

No. 23

**JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)**

**ROMANIA**

**MINISTRY OF AGRICULTURE AND FOOD**

**THE FEASIBILITY STUDY  
ON  
THE IRRIGATION PROJECT  
IN  
RUGINESTI-PUFESTI-PANCIU  
DISTRICT VRANCEA**

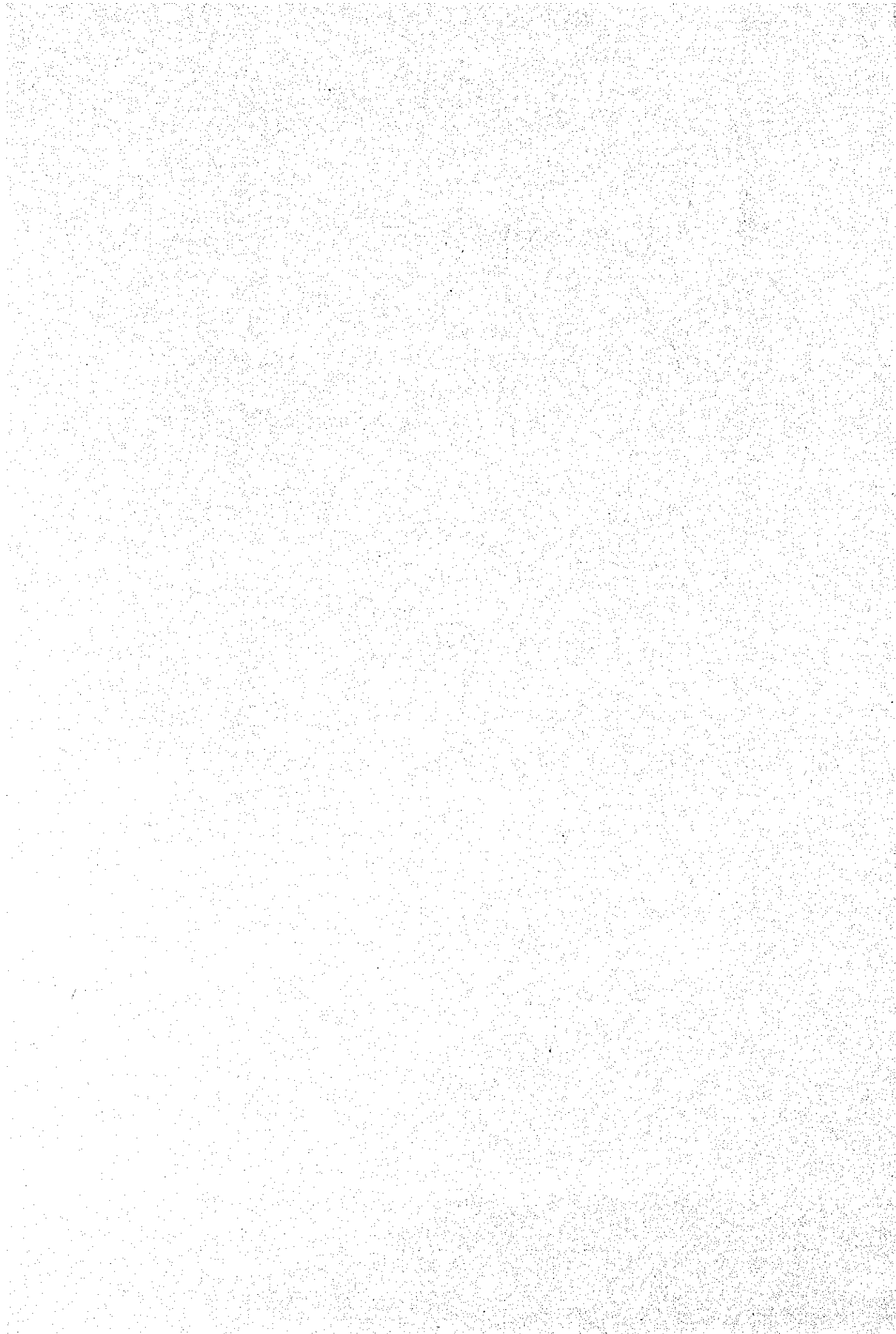
**FINAL REPORT**

**VOLUME II : ANNEXES**

**JUNE 1995**

**PACIFIC CONSULTANTS INTERNATIONAL  
SANYU CONSULTANTS INC.**

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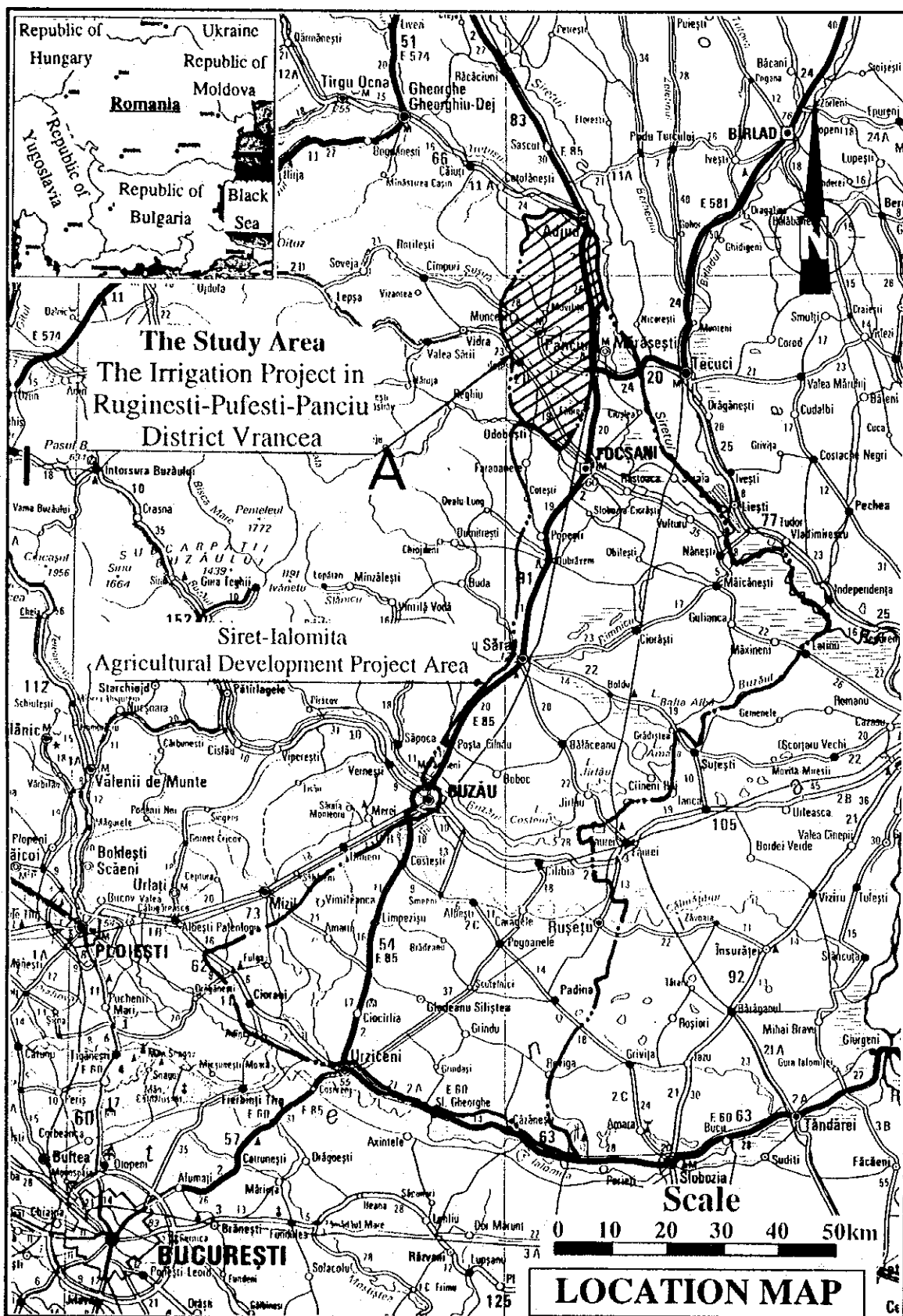


