub>3</sub> , PL <sub>5</sub>
	15	40	40	20	80	60	100	56.67	III	PL <sub>3</sub> , PL <sub>1</sub> , PL <sub>2</sub>
	16	20	60	20	80	40	100	53.33	IV	PL <sub>1</sub> , PL <sub>3</sub> , PL <sub>5</sub>
	17	40	40	20	80	40	80	50.00	IV	PL <sub>3</sub> , PL <sub>1</sub> , PL <sub>2</sub> , PL <sub>5</sub>
	18	20	60	20	100	40	80	53.33	IV	PL <sub>1</sub> , PL <sub>3</sub> , PL <sub>5</sub>
	19	20	20	20	100	40	60	43.33	IV	PL <sub>1</sub> , PL <sub>2</sub> , PL <sub>3</sub> , PL <sub>5</sub>
	20	20	20	20	80	40	80	43.33	IV	PL <sub>1</sub> , PL <sub>2</sub> , PL <sub>3</sub> , PL <sub>5</sub>
	21	40	20	20	100	40	100	53.33	IV	PL <sub>2</sub> , PL <sub>3</sub> , PL <sub>1</sub> , PL <sub>5</sub>
	Markazia	20	20	20	100	40	100	50.00	IV	PL <sub>1</sub> , PL <sub>2</sub> , PL <sub>3</sub> , PL <sub>5</sub>

**Table 9. Evaluation of the Animal Production**

	Village Name	Veterinary Services & Artificial Insemination	Type of Animal	Fodder Availability	Animal Shades	Skilled Labor Availability	Extensions programs	Milk Processing & Cooling	Rating value	Class	Limitations
		AP <sub>1</sub>	AP <sub>2</sub>	AP <sub>3</sub>	AP <sub>4</sub>	AP <sub>5</sub>	AP <sub>6</sub>	AP <sub>7</sub>			
Zone III	El Tanmia	20	40	60	60	40	40	40	42.86	IV	AP <sub>1</sub> , AP <sub>2</sub> , AP <sub>5</sub> , AP <sub>6</sub> , AP <sub>7</sub>
	Mohamed Farid	20	40	60	60	40	40	40	42.86	IV	AP <sub>1</sub> , AP <sub>2</sub> , AP <sub>5</sub> , AP <sub>6</sub> , AP <sub>7</sub>
	El Olla	20	40	60	60	40	40	40	42.86	IV	AP <sub>1</sub> , AP <sub>2</sub> , AP <sub>5</sub> , AP <sub>6</sub> , AP <sub>7</sub>
	Sayed Darwish	20	40	60	60	40	40	40	42.86	IV	AP <sub>1</sub> , AP <sub>2</sub> , AP <sub>5</sub> , AP <sub>6</sub> , AP <sub>7</sub>
	Salama Hegazi	20	40	60	60	40	40	40	42.86	IV	AP <sub>1</sub> , AP <sub>2</sub> , AP <sub>5</sub> , AP <sub>6</sub> , AP <sub>7</sub>
	El Zohour	20	40	60	60	40	40	40	42.86	IV	AP <sub>1</sub> , AP <sub>2</sub> , AP <sub>5</sub> , AP <sub>6</sub> , AP <sub>7</sub>
Zone II	13	20	40	60	60	40	40	60	45.71	IV	AP <sub>1</sub> , AP <sub>2</sub> , AP <sub>5</sub> , AP <sub>6</sub>

14	20	40	60	60	40	40	60	45.71	IV	AP <sub>1</sub> , AP <sub>2</sub> , AP <sub>5</sub> , AP <sub>6</sub>
15	40	40	60	60	40	40	60	48.57	IV	AP <sub>1</sub> , AP <sub>2</sub> , AP <sub>5</sub> , AP <sub>6</sub>
16	20	40	60	60	40	40	60	45.71	IV	AP <sub>1</sub> , AP <sub>2</sub> , AP <sub>5</sub> , AP <sub>6</sub>
17	20	40	60	60	40	40	40	42.86	IV	AP <sub>1</sub> , AP <sub>2</sub> , AP <sub>5</sub> , AP <sub>6</sub> , AP <sub>7</sub>
18	40	40	60	60	40	40	40	45.71	IV	AP <sub>1</sub> , AP <sub>2</sub> , AP <sub>5</sub> , AP <sub>6</sub> , AP <sub>7</sub>
19	20	40	60	60	40	40	40	42.86	IV	AP <sub>1</sub> , AP <sub>2</sub> , AP <sub>5</sub> , AP <sub>6</sub> , AP <sub>7</sub>
20	20	40	60	60	40	40	40	42.86	IV	AP <sub>1</sub> , AP <sub>2</sub> , AP <sub>5</sub> , AP <sub>6</sub> , AP <sub>7</sub>
21	20	40	60	60	40	40	40	42.86	IV	AP <sub>1</sub> , AP <sub>2</sub> , AP <sub>5</sub> , AP <sub>6</sub> , AP <sub>7</sub>
Markazia	40	60	60	60	60	60	40	54.29	IV	AP <sub>1</sub> , AP <sub>7</sub>

Table 10 summarizes the relation between the results of the evaluation for the different main groups and the level of development for all villages studied, where the rating values of the different levels are as follows:

Class I (85 – 100)    Class II (70 - 85)    Class III (55 - 70)    Class IV (40 - 55)    Class V (< 40)

The table also shows that the level of sustainable development in the different villages: Level (III) in El Markazia village and all other villages fall in level (IV).