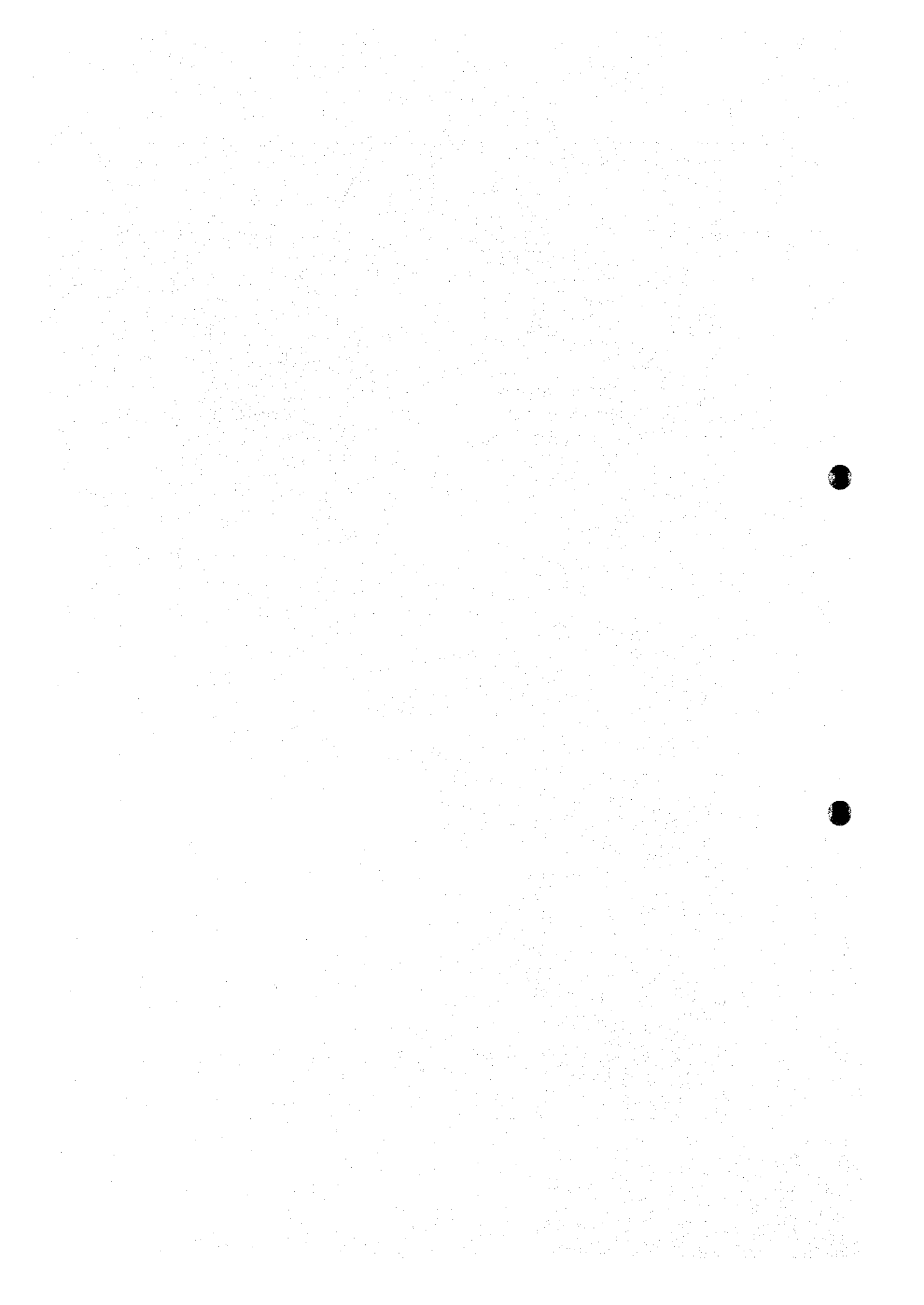
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*The Feasibility Study on the Irrigation Project  
in  
Ruginesti-Pufesti-Panciu District Vrancea*

**FINAL REPORT**

**VOLUME II : ANNEXES**

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## ACRONYMS

<i>Acronyms</i>	<i>in Romanian</i>	<i>in English</i>
AGROMECC	Societatea Comerciala de Prestari Servicii pentru Mecanizarea Agriculturii	Commercial Society of Agricultural Mechanization
AGROSEM	Filiale Judetene ale Semrom-ului	District Branch of SEMROM
AQUA PROIECT	Institutul de Proiectari pentru Ape	Institute for Design of Water Resources Project
DA-Vrancea		Department of Agriculture-Vrancea District
DJS-Vrancea	Directia Judeteană de Statistica-Vrancea	Statistic Office-Vrancea District
ICCPT-Funduiea	Institutul de Cercetari pentru Cereale si Plante Tehnice-Fundulea	Research Institute for Cereals and Plants-Funduiea
ICIM	Institutul pentru Cercetari si Ingineria Mediului	Environmental Research and Engineering Institute
ICITID	Institutul de Cercetare si Inginerie Tehnologica pentru Irigatii si Drenaje	Research Institute for Technical Engineering for Irrigation and Drainage
ICLF	Institutul de Cercetari pentru Legume si Fructe	Research Institute of Vegetable and Flower
ICPA	Institutul de Cercetari pentru Pedologice si Agrochimice	Pedological and Agrochemical Research Institute
IGFCOT	Institutul de Geodezie Fotogrammetrie Cartografie si Organizarea Teritoriului	Institute for Geodesy, Photogrammetry, Mapping and Territory Administration
INMH	Institutul National pentru Meteorologie si Hidrologie	National Institute of Meteorology and Hydrology
ISPIF-SA	Institutul de Studii si Proiectari pentru Imbunatatiri Funciare	Institute for Studies and Design of Land Reclamation Projects
LO-Vrancea		Land Office, DA-Vrancea
LRD		Land Reclamation Department (former)
GDCAL		General Directorate for Cadaster, Agricultural Land Management and Land Reclamation
RAIF	Regia Autonoma a Imbunatatirilor Funciare	Land Reclamation Agency
MAF		Ministry of Agriculture and Food
MoE		Ministry of Water, Forestry and Environmental Protection
NCS		National Commission for Statistics
NROCCI		National Register Office of the Chamber of Commerce and Industry
NUTRICOM	Societatea Comerciala pentru Comercializarea Nutretului	Commercial Society for Fodder Trading
OCOT	Oficiul Cadastral pentru Organizarea Teritoriului	Survey Office for Territory Administration
OSPA	Oficiul de Studii Pedologice si Agrochimice	Office of Pedological and Agrochemical Study
RENEL		Romanian Electric Power Supply Company
ROMCEREAL	Societatea Comerciala pentru Comercializarea Cerealelor	Commercial Society for Cereal Trading

ROMLACTA	Societatea Comerciala pentru Prelucrarea Laptelui	Commercial Society for Milk Processing
ROMSILVA SA	Agentia Autonoma a Padurilor	Romanian Forest Authority
SC ZBOINA-SA	Societate pe Actiuni Societatea Comerciala ZBOINA-Constructii	Commercial Society ZBOINA Commercial Society for Construction of Land Reclamation
SCELIF-SA	Societatea Comerciala pt Exploatarea si Intretinerea Lucrarilor de Imbunatatiri Funciare	Commercial Society for Operation and Maintenance of Land Reclamation Works
SCPL	Statiune de Cercetare pentru Plante si Legume	Plant and Vegetable Research Station
SCPP	Statiunea de Cercetari Pepiniere Pomicole	Agricultural Nursery Research Station
SEMROM	Societatea Comerciala pentru Comercializarea Semintelor si Conditionare	Commercial Society for Seed Conditioning and Trading
UNICARNE	Societatea Comerciala pentru Prelucrarea si Industrializarea Carnii	Commercial Society for Processing and Industrialization of Meat
ZAHAROM	Societatea Comerciala pentru Prelucrarea Zaharului	Commercial Society for Sugar Processing
FAO		Food and Agricultural Organization of the United Nations
IUCN		International Union for Conservation of Nature and Natural Resources
JICA		Japan International Cooperation Agency
OECE		Overseas Economic Cooperation Fund of Japan
ISA		Irrigation Study Area
SCSA		Soil Conservation Study Area
AAS	Asociatii Agricole Simple Familiare fara Personalitate Juridica	Informal Association of Private Farmers
AA	Asociatii Agricole Familiare cu Personalitate Juridica	Formal Association of Private Farmers
I	Taranii Individuali	Individual Farmer
SCCP	Societate Comerciala Compania cu Capital Integral Privat	Private Agricultural Company
SCM	Societate Comerciala cu Capital Mixt	State/Private Joint Agricultural Company
SCP	Statiuni de Cercetare si Productie	State Farm
SRP	Statie de Repompare	Distribution Pump Station
SPP	Statie de Punere sub Presiune	Booster Pump Station
CM	Canal Magistral	Main Canal
CD	Canal Distribuitor	Distribution Canal
CP	Conducta Principala	Distribution Pipeline
EC		Electric Conductivity
EIA		Environmental Impact Assessment
O&M		Operation and Maintenance
RBA		River Basin Agency
STAS	Standard de Stat	National Standard
WID		Women in Development

## ABBREVIATIONS

mm	:	millimeter
cm	:	centimeter
m	:	meter
km	:	kilometer
cm <sup>2</sup>	:	square centimeter
m <sup>2</sup>	:	square meter
km <sup>2</sup>	:	square kilometer
ha	:	hectare
lit	:	liter
h lit	:	hecto liter (100 lit)
m <sup>3</sup>	:	cubic meter
kg	:	kilogram
ton	:	ton
m/s	:	meter per second
m <sup>3</sup> /s	:	cubic meter per second
lit/s	:	liter per second
kg/ha	:	kilogram per hectare
ton/ha	:	ton per hectare
hr/ha	:	hour per hectare
m <sup>3</sup> /ha	:	cubic meter per hectare
m <sup>3</sup> /km <sup>2</sup>	:	cubic meter per square kilometer
mm/day	:	millimeter per day
mm/month	:	millimeter per month
mm/year	:	millimeter per year
%	:	percent
El	:	elevation above mean sea level
amsl	:	above mean sea level
No.	:	number
US\$	:	United States Dollar
Lei	:	Romanian Lei
°C	:	degree centigrade
approx.	:	approximately
min.	:	minimum
max.	:	maximum

## **CHAPTER 1 : INTRODUCTION**

## CHAPTER 1 : INTRODUCTION

### 1.1 GENERAL

These Annexes to the Main Report for the Feasibility Study on the Irrigation Project in Ruginesti-Pufesti-Panciu, District Vrancea (the Project) are prepared to supplement the main text in accordance with the table of contents of the Main Report. Therefore, more detailed information and breakdown of the analyses can easily be traceable based on the Table of Contents of the Main Report.

### 1.2 SEQUENCE OF THE STUDY

As shown in **Fig 1.2.1-A1**, the Study is being implemented in two phases. The scope and sequence of the Study in respective phases are as shown below:

#### (1) Phase I

- 1) Field Survey
  - Explanation of Inception Report and discussions on it
  - Collection and review of existing data and information
  - Field investigations and interview survey to the farmers
  - Identification and preliminary evaluation of development potentials and constraints
  - Preparation of Progress Report ( I )
- 2) Home Office Work
  - Formulation of basic development concept
  - Preparation of Interim Report

#### (2) Phase II

- 3) Field Survey
  - Explanation of Interim Report and discussions on it
  - Collection of additional and supplementary data and information
  - Supplemental field investigations
  - Preliminary formulation of irrigation and agricultural development plan
  - Preparation of Progress Report ( II )
- 4) Home Office Work
  - Finalization and evaluation of the proposed irrigation and related agricultural developments
  - Preparation of Draft Final Report
- 5) Explanation of Draft Final Report
  - Explanation of Draft Final Report and discussions on it
  - Opening of a seminar in connection with the Study as a part of the technical transfer to the Romanian counterpart
- 6) Preparation of Final Report
  - Preparation of Final Report by modifying Draft Final Report based on the comments on Draft Final Report by the Government of Romania

## **CHAPTER 2 : BACKGROUND**



## CHAPTER 2 : BACKGROUND

### 2.1 BRIEF DESCRIPTION OF THE COUNTRY

Romania is located in the middle eastern part of Balkan Peninsula, the territory of which lies in the range of 20°-15' to 29°-41' longitude East, 43°-37' to 48°-15' latitude North. The territorial land area extends over 237.5 x 10<sup>3</sup> km<sup>2</sup>, where the population as of July 1, 1992 was reported at around 22,800 x 10<sup>3</sup> (population pyramid is shown in Fig 2.1.1-A1). It is mostly under temperate, continental or Mediterranean climate with hot summer and cold winter. With regard to geographical features, the Danube River flows along its southern border, developing a fertile plain within its basin. While Transilvanian Plateau covers the western part of her territory and huge Carpathian mountain range occupies the central part. It has a short coast facing to Black Sea.