**Table 10. Summary of the different classes in relation to the main groups**

VILLAGE NAME	NR	EP	SL	SA	PL	AP	Rating Value	Sustainable Development Class
<b>ZONE III</b>								
El Tanmia	I	V	V	V	V	V	46.92	IV
Mohamed Farid	II	V	V	V	V	V	44.46	IV
El Olla	II	V	IV	V	IV	V	50.20	IV
Sayed Darwish	II	V	V	V	V	V	45.43	IV
Salama Hegazi	III	V	IV	V	V	V	45.43	IV
El Zohour	II	V	V	V	IV	V	46.77	IV
<b>ZONE II</b>								
13	III	V	V	V	V	V	41.58	IV
14	III	V	V	V	V	V	42.62	IV
15	I	V	IV	IV	V	V	54.20	IV
16	II	V	IV	V	V	V	48.54	IV
17	I	V	V	V	V	V	47.56	IV
18	I	V	V	V	V	V	46.55	IV
19	I	V	IV	IV	V	V	48.39	IV
20	II	V	V	V	V	V	45.24	IV
21	II	V	V	V	V	V	44.83	IV
Markazia	I	V	IV	III	V	V	55.80	III

**Map 3. Sustainable Classes – Zones II and III. // Not included !!**

## 6. Conclusion

The main commodities produced grain especially wheat, alongside clover, winter beans and summer vegetables. This structure is close to the government's recommendations for these new lands. It reflects the migrants' abilities to implement the recommended methodology. Although fruit cultivation is the most appropriate from a technical and economic point, it was discontinued because of the graduates' incapability to invest or to overcome possible risks incurred in changing to an uncertain income.

It is noticeable that the percentage of fodder cultivation on the migrants' lands is high testifying of the improvement of animal production. But the obvious aspect that requires attention is the high proportion of fallow areas on the migrants' lands, especially in summer.

It was observed that the income from one feddan is less than of that of the small entrepreneurs and investors, which is due to low standard of their acquired experience (which can be gained in time) or due to difficulties to sustain the level of soil fertility.

It was noticed that the graduates of the agricultural institutions in Zone III are doing comparatively well with regard to their production and harvestings if compared with the graduates of the agricultural faculties. This decreases if the graduate's family are farmers.

Although the establishment of these stable new rural communities in the desert was a very satisfactory step, services are. The reason of the inadequacy of public services in these new communities is the lack of perception of the needs of these new communities.

Generally speaking, there are many problems and obstacles that face the new communities, some due to unexpected circumstances that preclude the performance required for this project and thus common to all agricultural projects in Egypt. The Sugar Beet Zone as a new region of the agricultural expansion is confronted with special problems that affect its production.

- Some areas are not reclaimed completely, or it needs the migrants' efforts to be reclaimed (12 % from karm areas in SBZ, equal to 6500 feddan); 4,2 % of the region consists of hard pans, Petrocalcic and Petrogypsic, and 0,5 % is rock outcrops.
- The irrigation water amounts to less than the actual need. The irrigation intervals are not suitable. This negatively affects cultivation and production and causes problems and harms the relationships between people as a result of the competition for irrigation water.
- The role of the cooperative and internal institutions is weak in the community. The roles of the cooperatives are restricted to providing the production requirements and the agricultural services in a limited form. They also not assist in marketing the members' production.
- The lack of labour in the area precludes farmers to move towards high-value-crops and generate the income needed for hiring seasonal labour. Besides wages were raised. All these affect production costs.
- Most of the public services are absent or weak, because they are not organized. The educational, medical and potable water services, the decline of the water distribution system, the absence of a sewage net, security, communication and other services. The internal Community Society Development Associations, women leadership cadres should take a role in guiding and act a developing action, which means that these internal association's ability to communicate with the government and donor associations should be strengthened. Only then can organizations apply for finances to solve the society's problems.

There are problems and obstacles facing the communities in the new lands and these have negative effects on the production efficiency, but we should place them in the right perspective and in relation to the whole Egyptian society.

The solution of most of these problems is associated with national plans that have sustainable development dimensions aiming at developing Egypt. This is the challenge that faces Egypt and its future generations. This means that these pioneering migrants undertake duties not only for themselves but also for their society.

And the more the vision is clear, the more it is easy to determine the goals, plans, programs and cooperation to implement the plans.

## 7. References

- Bishay, A., 1993. "The deserts of Egypt development systems"  
The Agriculture Of Egypt, Oxford University Press.
- CIDC, 1995. (Caritas Integrated Development Center), Data Bank, unpublished information.
- Erian, W.F., 1989. "Soil climate and balance diagram of some horizontal extension areas in Egypt", Egyptain J. Soil sci, pp.45 - 74
- Erian, W.F., 1996. "The use of geographical information system (GIS) for land capability study on some soils of the Sugar Beet Zone, Nubariya Region, West of the Nile Delta."
- A Workshop on ; The use of Geographic Information System (GIS) in Desert Development., Cairo, May 4 - 5, 1996.
- Erian, W.F., 1996. "The use of GIS for monitoring some physical and socio-economic aspects which may affect the sustainability of newly formed rural communities in the desert areas of Egypt".  
Fifth International Conference On Desert Development, August 12 - 17, 1996 Lubbock, Texas
- Erian W.F., Zaghloul K.F., Gomaa F.A., 1997. "The use of geographic information system (GIS) to combine soil map with the suggested irrigation scheduling in the Sugar Beet Zone - Nubariya, Egypt".
- Earth Observation And Environmental Information Conference - Alexandria, Egypt - October 13 - 16, 1997. (under preparation)
- Ezzat, M.A., Nour S. S., Mishriki M.F. Marshed M.T. Habib M. 1977. "The ground water resources of Wadi El-Natroun Area.", unpublished report, the general petroleum company, Cairo.
- Hefny, K., 1993. "The role of groundwater in the sustainable development planning of the region of Wadi El-Natroun." , Unpublished research, Groundwater Research institute.