Administratively, Romania consists of 41 districts, in which 260 towns and 2,688 villages are distributed. Romanian, descendant of Roman, accounts for around 90 % of the population speaking Romanian language. Since the revolution in December 1989, the Government and the Nation have been challenging the task, privatization to economically catch up with western nations. With her rich resources and sincere efforts, the political and economic goals of modernization will be most probably fulfilled within shorter period than any other east European nations.

#### 2.1.1 National Economy

Since the revolution in December 1989, Romanian economy has been reorganized into a new regime of free economy with gradual privatization directed by Land Act and Privatization Law enacted in February 1991. The liberalization of the national economy has been smoothly promoted by the Government and a host of the state-owned enterprises and cooperatives are now on the way to privatized enterprises, whose investment share is held by either individual members, late employees, or both by them and the state as a co-investor. It has been widely observed throughout east European countries in a transitional stage to free-economy, that a two-digit inflation is still driving on in their economy. However, this inevitable process to participate in free market world, until a new equilibrium between the economic value of domestic and international goods is established, has recently shown a leveling-off, bearish trend in Romania especially in food commodities, as shown in the following table of recent trend in quarterly consumer price indices (also shown in Table 2.1.1-A1):

(Base: the previous year = 100)					
Item	1990	1991	1992	1993	1994
Food Stuff	105	299	325	374	168
Non-food	105	271	289	425	166
Service	106	221	301	338	190
Total	105	274	311	390	170

Romania has been fairly industrialized during the period before 1990, but the share of the industrial sector in GDP has now become smaller as a result of the change in trade structure. In order to secure means of basic but agreeable life, the role to be played by the agricultural and rural sectors will more be expected than ever, absorbing registered and latent unemployment reaching over 10%. It is also desirable from agricultural side that it should be equipped with younger labor force. The share of GDP by sector and calculated real GNP is given below:

Item	1989	1990	1991	1992	1993
Total Sector (10 <sup>6</sup> Lei)	721 (100)	788 (100)	2,066 (100)	5,970 (100)	18,435 (100)
Agriculture (%)	(15)	(23)	(20)	(19)	(22)
Industry (%)	(51)	(44)	(40)	(41)	(32)
Commerce (%)	( 6)	( 7)	(14)	(14)	(16)
GNP/Capita (US\$)	2,287	1,485	1,161	1,240	1,067

Radical changes in Romanian international trade structure are also important factors contributing to the economic situation. Although the trade balance deficit has been persisted on, the extent of deficit tends to be narrower and the overall balance has turned into positive. Imports of agricultural products can be deemed as a temporary phase that could be mostly substituted by self-supply through agricultural investment. Recent trade balance and major exports/imports items are given below:

Article	(Unit: 10 <sup>6</sup> US\$)			
	1990	1991	1992	1993
Export FOB	5,775	4,266	4,363	4,892
Import CIF	9,202	5,372	5,784	6,020
Current Accounts	-3,427	-1,106	-1,421	-1,128
Capital and Financial Accounts	1,606	1,092	1,640	1,650
Overall Balance	-1,821	-14	219	522
Exp. Mineral Products	1,111	654	581	574
Exp. Textile/Wears	563	385	462	785
Exp. Basic Materials	935	656	746	959
Exp. Machinery/Vehicles	1,687	986	932	1,150
Imp. Cereals/Perishable	364	365	403	475
Imp. Food/Beverages	391	353	410	400
Imp. Mineral Products	3,869	2,589	1,783	1,872
Imp. Machinery	1,320	2,229	527	1,150

As to exchange rate of the currency Lei into US\$, the single rate system started from May 1990 with a rate 20.6 Lei/US\$, and floating rate has been adopted. Now inflationary rise of the rate has been oriented to a stabilization stage with current rates fluctuating around 1,753 Lei equivalent to 1 US\$, as of October, 1994.

## 2.1.2 Agriculture

### (1) Agricultural Land Use and Land Holding

Romania is basically an industrial country, however, it also has rich resources for agriculture. As of December 1993, above 62% of the total territorial area of 23,839x10<sup>3</sup> ha was used for agricultural activities, of which more than 63%, or 9,342x10<sup>3</sup> ha was categorized as arable land and 21.7% or 3,200x10<sup>3</sup> ha has irrigation facilities (Table 2.1.2-A1). The land use pattern is shown below:

	(Unit: 10 <sup>3</sup> ha)						
	Agricultural Area	Arable Land	Pasture	Meadow	Vineyard	Orchard	Irrigated Area
Area	14,790	9,357	3,349	1,481	299	305	3,203
(%)	(100)	(63.3)	(22.6)	(10.0)	(2.0)	(2.1)	(21.6)
Private	10,336	7,465	1,086	1,385	224	197	2,173

Note : \* Private land is included in the total area

Agriculture has been sustained by rural population accounted for about 46% of the total population. Agricultural families engaged in farming individually are accounted as 3,419x10<sup>3</sup>, while population employed in agricultural sector in 1992 is estimated at 3,127x10<sup>3</sup>. Statistical data show the farming labor force as of December 1992:

(Unit: 10<sup>3</sup> persons)

Employed in Agriculture	Total Employees in Agriculture		of which Private Sector	
	Salary-paid	Casual-workers	Salary-paid	Casual-workers
3,361.6 (32.1%)	73.6 (8.2%)	460.8 (9.5%)	31.3 (8.9%)	6.3 (6.2%)

Furthermore, the data from population census in January 1992 show the following figures:

(Unit: 10<sup>3</sup> persons)

	Individual Worker	Association Member	Salaried Employee	Employer/Owner farmer
Total	1,536.6 (14.7%)	225.5 (2.2%)	436.3 (4.2%)	40.8 (0.4%)
Men	580.3 (10.0%)	91.6 (1.6%)	326.0 (5.6%)	29.8 (0.5%)

Individual farmers predominate in land holding, types of which are given below as of December 1992, but they are now on the way to form groups or associations as recommended by the Government. Assuming that farmers and farm employees equally participate in farming operation, 2.4 ha must be tilled by a farm worker, particularly women or aged workers:

Individual Farm Household	Association	Company w/ Mixed Capital	Company W/ Private Capital	State Farm
3,417,736	13,772	797	5,402	28

The size of land holding of the individual farmers differs from more than 3 ha in plain areas to less than 1 ha in mountainous ones, but generally speaking it falls into 2.28 ha per individual farm household, in other words 0.7 ha per family member, implying sufficient area for meeting basic needs for food as shown below:

Farm Size (ha)	0 - 0.5	0.5 - 1	1 - 3	3 - 5	5 - 7	7 - 10	Total
Ratio (%)	3.37	33.77	37.71	15.48	6.45	3.22	100.00

As regards reorganizing and privatizing previous Cooperatives (CAP), a substantial progress has been made in organizing into various types of new farming groups as of July, 1994 as summarized in the following:

Type of Group	Simple Association	Agricultural Society	Commercial Society	Remaining Cooperative *
Number	16,555 (4,320)	4,054	374	617
Area (ha)	1,872,268 (629,382)	1,812,174	84,916	-
Membership	746,805 (279,036)	750,319	34,254	-

The structure of land tenure as of the end of 1994 is shown below:

Item	Agricultural Area		Arable Area	
	10 <sup>3</sup> ha	%	10 <sup>3</sup> ha	%
Commercial Societies	2,187	15	1,466	16
Municipal Properties	2,270	15	380	4
Sub-total (State/Public Sector)	4,457	30	1,846	20
Individual and Informal Associations	8,566	58	5,706	61
Formal Associations	1,770	12	1,789	19
Sub-total (Private Sector)	10,336	70	7,495	80
Total	14,793	100	9,341	100

## (2) Crop and Livestock Production

Agriculture comprises crop and livestock sectors, sharing output values of 58 % and 42 %, respectively in 1992. Livestock sector is so to speak indispensable and unseparatable partner of crop production in terms of crop rotation and crop nutrient supply, also as draught animal and

means of transport. Major crop production area, per capita production are shown in Table 2.1.2-A2 to A6. And major crop acreage in 1993 is summarized below:

(Unit: 10<sup>3</sup> ha)

Crops	Cereals for Food	Oilseed	Sugar Beet	Fodder Crops	Fodder for Hay	Potato	Vegetables	Total
1991	6,047	643	202	1,552	724	735	195	9,197
1992	5,774	810	180	1,442	730	219	223	8,909
1993	6,395	703	97	1,305	578	249	219	9,166

General trends of cropping show dwindling acreage under industrial crops but rather constant sown area for cereals. The factors affecting crop acreage seems to be relative profitability, availability of such inputs as family labor, machinery hiring, seed and chemicals. The yield levels lie in a low level, but there is much room for further increase. Major crop yields are listed below:

(Unit: kg/ha)

Crops	Wheat/Rye	Maize Grain	Sun-flower	Soy Bean	Sugar Beet	Fodder Crops	Clover (Raw)	Potato	Tomato
1991	2,507	4,072	1,281	1,654	23,330	21,373	16,585	7,923	13,758
1992	2,188	2,046	1,257	762	16,098	18,235	15,086	11,871	14,779
1993	2,321	2,605	1,180	1,270	18,276	5,056	16,714	14,818	15,524

In general, domestic agricultural production can almost meet the basic demand of the population. However, problems arise from transportation, distribution and storage by which food sector is obliged to resort to casual grain imports. Food production and per-capita availability in 1992 are briefed as follows:

Item	Cereals	Vegetable Oil	Sugar	Vegetable	Meat	Milk
Crop (10 <sup>3</sup> ton)	12,289	900	2,897	2,632	1,895	4,493
Food (10 <sup>3</sup> ton)	10,446	315	280	1,974	1,516	3,370
Per Capita (kg/year)	458	14	12	87	68	148

Concerning livestock production, it is closely linked with cropping activities, and most small holders keep small herd of livestock within their farms, feeding for ages and allowing it to graze on meadows and harvested grain fields by paying grazing tax (for sheep, 800 Lei/year on 0.1 ha and for cow/cattle, 5,000 Lei/year on 0.5 ha). Livestock herds have been curtailed after the revolution, but they have begun to rebuild as farmland is restituted to due owners. Size and composition of livestock herd in the country are shown in Table 2.1.2-A7 and as of December 1993 are given below:

(Unit: 10<sup>3</sup> heads/fowl)

Year	Cattle	Milch Cow	Sheep	Goat	Pig	Horse	Poultry
1991	3,258	2,123	14,062	1,005	12,003	670	121,379
1992	2,089	2,266	13,879	954	10,954	749	106,032
1993	1,658	2,025	12,079	805	9,852	721	87,725
1994	1,618	1,979	11,499	776	9,262	751	76,532

Livestock production remains in lower efficiency as to milk yield and meat conversion rate, because of lower rate of concentrate feeding. In future, the productivity will be greatly improved as domestic feed grain production is expanded in vast crop land. In addition to grains, there exists relatively wide base for green and silage fodder production for the rebuilding and expansion of degraded livestock herds. Major profile of animal production is recapitulated as follows:

Year	Beef (10 <sup>3</sup> ton)	Pork (10 <sup>3</sup> ton)	Mutton (10 <sup>3</sup> ton)	Fowl (10 <sup>3</sup> ton)	Milk (10 <sup>3</sup> h lit)	Wool (10 <sup>3</sup> ton)	Egg (10 <sup>6</sup> pcs)	Honey (10 <sup>3</sup> ton)
1990	425	1,054	172	561	44,229	38.2	7,701	10.6
1991	375	1,012	162	459	46,098	32.5	7,177	8.3
1992	403	907	169	406	44,934	28.0	6,140	10.4
1993	421	962	167	376	47,347	26.0	5,633	9.9

### (3) Agricultural Inputs and Problems

Romanian agriculture has been fairly mechanized, but after the revolution in 1989, some difficulty has arisen in the efficient use of machinery. Nevertheless, as individual farmers are reorganized into associations or other types of groups, this problem will be automatically solved, since the country can produce any type of agricultural inputs at its disposal. The inventory of machinery and fertilizers are given below:

Year	(Unit: 10 <sup>3</sup> sets)						
	Farm Tractor	Cultivator	Seeder	Spreader	Sprayer/Duster	Grain Combine	Hay Bailer
1988	127.1	27.3	35.8	10.8	15.0	35.8	21.7
1989	132.8	23.9	35.0	9.9	14.1	34.5	20.7
1990	146.8	23.2	37.0	10.6	13.7	34.5	21.6
1991	158.1	23.6	43.9	10.7	12.8	34.6	19.2

Year	(Unit: 10 <sup>3</sup> ton)			
	Nitrogen	Phosphatic	Potash	Manure
1991	274.9	145.2	43.6	16,910.2
1992	258.0	133.0	31.0	15,792.0
1993	346.0	105.0	27.0	17,125.0

### (4) Currently Developing Policies/Strategies for Agriculture

Although there has not been any long-term agro-economic policy orientation or strategy, the Government of Romania has so far introduced practical policies with view to guiding farming activities to what are desirable and compatible to the national economy and domestic food/feed supply. The main profile of these are as follows:

- Promotion of private land ownership (Law No 18 and new law envisaged);
- Stimulation of utilizing high yielding seed, chemical fertilizers (HG No 1 envisaged in 1994);
- Strengthening and rebuilding cattle herds by introducing qualified breed with higher milchig/meat producing capacity (Law No 83);
- Providing larger amount of short-term loans with lowered interest rates for expanding piggery/poultry, medium/long-term loans for farm machinery; and
- Providing subsidies for sustaining/securing the production of strategy crop (wheat) and milk;
- Introducing pilot markets through EC assistance (PHARE), 3 vegetable-fruit markets in Constanta, Buzau and Arad, 3 cereal/animal markets in Ialomita, Mares and Suceava, and an en-gross agro-market in Bucharest.

Besides, reorganization and privatization of commercial societies with state capital (mainly livestock and agro-processing sector) are also on the way, while ROMCEREAL will be rearranged into state-storage and completely privatized commercial societies

## 2.2 GENERAL FEATURES OF VRANCEA DISTRICT

Vrancea represents one of 40 districts in Romania, located in mid-eastern part of the country, extending its surface area, 4,857 km<sup>2</sup>, from 26°-25' to 27°-30' longitude East, and between 45°-30' and 46°-10' latitude North. The eastern boundary of the District runs for the most part

on the Siret River, while other part of its border does on mountain peaks or divide line of Carpathian range. In other words, the District lies within the basin of tributaries of the Siret River. Hence, the area consists of western mountainous/hilly part, central alluvial fans and eastern plain along the Siret River. The District population is reported as 393,408 (numbers of household: 104,952) in 1992 census, 38.5% of which live in urban area, including the District center, Focsani (101,335) and 4 other villages/towns with an aggregate population of 51,304. Administratively, the District comprises 4 towns (Focsani, Panciu, Marasesti and Odobesti) and 59 villages. Each town or village is headed by a mayor responsible for administration. The social infrastructure as listed in **Table 2.2.1-A1** is presently available to District population and most towns develop along the Siret River and the railway.

### **2.2.1 District Economy**

Major economic activities so far developed within the District are agriculture and agro-industrial sectors including wineries. Besides, Focsani has industries specialized in tools, optical apparatus, textile and sawing. There have been reported 44 industrial enterprises, of which 28 remain still in public status, 11 in cooperative status and only 5 were privatized. Economically active population is totaled at 206,087 (52% of the total) of which only 14,434 (7%) account for unemployed. About 29% of them are engaged in agriculture, 33% in industry (of which 24% lives in Focsani).

Farm households account for 35 % of the total District households, while agricultural population has almost 50% share of the District population. Annual production value from agricultural sector amounts to  $41,295 \times 10^6$  Lei in 1992 as against  $68,943 \times 10^6$  Lei from industrial sector, 90 % of which is derived from public sector.

On the basis of land use, 52.6% of the total District land is used for agriculture, 39.3% for forestry and the rest 8.1% for other purposes. Industrial base of Focsani is not enough to absorb most of economically active population in the District, leading to exodus to such adjacently located industrial centers as Bacau, Comanesti, Braila and Mizii. The distribution of the wage workers in the District are as shown in **Table 2.2.1-A2**.

### **2.2.2 District Agriculture**

#### **(1) General**

An outstanding characteristic observed in agriculture in Vrancea lies in wine grape production from widely developed vineyards. An arch line of compound alluvial fan runs from Ploiesti to Bacau, on which vineyards have been developed. Below these fans a fluvial plain extends along the basin of the Siret River where cereal crops are mainly grown in rotation and livestock herds are allowed to graze. Arable land formerly belonged to CAP has been for the most part restituted to duly owners, while major part of grass land for pasturing is still held in public entities. As a result, a host of small holding individual farmers were born, and some of them have set up formal (AA) or informal associations and other private groups (**Table 2.2.2-A1**).

#### **(2) Crop and Livestock Production**

Crop and livestock herd composition are similar to those of the whole Romania, but production from vineyard has much higher share as compared with the state average. Overall crop yield levels are somewhat lower for cereal, but sometimes higher for some cash crops. Cropped area and yield levels (ton/ha) are briefed in **Table 2.2.2-A2**.

It is observed that acreage under industrial crop declines due partly to relatively low profitability and difficulty in yield improvement. Total cropped area in 1991 accounted for 139,364 ha (94.8 % of arable land area), of which 86% was cultivated by private sector. In 1992, the area

showed a little expansion reaching 143,512 ha (97.6% was used and also 86 % was covered by private sector). Overall falling trends of wheat and shift to maize still continue in this area. Crop yields were affected by drought in 1992 but the extent of the damage differ greatly.

As for livestock herd in Vrancea, the following numbers of livestock are fed by private and public sectors, but as far as forage base and herd management are concerned, the latter keeps still leading position, while the former ought to keep livestock for home-consumption, as draft power, as means of carriage/transport and as a source of organic fertilizer. Livestock herd composition and production are shown in **Table 2.2.2-A3**.

### **(3) Input Supply, Markets of Produce and Food Self-sufficiency**

Inputs have been supplied by APROs, society companies and other supply agencies to individual farmers. Individual farmers can supply fairly a wide spectrum of inputs by themselves such as seed, organic fertilizer, family labor. Farm machinery is available as a rental system from AGROMECS for them, while State Farms and large agricultural companies hold their own machinery and workshops. Farmers can maintain current productivity within the present supply capacity of machinery. However, additional and more efficient supply of machinery will be vital to expand production and enhance productivity level.

In as much as they produce particular species of cash crops for industrial material like sugar beet, sunflower, either through contract basis or by trading with ROMCEREAL, both input supply and market outlet are partly guaranteed. Nevertheless, market structure for minor commercial crops such as vegetables, fruits are not yet fully developed. Trade of live animal is usually done in special markets called Tirc de Animale held once a week in local centers. Status of major agricultural input supply is shown in **Table 2.2.2-A4**.

Agricultural production enables them to sustain food self-sufficiency, but it is really difficult for them with an average holding size of less than 1 ha to meet non-food demand, especially during current period of sky-rocketing inflation. Consequently, the farmers tend to resort non-farm income or pension. Some of their family members, often of younger generation, have to leave their home seeking for out-farm income to remit, often entailing to the fact that aged members are destined to sustain farming due to exodus and deficit of young labor force. Food self-sufficiency in grains and foods of protein source within the District is given in **Table 2.2.2-A5**.

## **2.3 HISTORICAL BACKGROUND OF THE PROJECT**

The idea to irrigate the Siret-Ialomita area that was one of the most important crop production areas of the country by inducing the river flow of the Siret River the discharge of which was comparatively ample came up in the 1910's. In the 1950's, the Integrated Siret River Development Plan was prepared and the above idea was further materialized.

In line with the above Plan, a multi-purpose dam named Izvorul Muntelui Dam ( effective storage capacity:  $930 \times 10^6 \text{ m}^3$  ) was completed on the Bistrita River, one of the branch rivers of the Siret River, in 1961. After the completion of this dam, three multi-purpose dams ( Galbeni, Racaciuni and Beresti ) were constructed on the main stream of the Siret River. The total effective storage capacity of these three dams are  $210 \times 10^6 \text{ m}^3$ . It has been reported that the total  $360 \times 10^3$  ha of the Siret-Ialomita area will be able to be irrigated by the completion of these dams.

In 1985, the basic design of the Siret-Ialomita Agricultural Development Project covering irrigation area of  $500 \times 10^3$  ha by constructing two storage dams ( Adjud and Prisaca, the total storage capacity:  $360 \times 10^6 \text{ m}^3$  ) in addition to the above mentioned existing dams was completed

and the implementation of the Irrigation Project in Ruginesti-Pufesti-Panciu, District Vrancea covering irrigation area of approx.  $23 \times 10^3$  ha ( hereinafter referred to as the Project ) was approved by the Government as the Phase I of the Siret-Ialomita Agricultural Development Project which was divided into VIII phases as shown in Table 2.3.1-A1. And the construction of the Project works has been started since the same year. In parallel with the implementation of the Project, the construction of the Calimanesti Dam, the main purpose of which being hydraulic power generation, was started in 1987 and completed in 1992 by the Ministry of Energy.

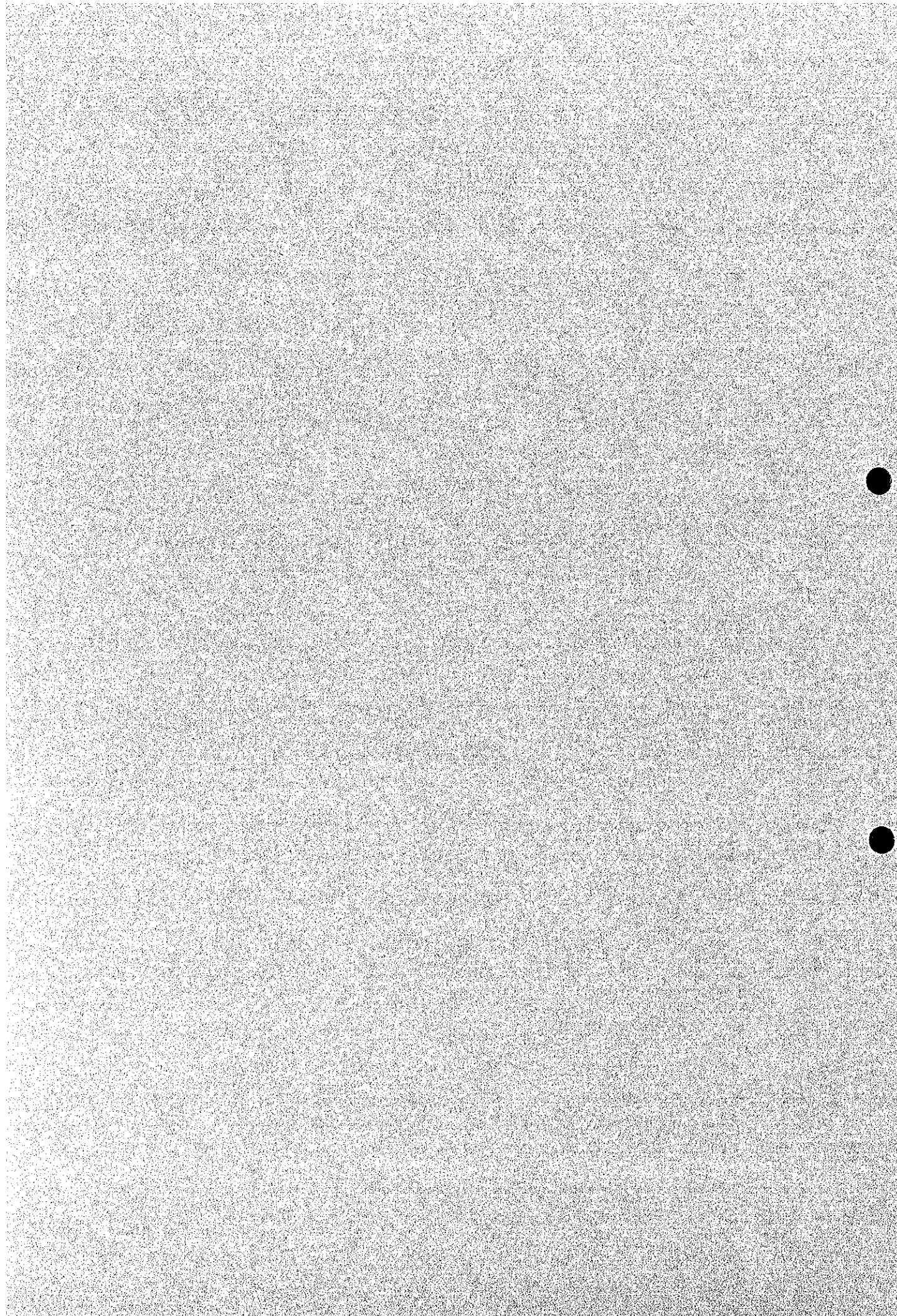
The construction works of the Project have been executed under the control of two Ministries. That is; the construction of the Siret-Baragan Canal including the intake facilities (hereinafter referred to as the Main Canal) was started in 1986 and has been executing by the Ministry of Water, Forestry and Environmental Protection. On the other hand, the construction of other irrigation facilities such as pump stations, branch canals and pipe lines has been executing by the Land Reclamation Department of the Ministry of Agriculture and Food.

The construction works of the Project was suddenly stopped due to lack of fund after the revolution to the Ceausescu's Government in December 1989. The upstream section of the Main Canal of 5.5 km, some of the pump stations, some sections of the pipe lines and the Branch Canals and other related structures had been almost completed by that time.

The new Government decided to continue the Project in consideration of its importance for the improvement of Romanian agriculture and has been re-continuing the construction works little by little in compliance with the availability of fund. However, in consideration of lack of the Government fund and achievement of the Project in the earliest time possible, the Government has decided to ask the financial assistance from the Government of Japan and is expecting the immediate financial assistance from Japan.



## **CHAPTER 3 : THE STUDY AREA**



## CHAPTER 3 : THE STUDY AREA

### 3.1 GENERAL FEATURES

#### 3.1.1 Location

The Study Area lies on the right bank of the Siret River in the northeastern part of Vrancea District, with altitude approximately between 46°-10' to 45°-45' North and longitude 27°-05' to 27°-15'. It locates about 200 km northeast from Bucharest, the capital of Romania. The capital city of the Vrancea District is Focsani, and locates at the south-eastern border of the Study Area.

#### 3.1.2 Administration

The Study Area is covered by 19 villages/towns out of 64 villages/towns in Vrancea District. These 19 villages/towns can be categorized as follows:

Category	Classification	Number of Village/Town	Name of Village/Town
I	Whole village areas being involved in the Study Area	11	Ruginesti, Paunesti, Pufesti, Movilita, Straoane, Fitionesti, Panciu, Tifesti, Bolotesti, Marasesti and Odobesti
II	Partial village areas being included in the Study Area	3	Jaristea, Brosteni and Campineanca.
III	Villages having separated lands the Study Area	5	Soveja, Vidra, Racoasa, Focsani and Grafoafa

Note : Marasesti, Odobesti and Panciu are classified as towns and Focsani is classified as a municipality.

The location of these villages/towns is shown in Fig 3.1.2-A1. Each village is governed by the local board and has a major who is elected by the village people. The District is governed by the district board and the administration is executed by the Chief of District who is assigned by the central Government.

#### 3.1.3 Population

According to the Population and Housing Census of January 7, 1992, the total population in the Study Area (11 villages) is estimated at 67,805. The village population, population by age group and occupation of active population in the Study Area are shown in Table 3.1.3-A1. Agriculture is the main work in the Study Area, occupying 49 % of the total workable population of 16,395.

The population growth of whole Romania and Vrancea District in January 1992, 1977 and 1948 are shown as follows:

Item	Jan. 1948	Jan. 1977	Jan. 1992	Remarks
Population	15,872,624	21,559,910	22,810,035	
Population Growth	1.01 %	0.38 %		per annum
Population Density	66.58	90.44	95.68	
Population	290,183	369,740	393,408	
Population Growth	0.84 %	0.42 %		per annum
Population Density	59.75	76.13	81.00	

Source : Statistical Yearbook of Romania, 1994, National Commission for Statistics

### 3.1.4 Social Infrastructure

#### (1) General

Social Infrastructure in the Study Area is summarized in **Table 3.1.4-A1**.

#### (2) Roads

The National Motor Highway No. 2 (European Highway E-85) which connects Bulgaria at Girugiu, Bucharest and Ukraine at Siret, penetrates the Study Area on its eastern border. Through the highway, it is possible to access to the Study Area with about 200 km or within 4 hours from Bucharest, the capital of Romania. The highway surface is covered by asphalt and has partially 2 lines with double traffics. The National Motor Highway No. 24 (European Highway E-581) diverts eastern words from National Highway No. 2 in the Study Area and connects to Tecuci and Iasi over the Siret River. In addition to the above, there is a national road crossing the Study Area from east to west, named as No. 2D, and connecting Focsani - Bolotesti - Colacu - Lepsa and cross the Carpathian Mountains.

There are 5 district roads, Dj-205A (Focsani - Odobesti - Bolotsti), Dj-205E (Bzighesti - Tifesti - Vidra), Dj-205F (Marasesti (Tisita) - Panciu - Straoane - Soveja - Lepsa), Dj-204E (Haret - Panciu) and Dj-205H (Domnesti -Sat - Paunesti - Movilita - Panciu). They are mostly paved with asphalt or gravel and some portions are difficult to drive during rainy season. According to the information of District Road Authority, the traffic number of each district road in 1990 and forecast of 1995 and 2000 are as follows:

No.	District Road		Number of Vehicle Traffic		
	Name	Section	1990	1995	2000
1	Dj 205A	0+000 - 10+000	7,762	11,684	16,455
2	Dj 205B	0+000 - 8+200	203	284	393
3	Dj 205F	0+000 - 8+200	3,041	4,752	6,742
4	Dj 205H	0+000 - 24+000	338	558	849
45	Dj 204E	24+300 - 43+000	1,799	2,224	3,157

Source : Road Authority of Vrancea District

Several communal roads crossing the Study Area from east to west are basically working as farm roads and are difficult to drive after heavy rains. They are shown in **Fig 3.1.4-A1** together with railway. The road density of Romania and Vrancea District are 30.5 km and 14.3 km / 100 km<sup>2</sup>, respectively.

#### (3) Railway

State owned Romanian National Railway (CFR) has one main line No 500 and 2 branch lines in the Study Area. Main line No 500 connects Bucharest and Vicsani to the North, which runs along the National Motor Highway through the Study Area. Main stations of Main line No 500 in the Study Area are Focsani, Marasesti. The latter is the diverting point of Main line No 600 to the Northeast. There are 27 passenger and 30 cargo train services a day to the north and south. About 52,920 travelers and 122,000 ton of cargo a day are passing Focsani by this line. Branch line No 507, which connects Marasesti and Panciu with distance of 18 km, is operated 4 mixed train services a day upward and downward. Another branch line connecting Focsani, Odobesti and Vidra Burca is not used at present.

#### (4) Electricity

The electricity supply service is made by the state owned Romanian Electric Company. In the Study Area, double high tension lines with 110 / 20 kv are passing interconnecting with Chiscani (Braila), Borzesti, Teleajen and other major hydro-thermal power stations. Power station of interconnection locates in Focsani. The Bistrita River, one of the Major tributary of

the Siret River, creating hydro-power by several dams of which the Izvorut Muntelui dam is the first large scale dam for hydro-power in Romania. The Calimanesti dam, the reservoir for the Siret Baragan Canal (the Main Canal), also has hydro-power station.

According to the field survey by the Study Team, the electrification in the Study Area has almost completed with 425 km of electric supply network and most of the houses are receiving electricity. The average monthly electricity consumption per house is 130 kwh. Extension of electric lines for the proposed pumping stations is expected to have no trouble in the Study Area. Electricity tariff for irrigation pump operation varies between 68.9 and 230 Lei/kwh depending the time and season.

#### **(4) Water Supply**

Each village has separate water supply system except for Pufesti. However, these systems are not fully functioning at present because of lack of water sources, deterioration of systems or lack of operation funds. Their water sources are lake/springs and deep/shallow wells. The groundwater quality is normally good enough for drinking, but water in lakes is poor. Some of the villages are extracting groundwater near the National Motor Highway No 2 and conveying it by pipe lines with high energy. The water shortage in Paunesti and Movilita is most serious in the Study Area and an urgent countermeasures against water shortage are strongly requested by the farmers in those villages.

#### **(5) Health Care**

Each village has minimum one clinic, and only three towns, Panciu, Marasesti and Odobesti have respective hospitals with 475 beds in total in the Study Area. The hospital bed population in the Study Area is 7 beds/1000 capita. Special local diseases are not specific in the Study Area. Higher share of aged people, the ratio above 60 years old, in the Study Area may become one of the problems in the near future. The shares in the Study Area, Vrancea District and whole Romania were 19.5 %, 18.0 % and 16.4 % in 1992, respectively.

#### **(6) Education**

Each village has more than 3 primary schools and totally 57 primary schools with 10,000 pupils under 653 teachers are operated in 11 villages in the Study Area. A high school is operated in Panciu. Higher education can be obtained only outside the Study Area, such as Focsani.

### **3.2 NATURAL FEATURES**

#### **3.2.1 Topography**

The Study Area of 51,800 ha is divided into two study areas, one is Irrigation Study Area (ISA) of 28,900 ha and the other is Soil Conservation Study Area (SCSA) of 22,900 ha. Both of the study areas spread on the Siret terrace, old and recent. ISA locates on the recent terrace with elevation between 80 to 180 m and gradient less than 3 %. ISA is divided into 5 blocks by tributaries of the Siret River. They are the Trotus, Carecna, Zabraut, Susita, Putna and Milcov rivers from the north. Their areas, excluding the areas of towns/villages and river courses, with average slope and elevation, based on the topographic maps are shown below and plotted on Fig 3.2.1-A1.: