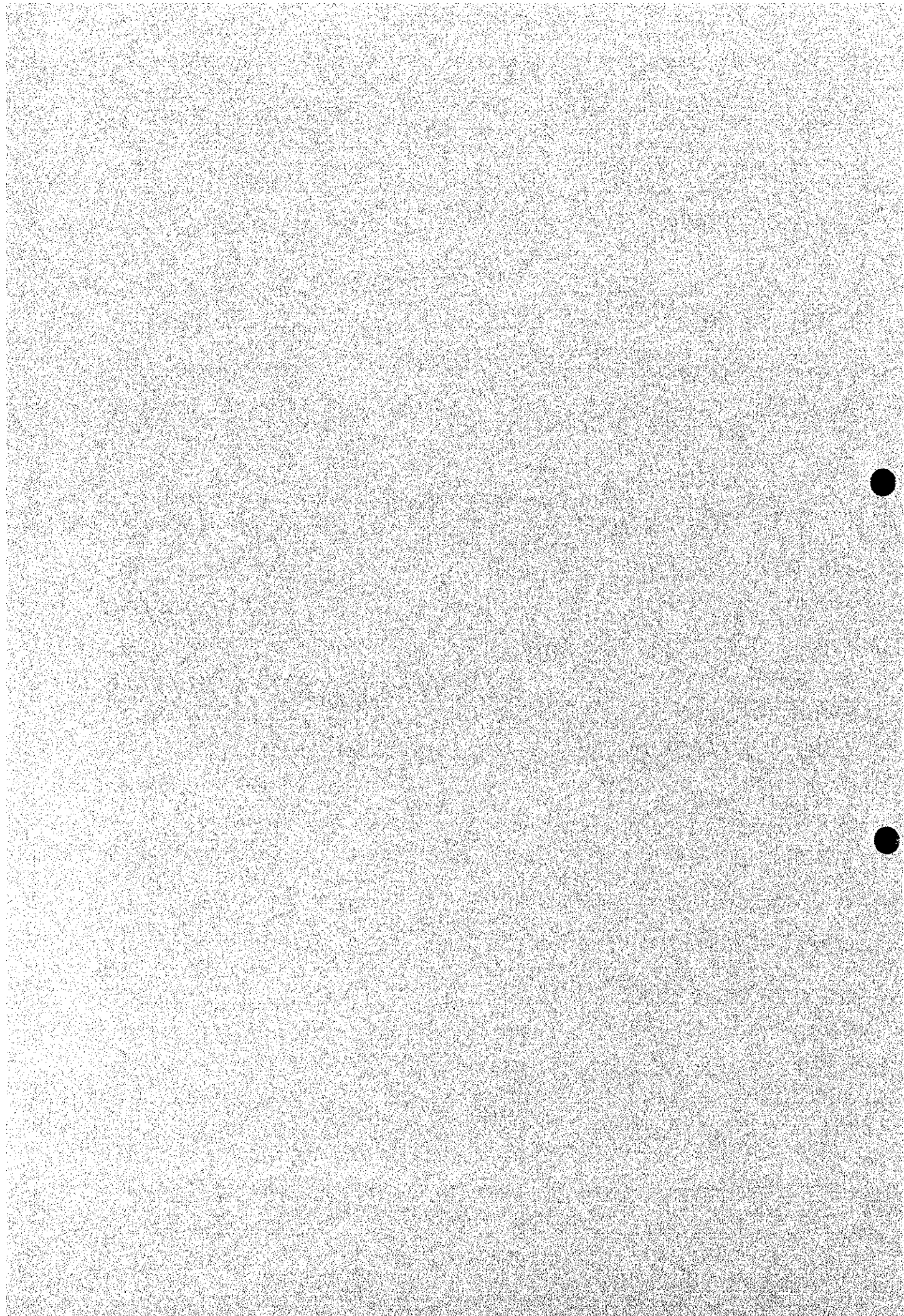


CHAPTER 7
RECOMMENDATIONS



CHAPTER 7 : RECOMMENDATIONS

1. Soonest Implementation of the Project

The Project should be implemented as soon as possible in consideration of the following matters:

- a. The Project is feasible judging from both economic and financial view points, and the implementation of the Project will contribute very much to the improvement of living standards of the farmers in the area and also to the development of the area.
- b. Some of the main Project facilities such as the Calimanesti Dam, the intake structure and some of the main pumping stations have almost been completed, and some sections of the branch canals have already been completed or are under construction.
- c. The Project is very important as the model agricultural development project for the improvement of agriculture not only of the District but also in Romania in cope with the progressing free economic system, even though the initial investment cost is more expensive than those of the rehabilitation works of the existing irrigation schemes mostly located along the Danube River.

Furthermore, it is recommended that Phase I of the Project be implemented even partially as soon as possible, if the construction works of the Siret-Baragan Canal by MoE is delayed with some reasons.

2. Land Ownership and Reallocation of Farm Land

The delay of the process of land ownership from the former state farm to the original owners is hampering the strong desire of the farmers especially individual small and medium-scale farmers to improve their farming and to participate in associations, and also is making it hard for them to obtain agricultural credit from financial organizations. Therefore, the promotion of the process of land ownership is strongly recommended. However, reallocation of the lands returned to the farmers in accordance with the proposed layout of the irrigation blocks is definitely necessary for the success of the Project.

3. Establishment of Pilot/Experimental Farm

In order to realize the smooth and effective introduction of new crops especially vegetables to the farms in the Project Area, it is strongly recommended that the pilot and experimental farm is established within an association farm near the almost completed pump station SRP-V considering the future availability of irrigation water for test farming. Furthermore, it is also

important theme of the pilot farm to train the extension workers who will directly visit the farms and train the farmers and/or farm workers in the Project Area and transfer the technique in connection with introduction of new crops and other related matters to them by reorganizing the existing extension workers who are working in the towns/villages in and around the Project Area.

4. Agricultural Credit System

In order to achieve the improvement of marketing system, agro-processing system, agricultural supporting system, etc. necessary for the success of the Project, earlier materialization of low-interest agricultural credit system to the farmers by obtaining financial sources is strongly recommended.

5. Joint Ventured Enterprise

In order to solve the problems in connection with the dilapidated processing facilities, out-dated technology and scarcity of low-interest credit-funds, it is advised to formulate a joint venture with overseas enterprises, envisaging innovation of operational management and technology; faster acquisition of transferable know-how/strategies for sales.

6. Effective Utilization of the Existing Agricultural Machines

In order to perform the proposed cropping schedule smoothly and effectively, it is indispensable to equip an agricultural machinery of sufficient number with well-maintained condition by establishing an effective utilization system of machines. It is proposed to establish users' associations newly where proper number of operators and mechanics are secured by improving the present AGROMECC's facilities at Adjud, Panciu, Marasesti, Odobesti and Cimpineanca in addition to ROMCEREAL's facilities. It is also proposed to introduce a rental system of machines in which the respective farmers can operate the machines by themselves.

7. Importance of Soil Conservation Works

The priority for the implementation of soil conservation works on SCSA is higher than those on ISA due to steeper slope of land in SCSA. Therefore, earlier implementation of soil conservation works including reforestation is strongly recommended in order to increase the productivity of crop production in the Project Area and to maintain the irrigation facilities to be constructed with the Project in operational condition always.

8. Improvement of Rivers in the Project Area

The branch streams of the Siret River; the Putna, Susita, Zabraut, Voilui and Domosita, are flowing through the Project Area, and the countermeasures against progressing erosion and occasional flood on these rivers have not yet been taken satisfactorily. The improvement of these rivers against erosion and flood is urgently required in parallel with the implementation of the Project works.

9. Improvement of Domestic Water Supply

Most of the villages or towns in the Study Area have own water supply system. But they are not fully functioning at present because of lack of water sources, deterioration of the systems or lack of operation funds. Urgent countermeasures against water shortage in the towns and villages in the Study Area are strongly recommended for the improvement of living standards of the people in the area, even though it is not directly connected with the agricultural development.

TABLES

Table 2.1.1 Gross Domestic Product by Branch and Estimated GNP

Year	(Unit: 10 ⁶ Lei current price)						
	1986	1987	1988	1989	1990	1991	1992
G.D.P Total Sector	839 (99.2)	845 (100)	857 (99.6)	800 (93.7)	858 (88.5)	2,199 (77.0)	5,982 (66.6)
Agriculture/ Forestry	107 (110.8)	103 (100)	116 (109.1)	113 (102.8)	155 (118.5)	412 (108.3)	1,130 (95.2)
Industry/ Cottage Ind.	476 (99.3)	477 (100)	472 (96.1)	433 (91.0)	435 (78.7)	953 (67.1)	2,674 (56.4)
Commerce	40 (99.3)	43 (100)	47 (107.5)	51 (112.1)	58 (118.9)	311 (93.2)	790 (77.0)
Constructions	60 (101.0)	61 (100)	60 (99.3)	44 (83.5)	46 (84.4)	104 (66.0)	261 (60.2)
Transport/ Communication	57 (98.5)	58 (100)	60 (105.2)	61 (103.7)	54 (79.2)	138 (67.7)	383 (56.1)
						(Unit : 10 ³ Lei)	
Per Capita GDP	36.7	36.8	37.1	34.6	37.0	94.8	262.5
Per Capita GNP	-	-	-	-	33.7	91.4	240.3
PC-GNP(inUS\$)	-	-	-	-	1,453	1,240	736

Source: Statistical Quarterly Bulletin, 1993-1994

Note: for indices in brackets 1987 = 100

Table 2.1.2 Livestock Herds in Romania

Year	(Unit: 10 ³ heads, fowls, families)					
	1988	1989	1990	1991	1992	1993
Bovine Total	6,559	6,416	6,291	5,381	4,355	3,683
of which						
Milk cows	2,727	2,758	2,468	2,123	2,266	2,025
Pigs	14,328	14,351	11,671	12,003	10,954	9,852
breedsows	1,091	1,099	1,023	951	771	792
Sheep	16,839	16,210	15,435	14,062	13,879	12,079
ewes	9,805	9,890	9,292	9,050	11,496	8,854
Goats	990	1,078	1,017	1,005	954	805
she-goats	707	756	706	697	734	613
Horse	693	702	663	670	749	721
adult-mares	213	222	210	212	-	-
Poultry	127,304	127,561	113,968	121,379	106,032	87,725
laying-hens	51,742	52,498	49,390	51,475	50,213	42,406
Bees	1,357	1,418	1,201	1,091	1,207	780

Source: Statistical Quarterly Bulletin, 1993-1994

Table 2.2.1 Status of Land Tenure

Land Type	Total area		Public Property (%)		Private Property (%)		
	(ha)	(%)	Public	State	Individual	Commercial	Association
Arable land	147,747	(21)	1.1	12.2	75.6	1.3	9.8
Grass land	44,458	(9)	81.7	2.9	15.2	0.2	0.0
Hay field	30,417	(6)	2.2	0.8	96.8	0.1	0.0
Vineyards	28,104	(6)	2.1	24.4	71.1	0.8	1.6
Orchard	4,602	(1)	-	-	-	-	-
Agricultural	255,328	(52)	15.9	10.4	66.9	0.8	6.0
Forest land	191	(39)	92.3	0.0	7.6	0.1	0.0
Other land	211	(43)	72.1	6.9	20.7	0.3	0.0
Total land	486	(100)	50.5	6.0	39.8	0.5	3.1

Source: Statistical Quarterly Bulletin, 1993-1994

Table 2.2.2 Area and Yields of Major Crops in Vrancea District

Crop	Year	Wheat/Rye	Barley	Oats	Maize	Beans	Sunflower	Sugerbeet
Area	1991	38.3(91)	10.0(71)	1.1(68)	50.6(89)	0.3(73)	6.8(80)	3.0(93)
Area	1992	24.8(85)	5.5(58)	1.0(38)	80.5(97)	0.2(80)	7.3(77)	2.4(92)
Yield	1991	2,035(94)	2,680(88)	891(99)	3,843(100)	503 (97)	1,233(91)	18,513(98)
Yield	1992	1,839(88)	2,193(75)	2,833(57)	1,374(101)	745(108)	1,147(94)	14,847(99)

Crop	Potatoes	Vegetables	(Tomato)	Fodder	Perennial Hay	Grape	
Area	1991	4.6(92)	2.9(91)	0.7(90)	22.3(65)	13.8(70)	25.7(76)
Area	1992	1.3(85)	3.5(92)	0.9(95)	14.6(54)	10.6(61)	26.2(74)
Yield	1991	7,746(91)	-	17,582(101)	21,215(93)	19,456 (95)	7,723(90)
Yield	1992	8,891(82)	-	11,197 (96)	20,866(89)	30,757(101)	3,920(85)

Source: Statistical Quarterly Bulletin, 1993-1994

Table 2.2.3 Livestock Herds and Products

Livestock	Unit: 1,000heads,fowls and families,1,000ton,h.litre							
	Cattle	Milk-Cow	Pig	Sheep	Goat	Horse	Poultry	Bee
Head 1991	26.6	33.2	113.6	174.9	34.9	15.4	1,806.9	24.9
Head 1992	29.6	34.1	133.3	235.3	27.0	14.9	1,854.2	12.1
Products	Beef	Milk	Pork	Wool	Mutton	Fowl	Egg	Honey
Total 1991	7.25	601.0	12.86	0.42	3.61	12.70	6.71	0.07
(Private %)	(82.4)	(85.5)	(75.3)	(75.2)	(90.1)	(64.8)	(76.0)	(99.2)
Total 1992	7.34	774.6	12.70	0.42	3.97	14.28	6.49	1.24
(Private %)	(91.0)	(70.2)	(73.3)	(82.5)	(93.6)		(75.2)	(98.2)

Source: Statistical Quarterly Bulletin, 1993-1994

Table 3.2.1 Summary of Monthly Mean River Discharge in the Study Area

(unit : m³/sec)

Name of River	Item	Description	Mean Monthly Discharge												Annual Average				
			Jan.	Feb.	Mar.	Apr.	May	Jun	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual Mean	I-XII	X-IX	IV-IX	X-III
Ialornita	No. of Station	546	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	43
	Name of Station	Cosereni	29.3	36.1	47.7	59.6	63.3	56.4	43.8	29.4	22.9	25.8	26.3	30.1	39.2	39.2	39.1	45.9	32.9
	Catchment Area	6,265 km ²	120.0	109.0	145.0	156.0	179.0	125.0	192.0	71.9	97.3	298.0	80.1	79.3	82.4	82.4	84.5	88.6	102.4
	period	1950 - 1993	8.1	10.2	13.5	10.3	11.3	6.5	5.5	5.3	5.1	5.7	8.8	7.4	11.8	11.8	11.2	10.0	12.2
	No. of Station	547	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
	Name of Station	Slobozia	33.1	38.9	55.6	67.2	68.0	63.0	49.4	33.9	26.1	27.5	28.6	32.7	43.7	43.7	43.6	51.3	36.5
Siret	Catchment Area	9,154 km ²	145.0	110.0	147.0	242.0	164.0	214.0	83.7	97.6	282.0	81.6	88.3	86.8	86.8	94.1	101.6	111.3	
	period	1950 - 1993	10.6	11.0	14.7	11.1	12.2	8.3	9.0	4.0	3.7	5.0	9.4	8.5	12.8	12.8	13.0	10.8	13.0
	No. of Station	579	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	32
	Name of Station	Racatau	61.6	74.1	118.2	203.2	221.3	218.5	183.8	148.1	98.2	88.5	79.3	74.8	130.8	130.8	132.5	178.8	82.7
	Catchment Area	19,492 km ²	145.0	145.0	252.0	433.0	924.0	633.0	672.0	844.0	247.0	372.0	174.0	179.0	246.8	246.8	251.0	370.3	195.5
	period	1950 - 1985	11.8	24.1	43.5	66.7	63.6	50.9	41.5	36.0	28.4	31.8	31.3	18.7	60.2	60.2	60.9	68.0	33.9
Siret	No. of Station	580	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	43
	Name of Station	Cosmesti	70.5	93.4	172.9	329.8	318.7	296.5	229.4	191.6	122.5	102.3	90.8	86.6	175.4	174.0	173.1	245.2	102.6
	Catchment Area	25,666 km ²	236.0	215.0	470.0	917.0	1151.0	762.0	819.0	939.0	360.0	686.0	243.0	278.0	327.9	327.9	371.1	492.0	290.2
	period	1950 - 1993	11.0	21.9	36.7	47.7	42.2	38.9	40.1	32.8	30.0	27.0	29.0	22.3	52.0	52.0	51.3	61.5	30.8
	No. of Station	581	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
	Name of Station	Lungoci	88.6	114.6	208.3	368.2	352.4	330.2	254.7	211.0	139.4	119.1	107.8	104.2	199.9	199.9	198.9	276.0	123.6
Putna	Catchment Area	36,036 km ²	265.0	242.0	517.0	1000.0	1253.0	833.0	894.0	998.0	399.0	751.0	272.0	310.0	363.9	363.9	363.0	540.8	323.6
	period	1950 - 1993	19.1	33.5	49.5	61.4	55.5	51.9	44.7	45.3	38.0	37.4	29.8	29.1	66.0	66.0	64.8	76.2	44.8
	No. of Station	665	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
	Name of Station	Colacu	4.7	5.8	10.9	24.7	27.7	17.2	13.3	10.7	7.9	6.5	5.7	5.4	11.7	11.7	11.9	16.8	6.6
	Catchment Area	1,100 km ²	18.8	17.9	32.8	51.0	101.0	39.1	51.4	49.6	48.3	53.3	15.8	17.1	21.5	21.5	21.9	31.5	15.6
	period	1950 - 1993	0.9	1.0	3.4	4.6	5.6	3.3	2.2	2.1	1.1	1.2	1.2	1.5	5.5	5.5	4.6	3.4	1.7
Buzau	No. of Station	677	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	48
	Name of Station	Sageala-Banita	14.7	21.5	34.6	52.2	46.8	41.3	36.6	21.1	13.8	13.0	15.5	17.0	27.3	27.3	27.3	35.3	19.5
	Catchment Area	3,980 km ²	60.7	76.5	99.0	108.0	151.0	116.0	154.0	110.0	44.6	125.0	98.4	67.6	49.7	49.7	51.5	68.1	50.7
	period	1945 - 1993	3.4	3.1	7.0	7.9	5.3	4.8	4.0	0.9	0.5	3.1	2.5	3.1	9.8	9.8	8.9	10.1	5.4
	No. of Station	678	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49
	Name of Station	Racovita	15.9	21.9	34.8	52.2	46.5	40.3	36.0	20.9	14.3	14.3	15.5	16.9	27.4	27.3	27.3	35.0	19.8
Buzau	Catchment Area	5,240 km ²	85.5	76.5	96.0	133.0	175.0	116.8	167.0	110.0	57.9	154.0	57.7	67.8	54.1	54.1	55.6	71.1	53.9
	period	1945 - 1993	1.5	2.1	7.0	7.9	5.3	1.4	4.0	0.9	0.5	3.2	2.5	3.1	9.9	9.9	8.9	10.2	3.7

Source : INMH/ISPIF

Table 3.2.2-1 Characteristics of Soil Units in the Study Area (1/4)

SU	Classes	Symbol	Soil type and subtype	Mother material	Soil texture	Drainage	Soil depth	Gravel	pH	Elect. cond.	Total cationic exchange capacity	Degree of base saturation	Organic matter	N Total	P	K	Slope	Ground water depth	Area	
																			ha	%
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Sub-table I IRRIGATION STUDY AREA																				
1	Mollisols	Czi	Typic Chernozem	alluvial deposit	L/L	Good	125	-	N	-	L	MB	L	M	L	L	<2	>5	34.1	0.1
2		Ccti	Typic Chernozem with cambic B horizon (on loess deposit and loam texture)	loess (and or alluv. dep.)	L/L, SL/SL	Good	70-115	-	N	N	L	MB	L	L	M	M	<2	>5	8,984.9	33.1
3		Ccti	Typic Chernozem with cambic B horizon, (on alluvial deposit with clay-loamy texture)	alluv. dep.	L-CL/L-CL	Good	90	-	Ac	-	M	MB	M	L	L	H	<2	>5	1,011.9	3.7
4		Ccvi	Typic Chernozem with cambic B horizon slightly eroded	loess dep.	L/L	Excessively	80	-	Ac	-	-	-	L	-	-	-	2-5	>5	99.7	0.4
5		Ccti	Typic Chernozem with cambic B horizon moderately eroded	loess dep.	L/L	Excessively	100	-	Ac	-	L	EB	L	VL	-	-	5-10	>5	410.3	1.5
6		Ccti	Typic Chernozem with cambic B horizon slightly to very gravelly	alluv. dep.	L/L	Excessively	76-100	6-50	AC	-	-	-	L	-	-	-	<2	>5	1,150.1	4.2
7		Ccti	Typic Chernozem with cambic B horizon, gravelly to very gravelly, gravelly substratum	alluv. dep.	CL/CL	Excessively	51-75	26-50	AC	-	-	-	L	-	-	-	<2	>5	353.3	1.3
8		Ccti	Typic Chernozem with cambic B horizon, gravelly to extremely gravelly, gravelly substratum	alluv. dep.	SL-L/SL-L	Good	54-80	26-75	AC	N	L	MB	M	L	VL	L	<2	>5	1,105.9	4.1
9		Ccvs	Vertic Chernozem with cambic B horizon and vertisols	caly-expansive soil	CL/CL	Good	100	-	AC	-	-	-	L	-	-	-	<2	>5	245.0	0.9
10		Ccvs	Vertic Chernozem with cambic B horizon	expansive soil	CL/CL	Good	90-115	-	AC	N	M	MB	L	M	L	M	<2	>5	137.8	0.5
11		Ccgz	Gley Chernozem with cambic B horizon	alluv. dep.	CL/L	Moderately	100	-	FAC	N	M	MB	M	M	M	H	<2	>5	160.0	0.6
12		Clife	Typic Chernozem with argillic B horizon slightly eroded	loess dep.	L/CL	Good-Exc.	90	-	Ac	-	-	-	L	-	-	-	2-5	>5	46.0	0.2
13		CNcc	Grey Soils with cambic B horizon	loess dep.	L/L	Good	90	-	Ac	-	-	MB	L	VL	M	M	<2	>5	243.3	0.9
14		CNt	Typic Grey Soils	loess (and or alluv. dep.)	L/CL	Good	80-140	-	Ac	-	L	MB	L	L	M	H	<2	>5	2,678.5	9.8
15		CNtfe	Typic Grey Soils slightly eroded	loess dep.	L-CL/CL	Good	110-130	-	Ac	-	M	MB	L	L	M	M	2-5	>5	2,238.0	8.6
16		CNtfe	Typic Grey Soils moderately eroded	loess dep.	L/L-CL	Excessively	90	-	N	-	-	-	L	L	H	M	5-10	>5	130.6	0.5
18	Argilluvic soils	Btmo	Brown Soils with mollic B horizon and argillic B horizon	loess dep.	L/CL	Good	80-135	-	Ac	-	M	MB	L	L	L	M	<2	>5	80.2	0.3
19		BtDyz	Brown Soils with argillic B Horizon and surface water gley	loess dep.	L/CL	Good	120	-	Ac	-	-	-	L	-	-	-	2-5	>5	93.3	0.3
21		BtDte	Brown Soils with argillic B horizon, slightly eroded	loess dep.	L/CL	Good	90-125	-	Ac	N	L	MB	L	L	L	M	2-5	>5	1,330.8	4.9

Table 3.2.2-2 Characteristics of Soil Units in the Study Area (2/4)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
22		BD/c	Brown Soils with argillic B horizon, moderately eroded	loess dep.	L/CL	Good-Ex.	90-116	-	Ac	-	M	MB	L	L	-	-	5-10	>5	502.5	1.8
24		BD/c	Brown Soils with argillic B horizon, and Gullied land	loess dep.	L/CL	Excessively	70-90	-	AL	-	-	MB	L	-	-	-	5-10	>5	6.8	0.0
30	Hydromorphic soils	LCu	Eutric Humic Gley Soils	altuv.dep.	CL/CL	Imperfectly	130	-	AL	N	-	MB	M	-	-	-	<2	0.5-1	97.5	0.4
31		GCu	Eutric Low Humic Gley Soils	altuv.dep.	CL/CL	Imperfectly	80-130	-	AL	-	-	EB	M	-	-	-	<2	1	274.8	1.0
32		GCml	Boggy Gley Soils	altuv.dep.	L-CL/L-CL	Very slighty	120	-	N	-	-	EB	M	-	-	-	<2	0.5	46.6	0.2
33	Vertisols	VSt	Typic Vertisols	expansive soil	LC/LC	Good	100	-	N	N	H	EB	M	M	L	H	<2	>5	555.0	2.0
34	Undeveloped soils	RSt	Typic Regosols	loess dep.	L/L	Excessively	25	-	AL	-	-	EB	VL	M	M	H	>20	>5	240.1	0.9
36		RSt	Typic Regosols and Gullied land	loess dep.	L/SL	Excessively	15	-	AL	-	-	EB	VL	-	-	-	>20	>5	5.2	0.0
38		SAu	Typic Alluvial Soils	altuv.dep.	SL-L/SL-L	Good	30-50	-	AL	N	-	EB	M	-	-	-	<2	>5	1,011.9	3.7
39		SAu	Typic Alluvial Soils	altuv.dep.	L-CL/CL	Good	40-50	-	AL	-	-	EB	L	-	-	-	<2	>5	331.8	1.2
40		SAu	Typic Alluvial Soils, seldom flooded	altuv.dep.	LS-L/LS-L	Good	28-50	-	AL	-	L	EB	VL	VL	M	VL	<2	>5	452.7	1.7
41		SAu	Typic Alluvial Soils, phreatic phase	altuv.dep.	SL/L-CL	Good	76-90	-	Ac	N	-	MB	M	L	M	H	<2	3-5	266.2	0.9
42		SAGz	Gley Alluvial Soils	altuv.dep.	SL-L/CL	Moderately	70-90	-	Al	N	-	EB	L	L	H	VH	<2	2-3	911.0	3.4
43		SAGz	Gley Alluvial Soils	altuv.dep.	L-CL/LS-SL	Moderately	70-90	-	AL	N	-	EB	M	M	-	-	<2	2-3	180.1	0.7
44		SAh	Typic Alluvial Soils, slightly, to moderately gravelly, gravelly substratum	altuv.dep.	SL-L/LS-SL	Excessively	45-50	6-50	AL	-	-	EB	M	L	H	H	<2	>5	374.7	1.4
45		SAh	Typic Alluvial Soils, slightly to moderately gravelly, gravelly substratum	altuv.dep.	SL-L/LS-SL	Excessively	50-60	6-25	AL	-	L	EB	L	VL	H	M	<2	3	140.1	0.5
46		SAh	Alluvial Soils very to extremely gravelly, gravelly substratum	altuv.dep.	L/L	Excessively	25	51-75	AL	-	-	EB	L	L	-	-	<2	2-3	706.4	2.6
47		SAmo	Mollic Alluvial Soils	altuv.dep.	L/L	Excessively	50-60	-	AL	-	-	EB	L	-	-	-	<2	3-5	204.4	0.8
48		AAIs	Alluvial Soils extremely, gravelly (rubble land)	altuv.dep.	LS/LS	Excessively	25	51-75	AL	-	-	MB	VL	VL	-	-	<2	>5	170.5	0.6
50		AAh	Typic Alluvial (Protosol), slightly to moderately gravelly seldom flooded	altuv.dep.	LS/LS	Excessively	<10	6-25	AL	-	-	EB	VL	-	-	-	<2	3-5	78.8	0.3
Sub-total I IRRIGATION STUDY AREA																			27,191.0	100.0

Table 3.2.2-3 Characteristics of Soil Units in the Study Area (3/4)

SU	Classes	Symbol	Soil type and subtype	Mother material	Soil texture	Drainage	Soil depth	Gravel	pH	Elect. cond.	Total cationic exchange capacity	Degree of base saturation	Organic matter	N Total	P	K	Slope	Ground water depth	Area	
																			ha	%
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20.0	21.0
Sub-table II SOIL CONSERVATION STUDY AREA																				
2	Mollisols	Ccu	Typic Chernozem with cambic B horizon (on loess deposit and loam texture)	loess (and or alluv. dep.)	L/L, SL/SL	Good	70-115	-	N	N	L	MB	L	L	M	M	<2	>5	338.5	2.0
4		Cciv	Typic Chernozem with cambic B horizon slightly eroded	loess dep.	L/L	Excessively	80	-	Ac	-	-	-	L	-	-	-	2-5	>5	120.4	0.7
5		Ccti	Typic Chernozem with cambic B horizon moderately eroded	loess dep.	L/L	Excessively	100	-	Ac	-	L	EB	L	VL	-	-	5-10	>5	5.6	0.0
12		ChIu	Typic Chernozem with argillic B horizon slightly eroded	loess dep.	L/CL	Good-Exc.	90	-	Ac	-	-	-	L	-	-	-	2-5	>5	107.1	0.6
14		CNi	Typic Grey Soils	loess (and or alluv. dep.)	L/CL	Good	80-140	-	Ac	-	L	MB	L	L	M	H	<2	>5	655.7	3.9
15		ChIu	Typic Grey Soils slightly eroded	loess dep.	L-CL/CL	Good	110-130	-	Ac	-	M	MB	L	L	M	M	2-5	>5	1,103.8	6.5
16		CNi	Typic Grey Soils moderately eroded	loess dep.	L/L-CL	Excessively	90	-	N	-	-	-	L	L	H	M	5-10	>5	503.3	2.9
17		CNi	Typic Grey Soils, moderately eroded sheet and gully erosion	loess dep.	L/CL	Excessively	85	-	N	-	-	-	L	-	-	-	5-10	>5	160.9	0.9
18	Argilluvic soils	BDmo	Brown Soils with mollic B horizon and argillic B horizon	loess dep.	L/CL	Good	80-135	-	Ac	-	M	MB	L	L	L	M	<2	>5	302.2	1.8
19		BDpz	Brown Soils with argillic B horizon and surface water gley	loess dep.	L/CL	Good	120	-	Ac	-	-	-	L	-	-	-	2-5	>5	444.1	2.6
20		BDpze	Brown Soils with argillic B horizon and surface water gley, slightly eroded	loess dep.	L/CL	Moderately	105-130	-	Ac	-	L	MB	L	L	VL	L	<2	>5	1,454.4	8.6
21		BDi	Brown Soils with argillic B horizon, slightly eroded	loess dep.	L/CL	Good	90-125	-	Ac	N	L	MB	L	L	L	M	2-5	>5	2,168.2	12.8
22		BDi	Brown Soils with argillic B horizon, moderately eroded	loess dep.	L/CL	Good-Exc.	90-116	-	Ac	-	M	MB	L	L	-	-	5-10	>5	2,019.3	12.1
23		BDi	Brown Soils with argillic B horizon slightly to moderately eroded (sheet and gully horizon)	loess dep.	L/CL	Excessively	80-135	-	FAC	-	L	MB	L	VL	L	H	5-10	>5	1,023.8	6.1
24		BDi	Brown Soil with argillic B horizon, and Gullied land	loess dep.	L/CL	Excessively	70-90	-	AL	-	-	MB	L	-	-	-	5-10	>5	399.0	2.4
25		BDi	Brown Soils with argillic B horizon severely eroded	loess dep.	CL/CL	Excessively	60-80	-	AL	-	-	MB	L	-	-	-	10-15	>5	101.9	0.6
26		BFpz	Bleached Brown Soils with argillic B horizon and surface water gley	expansive dep.	L/CL	Moderately	105-120	-	FAC	-	-	MB	L	-	-	-	<2	>5	107.1	0.6
27		BFpze	Bleached Brown Soils with argillic B horizon and surface water gley, slightly eroded	loam dep.	L/CL	Excessively	100-110	-	FAC	-	-	MB	L	-	-	-	2-5	>5	399.2	2.4

Table 3.2.2-4 Characteristics of Soil Units in the Study Area (4/4)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20.0	21.0	
28		BP/e	Brown Soils with argillic B horizon, moderately-severely eroded	loam dep.	L/CL	Excessively	80-90	-	Ac	-	-	MB	L	-	-	-	5-10	>5	472.4	2.8	
29	Soils with cambic B horizon, (other than mollisols)	BMti	Brown Soils with cambic B horizon	alluv.dep.	L/L	Good	110	-	N	-	-	MB	L	-	-	-	<2	>5	33.7	0.2	
33	Vertisols	VSh	Typic Vertisols	expansive soil	LC/LC	Good	100	-	N	N	H	EB	M	M	L	H	<2	>5	35.1	0.2	
34	Undeveloped soils	RSti	Typic Regosols	loess dep.	L/L	Excessively	25	-	AL	-	-	EB	VL	M	M	H	>20	>5	839.0	4.9	
35		RSh	Typic Regosols	loam dep.	SL/SL-LS	Excessively	20	-	AL	-	-	EB	L	-	-	-	>20	>5	366.4	2.2	
36		RSti	Typic Regosols and Gullied land	loess dep.	L/SL	Excessively	15	-	AL	-	-	EB	VL	-	-	-	>20	>5	1,073.3	6.6	
37		ERti	Severely Eroded Soils	loess dep.	L/L-CL	Excessively	12-15	-	AL	-	-	EB	VL	-	-	-	15-20	>5	324.8	1.9	
38		SAti	Typic Alluvial Soils	alluv.dep.	SL-L/SL-L	Good	30-50	-	AL	N	-	EB	M	-	-	-	<2	>5	353.9	2.1	
39		SAti	Typic Alluvial Soils	alluv.dep.	L-CL/CL	Good	40-50	-	AL	-	-	EB	L	-	-	-	<2	>5	22.5	0.1	
40		SAti	Typic Alluvial Soils, seldom flooded	alluv.dep.	LS-L/LS-L	Good	28-50	-	AL	-	L	EB	VL	VL	M	VL	<2	>5	1,006.8	6.0	
43		SAGz	Gley Alluvial Soils	alluv.dep.	L-CL/LS-SL	Moderately	70-90	-	AL	N	-	EB	M	M	-	-	<2	2-3	309.7	1.8	
44		SAti	Typic Alluvial Soils, slightly to moderately gravelly, gravelly substratum	alluv.dep.	SL-L/LS-SL	Excessively	45-50	6-50	AL	-	-	EB	M	L	H	H	<2	>5	255.9	1.5	
45		SAti	Typic Alluvial Soils, slightly to moderately gravelly, gravelly substratum	alluv.dep.	SL-L/LS-SL	Excessively	50-60	6-25	AL	-	L	EB	L	VL	H	M	<2	3	192.0	1.1	
48		AAIs	Alluvial Soils extremely, gravelly (rubble land)	alluv.dep.	LS/LS	Excessively	25	51-75	AL	-	-	MB	VL	VL	-	-	<2	>5	151.2	0.9	
49		AAgz	Gley Alluvial protosol often flooded	alluv.dep.	LS/S	Moderately	<10	-	AL	-	-	EB	VL	-	-	-	<2	2-3	39.8	0.2	
Sub-total II SOIL CONSERVATION STUDY AREA																				16,891.0	100.0
TOTAL AGRICULTURAL LAND OF STUDY AREA																				44,982.0	

Explanation for Table 3.2.2 Characteristics of Soil Units in the Study Area

Soil texture:

Sand = 2 ~ 0.02 mm, Silt = 0.002 ~ 0.002 mm, Clay < 0.002 mm

Sand = S, Loamy Sand = LS, Sandy Loam = SL, Loam = L

Clay Loam = CL, Loamy Clay = LC, Clay = C

pH:

FAC = 5.1 ~ 5.8; Ac = 5.9 ~ 6.8; N = 6.9 ~ 7.2; AL = 7.3 ~ 8.4; FL+ = 8.5 ~ 9; MFAL > 9

Electroconductivity:

ECe : 0 ~ 1.7 mmho/cm = No saline = N

Total N (%)

VL ~ Very low < 0.100; L ~ Low = 0.100 ~ 0.140; M ~ Moderate = 0.141 ~ 0.270

H ~ High = 0.271 ~ 0.600; VH ~ Very high > 0.600

Available P (ppm)

VL = 0 ~ 8; L = 9 ~ 18; M = 19 ~ 36; H = 37 ~ 72; VH > 72

Available K (ppm)

VL = 41 ~ 65; L = 66 ~ 130; M = 131 ~ 200; H = 201 ~ 300; VH > 300

Total cationic exchange capacity (Tme, % gr. soil)

VL = 6 ~ 10; L = 11 ~ 20; M = 21 ~ 35; H = 36 ~ 55

Degree of base saturation (V, %)

OM: oligomezobasic 40 ~ 70, MB: mezobasic 71 ~ 90, EB: eubasic 91 ~ 100

Organic matter (humus)

	Texture					
	S	LS	SL	L	CL	C
VL	0.3 ~ 0.5	0.5 ~ 0.8	0.6 ~ 1.1	0.7 ~ 1.3	0.9 ~ 1.5	1.1 ~ 2.0
L	0.6 ~ 1.0	0.9 ~ 1.7	1.2 ~ 2.2	1.4 ~ 3.0	1.6 ~ 3.5	2.1 ~ 5.0
M	1.1 ~ 2.0	1.8 ~ 4.0	2.2 ~ 5.5	3.1 ~ 6.5	3.6 ~ 8.0	5.1 ~ 10.0
H	2.1 ~ 5.0	4.1 ~ 7.0	5.6 ~ 8.5	6.6 ~ 10.5	8.1 ~ 12.5	10 ~ 1-16.0

Table 3.2.3 Standard of Land Classification

Constraints	Class I	Class II	Class III	Class IV	Class V	Class VI
Texture	SL,L	LS,CL,CLSi	S,SS,C	S,C	S,C	S,C
Slope and erosion (p)	0-2% erosion no visible	2.1-10% slight moderate erosion	10.1-15% moderate-strong erosion	15.1-20% strong-very strong erosion	20.1-25% v. strong-excessive erosion	>25% excessive erosion
Water stagnation on soil surface (w)	no stagnation	short time stagnation 5-15 days	medium time stagnation 15-30 days	long time stagnation >30 days	very long time stagnation marsh	-
Depth of ground water (Q)	<3 m	2-3 m	1-2 m	0.5-1 m	<0.50	pond
Flooding (i)	no flooding	rare flooding	moderate flooding	frequent flooding	once by year	more once by year
Gravel in soil profile (q)	<6%	6-50%	26-75%	51-75%	51-75%	75% or more

Source: The Methodology of the Elaboration of Soil's Reports. Norm number 20 A/1986

Table 3.3.1 Area Cultivated, Production and Unit Yield of Crops in 19 Towns/Villages Related to the Study Area*

Crops Cultivated	Area cultivated (ha)			Production (ton)			Yield (kg/ha)			
	1985	1990	1992	1985	1990	1992	1985	1990	1992	Average
Wheat	11,756	12,953	5,959 (9.8%)	22,318	33,304	15,190	1,898	2,571	2,549	2,340
Maize	14,915	13,546	26,506 (43.6%)	70,571	35,132	43,383	4,732	2,594	1,637	2,987
Barley	2,099	2,679	1,582 (2.6%)	3,954	5,360	5,323	1,884	2,001	3,365	2,416
Bean seeds	547	12	41 (0.0%)	761	120	110	1,391	10,000	2,683	4,691
Sugar beet	495	165	224 (0.4%)	7,468	2,743	3,421	15,087	16,624	15,272	15,661
Sunflower	2,345	1,447	1,294 (2.1%)	4,469	1,869	1,656	1,906	1,292	1,280	1,492
Potatoes	975	877	485 (0.8%)	17,776	6,427	6,187	18,232	7,328	12,757	12,772
Vegetables	1,136	1,526	1,564 (2.6%)	22,302	17,868	29,254	19,632	11,709	18,705	16,682
Pasture - Perennial	3,821	5,764	4,192 (6.9%)	108,636	101,748	105,536	28,431	17,652	25,176	23,753
- Annual	0	3,592	2,045 (3.4%)	0	50,253	26,685	-	13,990	13,049	9,013
Orchards	-	-	1,705 (2.8%)	18,542	19,729	38,876	-	-	-	-
Vineyards	14,207	14,683	15,228 (25.0%)	33,068	110,378	55,474	2,328	7,517	3,643	4,496
Total	52,296	57,244	60,825 (100%)	-	-	-	-	-	-	-

Source : DJS-Vrancea

Note : * including out side are of the Study Area

Table 3.3.2 Number of Livestock Raised and Their Production in 19 Towns/Villages Related to the Study Area *

	Name of Livestock and Their Production	Year				Per Farm** Household
		1986	1988	1990	1992	
Number of heads raised (heads/Family)	Cattle	32,829	29,933	31,852	21,528	0.87
	Pigs	16,523	16,472	26,285	40,995	0.72
	Sheep	97,947	95,313	80,951	59,661	2.20
	Goat	12,108	14,900	15,836	12,770	0.40
	Horse	4,887	4,780	4,690	878	0.13
	Chicken	868,831	1,014,173	1,030,673	1,086,333	28.07
	Bee	8,635	8,660	7,185	1,888	0.20
	House rabbit	7,612	32,746	9,374	703	0.26
Production	Meat(ton)	13,500	13,694	10,090	16,059	0.27
	Cattle milk (h lit)	197,971	171,361	137,425	155,835	3.74
	Sheep/Goat milk (h lit)	15,842	12,810	9,913	37,203	0.27
	Wool (kg)	179,900	159,439	118,148	124,684	3.22
	Eggs (1,000 pcs.)	27,137	28,701	44,093	47,990	1.20
	Honey (Kg)	152,900	176,766	37,789	23,804	1.03

Source : DJS-Vrancea

Notes : * including outside area of the Study Area

** in 1992

Table 3.3.3 Major Agricultural Supporting Organizations

Name of Supporting System	Location	Function	Managed by
Banca Agricola Focsani Agents: 2 in Focsani, 1 in Panciu, 1 in Adjud	Focsani	Credit Supply	S.A.
APRO (MILCOV) Cimpineanca	each village/town	Inputs Supply	S.A.
AGROSEM Vrancea	Focsani	Certified Seed	S.A.
ROMCEREAL Vrancea	Marasesti Focsani	Buyer of Grain Grain Storage	S.A.
AGROMECA Panciu, etc.	11, of which 5 in Study Area	Rental Machinery	Privatized
Centre Agricole (District)	Focsani	Extension	Public
Veterinary Offices	each village/town	Animal Health	Public
Weekly held Tric (Market)	Focsani	Livestock Trade	Public

Source: DO

Table 3.3.4 Population, Number of Households and Private Land Use in the Study Area

NO.	Town and Village	Number of Households		Population			Acreage of Farm Land and Farmers by Farming Types						Percentage of Acceptance			
		Total	Farm	Total	Farmers Working in Active		SCM			AA.AAs			Private Farm			
					Farmers in SCM	in AA & AAs	in Private Farm	Total	Number of Farm	Number of Farmers	Total	Number of Farm	Number of Farmers	Total	Acreage	Title of Certificate
1	RUGINESTI	1,675	1,675	2,800	0	2	2,800	0	0	0	2(Figs)	0	2	3,213	100.0	25.0
2	PAUNESTI	2,500	2,500	3,800	200	0	3,800	0	0	0	0	0	0	4,521	100.0	20.0
3	PUFESTI	1,266	1,266	2,611	100	22	2,611	0	0	1	1	48	22	2,179	100.0	48.0
4	MOVILITA	1,650	1,650	2,200	15	85	2,115	0	0	1	1	120	85	2,671	100.0	18.0
5	STRAOANE	1,600	1,600	2,000	300	0	2,000	0	0	0	0	0	0	3,252	95.0	12.0
6	FIIONESTI	1,237	1,237	1,960	40	0	1,960	0	0	0	0	0	0	2,594	90.0	0.0
7	PANCTU	3,300	1,830	4,740	770	12	4,728	1	2,850	2	870	340	12	5,180	100.0	0.7
8	TIFESTI	1,975	1,975	1,500	20	0	1,500	3	1,200	0	20	0	0	4,040	98.0	16.2
9	BOLTESTI	2,056	2,056	1,751	0	0	1,751	0	0	0	0	0	0	1,028	85.0	1.0
10	MARASESTI	4,234	2,100	3,200	0	2,560	3,200	1	-	-	-	1,800	2,500	2,622	100.0	12.6
11	ODOBESTI	2,740	1,210	920	327	78	920	5	-	327	1	42	78	1,350	100.0	20.6
	Total	24,233	19,099	27,482	1,772	2,759	27,385	-	-	-	-	-	-	-	-	-
	%	100.0	78.8	100.0	6.4	10.0	99.6	-	-	-	-	-	-	-	-	-

Source : Interview survey for Mayors, JICA team, 1994

Table 3.5.1 Assessment of the Erosion Control Area

Area Number	Basin River	Area of Basin (ha)	Area of Vineyard (ha)	(%) of Vineyard	Slop (%)	Sheet Erosion Class	Sediment Capacity by Gully Erosion (m ³ /ha/yr)	Soil Losses (ton/ha/yr)	Location vs. Irrigation Area	Class of Priority
E/1/1	Putna	264	57	21.6	7-25	-	600-900	-	near irrigation border	II
E/1/2	-	16	9	56.3	6-22	-	500-800	-	-	II
E/1/3	-	164	74	45.1	5-24	-	400-600	-	-	II
E/1/4	-	26	5	19.2	7-10	-	500-700	-	outside irrigation system	III
E/1/5	-	16	0	0.0	7-12	-	400-600	-	-	III
E/1/6	-	39	5	12.8	6-11	-	500-800	-	-	III
E/1/7	-	110	40	36.4	6-14	-	400-500	-	-	III
E/1/8	-	124	9	7.3	5-14	-	400-500	-	-	III
E/1/9	-	26	6	23.1	18-30	very strong excessive	-	24-30	-	III
D/1/10	-	180	6	3.3	20-32	-	-	26-32	-	III
D/1/11	Susita	191	6	3.1	16-26	-	-	16-28	-	III
C/1/12	-	844	127	15.0	12-25	-	500-700	18-25	-	III
C/1/13	Zabrait	29	7	24.1	8-12	very strong	300-400	16-20	-	III
C/1/14	-	29	20	69.0	18-22	-	-	18-25	-	III
C/1/15	-	244	37	15.2	18-28	very strong excessive	500-600	21-27	-	III
C/1/16	-	126	0	0.0	12-18	-	300-400	24-28	-	III
C/1/17	-	235	18	7.7	14-26	very strong	400-500	20-26	-	III
B/1/18	-	318	6	1.9	14-25	very strong excessive	300-400	18-25	-	III
B/1/19	Carecna	240	11	4.6	15-25	very strong	300-400	16-24	-	III
B/1/20	-	38	0	0.0	18-22	-	300-400	17-22	-	III
A/1/21	-	131	0	0.0	12-20	-	-	14-22	-	III
A/1/22	-	192	11	5.7	12-20	-	-	12-18	-	III
A/1/23	Trotus	94	4	4.3	18-26	-	-	17-26	-	III
A/1/24	-	260	9	3.5	13-22	-	400-500	18-24	-	III
A/1/25	-	153	77	50.3	16-22	-	-	22-28	-	III
A/1/26	-	294	106	36.1	16-28	-	-	23-30	-	III
A/1/27	-	40	9	22.5	25-30	very strong excessive	300-350	14-18	-	III
A/1/28	-	180	32	17.8	14-28	-	400-500	20-26	-	III
A/1/29	-	54	0	0.0	28-35	-	-	12-16	-	III
A/1/30	Bouhai	250	195	78.0	18-28	-	-	12-16	-	III
sub-total		4,907	886	18.1						
E/1/1	Milcov	453	421	92.9	6-14	strong - very strong	-	12-18	outside irrigation system	III
E/1/2	Putna	214	161	75.2	12-16	-	-	13-19	-	III
E/1/3	-	185	185	100.0	10-16	-	-	13-19	-	III
E/1/4	-	142	109	76.8	8-12	-	-	10-16	-	III
E/1/5	-	104	81	77.9	8-12	-	-	10-16	-	III
E/1/6	-	1,234	785	63.6	6-12	-	-	14-18	-	III
D/1/7	Susita+Putna	138	138	100.0	6-12	strong	-	14-18	-	III
C/1/8	Zabrait	141	124	87.9	6-14	-	-	13-17	-	III
C/1/9	-	225	225	100.0	6-10	moderate-strong	-	8-14	-	III
C/1/10	Susita	176	155	88.1	5-10	moderate	-	6-12	-	III
C/1/11	Susita+Zabrait	248	171	69.0	4-18	moderate-strong	-	8-14	-	III
C/1/12	Zabrait	28	28	100.0	8-14	-	-	7-12	-	III
C/1/13	-	308	134	43.5	5-12	moderate	-	6-12	-	III
C/1/14	-	54	0	0.0	8-12	-	-	7-10	-	III
B/1/15	Carecna	179	9	5.0	6-10	-	-	6-10	-	III
A/1/16	-	329	106	32.2	5-16	moderate-strong	-	6-10	-	III
A/1/17	Trotus	42	2	4.8	7-12	moderate	-	6-8	-	III
A/1/18	-	64	55	85.9	8-14	moderate-strong	-	7-11	-	III
A/1/19	-	65	12	18.5	5-8	moderate	-	6-8	-	III
sub-total		4,329	2,901	67.0						
E/1/1	Putna	570	450	78.9	6-10	moderate	-	7-14	near irrigation border	II
E/1/2	Putna	428	362	84.6	5-10	-	-	7-14	-	II
D/1/3	Putna+Susita	520	490	94.2	3-6	-	-	4-8	-	II
C/1/4	Putna+Zabrait	1,490	1,340	89.9	4-7	-	-	5-8	-	II
B/1/5	Siret	840	750	89.3	3-7	-	-	5-9	-	II
A/1/6	-	640	560	87.5	4-8	moderate	-	5-9	-	II
A/1/7	-	300	235	78.3	4-8	moderate	-	5-9	-	II
sub-total		4,788	4,187	87.4						
C/1/1	Siret	131	60	45.8	3-7	moderate	-	6-12	inside irrigation area	I
B/1/2	-	290	0	0.0	3-7	-	-	6-12	-	I
B/1/3	-	110	0	0.0	3-7	-	-	6-12	-	I
B/1/4	-	125	0	0.0	3-7	-	-	6-12	-	I
B/1/5	-	130	0	0.0	3-7	-	-	6-12	-	I
B/1/6	-	85	50	58.8	3-7	-	-	6-12	-	I
A/1/7	-	70	0	0.0	3-7	-	-	6-12	-	I
A/1/8	-	990	30	3.0	3-7	moderate-strong	-	6-12	-	I
sub-total		1,931	140	7.3						
E/1/1	Siret	1,544	736	47.7	2-5	Slight	-	2-6	inside irrigation area	I
D/1/2	-	472	41	8.7	2-5	-	-	2-6	-	I
C/1/3	-	2,147	196	9.1	2-5	-	-	2-6	-	I
B/1/4	-	1,737	300	17.3	2-5	-	-	2-6	-	I
A/1/5	-	1,755	116	6.6	2-5	-	-	2-6	-	I
sub-total		7,655	1,389	18.1						
Total		23,610	9,503	40.2						

Table 4.3.1 Project Plan of Cultivation Area and Cropping Time

Crop	Area (%)	Cropping time		
		Sowing	Transplanting	Harvesting
Wheat	12.0	E/Oct	-	M/July
Barley	3.0	L/Sep	-	M/June
Maize	45.0	L/April	-	M/Sep
Bush bean (Soybean)	25.0 (25.0)	E/May-M/June (M/May)	-	E/Aug-M/Sep (E/Sep)
Bean seeds	(to be included in bush bean)			
Sunflower	2.5	E/May	-	M/Sep
Sugar beet	0.5	L/March	-	L/Sep
Potato	1.0	E/April	-	L/Aug-E/Sep
Maize for silo	3.0*	July	-	E.M/Oct
Cabbage				
Medium	1.5	M/Feb	E/April	July-Sep
Late	4.0*	M/June	M.L/July	Oct-Nov
Cauliflower		(Same as Cabbage)		
Medium	1.5	(- do -)		
Late	4.0*	(- do -)		
Cucumber				
Early	1.0	L/April	-	July-Aug
Late	4.0*	July	-	Sep-Oct
Onion	1.0	May	E.M/June	Sep-Oct
Garlic(H.quarity)	1.0	(Same as Onion)		
Green pepper	1.0	March	May	L/July-Oct
Egg plant	1.0	March	May	L/July-Oct
Carrot	1.4	March-June	-	July-Nov
Tomato	1.5	Feb-March	E.M/May	July-Oct
Annual pasture	0.1	-	-	-
Total arable land	100	-	-	-
Total cropped area	115	-	-	-

- Notes :
- 1) E,M,L: 1st,2nd and 3rd 10 days of the month
 - 2) *: Succeeding crops
 - 3) Source: ICLF Vidra, SCPL Bacau and farmers in the Study Area
 - 4) (): Alternative

Table 4.3.2 Crop Rotation System Planned

Crop rotation pattern	1st year	2nd year	3rd year	4th year
I	M	M	C	B
II	M	M	W/MC	B
III	M	M	B	W/MC
IV	M	M	B	C
V	C	W/MC	W/MC	B
VI	B	W/MC	W/MC	C

- Notes :
- M: Maize, C: Cash crop, B: Leguminous crop,
 MC: Maize for silo as a succeeding crop of barley and cash crop(Vegetables) as a succeeding crop of wheat

Table 4.3.4 Production Plan in the Project Area

Crop	Area cultivated		Yield (kg/ha)	Production (ton)
	(ha)	(%)		
Wheat	2,377	12.0	3,399	8,080
Barley	594	3.0	3,624	2,154
Maize	8,915	45.0	4,524	40,329
Bush bean	4,953	25.0	2,200	10,897
(Soy bean)	(4,953)	(25.0)	(3,000)	(14,858)
Bean seeds	(including bush bean)			
Sunflower	495	2.5	2,319	1,148
Sugar Beet	99	0.5	30,502	3,021
Potato	198	1.0	21,329	4,225
Maize for silage*	594	3.0	39,000	23,166
Cabbage				
Medium	297	1.5	43,000	12,777
Late*	792	4.0	65,000	51,480
Cauliflower				
Medium	297	1.5	17,000	5,052
Late*	792	4.0	23,000	18,216
Cucumber				
Early	198	1.0	50,000	9,905
Late*	792	4.0	28,000	22,176
Onion	198	1.0	22,000	4,358
Garlic(H.quarity)	198	1.0	7,000	1,387
Green pepper	198	1.0	22,000	4,358
Egg plant	198	1.0	33,000	6,537
Carrot	277	1.4	38,000	10,526
Tomato	297	1.5	60,000	17,829
Annual pasture	20	0.1	22,714	454
Sub-total	22,780	115.0	-	258,077
[Net area]	[19,810]	[100.0]	-	-
Perennial pasture	500	100.0	23,753	11,877
Grape	2,550	-	8,946	22,812
Total	25,830	-	-	292,764
[Net area]	[22,860]	-	-	-

Notes : * : Succeeding crop of Barley and Wheat
() : Alternative

Table 4.4.1 Unit Monthly Irrigation Water Requirement

(80 % assurance)

(Unit : m3/ha/month)

Crop	Cropping Area Ratio	April	May	June	July	August	Sept.	Total
Wheat/Barley	15.00%	354	1,233	815	0	0	0	2,402
Maize (silage)	3.00%	0	0	0	527	974	707	2,208
Maize (grain)	45.00%	0	168	499	1,460	465	0	2,592
Soy Bean	25.00%	0	79	407	1,487	489	0	2,462
Sugar Beet	0.50%	0	343	673	1,460	1,118	0	3,594
Sunflower	2.50%	0	333	701	1,514	0	0	2,548
Beans	0.00%	0	203	506	1,239	0	0	1,948
Potatoes	1.00%	0	372	628	1,363	477	0	2,840
Vegetables	22.90%	51	369	1,235	1,279	343	158	3,435
Lucerne	0.10%	184	543	708	1,363	962	605	4,365
Grape	0.00%	0	96	307	549	747	0	1,699
Weight Total*		57	335	611	1,244	446	49	2,742

(50 % assurance)

(Unit : m3/ha/month)

Crop	Cropping Area Ratio	April	May	June	July	August	Sept.	Total
Wheat/Barley	15.00%	46	965	800	0	0	0	1,811
Maize (silage)	3.00%	0	0	0	401	715	631	1,747
Maize (grain)	45.00%	0	0	355	1,211	441	0	2,007
Soy Bean	25.00%	0	0	195	1,131	484	0	1,810
Sugar Beet	0.50%	0	0	508	1,105	1,017	0	2,630
Sunflower	2.50%	0	0	524	1,217	0	0	1,741
Beans	0.00%	0	0	254	1,051	0	0	1,305
Potatoes	1.00%	0	0	501	1,015	463	0	1,979
Vegetables	22.90%	0	280	1,024	1,059	300	131	2,794
Lucerne	0.10%	0	193	505	1,048	764	510	3,020
Grape	0.00%	0	0	0	327	548	0	875
Weight Total*		7	175	461	1,002	416	42	2,104

Source : ICTTID calculation results, Sep. 1994

Note : * arithmetic estimate by the Project cropping area ratio without vineyard, with vineyard irrigation shall be estimated separately

Table 4.4.2 Irrigation Blocks

Name of Tributaries	Total of Irrigation Blocks			Direct Area			1st Stage			2nd Stage			3rd Stage		
	Block No.	Total Area (ha)	Average Area (ha)	Block No.	Total Area (ha)	Average Area (ha)	Block No.	Total Area (ha)	Average Area (ha)	Block No.	Total Area (ha)	Average Area (ha)	Block No.	Total Area (ha)	Average Area (ha)
Trotus	9	4,052	450	-	-	-	3	1,294	431	4	2,015	504	2	743	372
Calcuna	10	4,174	417	2	792	396	2	951	476	3	1,243	414	3	1,188	396
Zabraut	11	3,947	359	1	100	100	5	1,743	349	3	1,221	407	2	883	442
Susita	8	2,983	373	2	939	470	2	718	359	2	864	432	2	462	231
Putna	11	7,204	655	3	1,865	622	3	1,996	665	3	1,826	609	2	1,517	759
Milcov															
Total	49	22,360	456	8	3,696	462	15	6,702	447	15	7,169	478	11	4,793	436

Table 4.7.1 Design Conditions of Pump Stations (SRP)

No.	Name of pump station	Service area (ha)	Design discharge (l/s)	Total head (m)	Pump				Motor
					Type	Number	Discharge (l/s)	Diameter	
1	SRP-I	2,758	1,763	44.0	MV	5	353	403C	6kv/315kw
2	SRP-IA	1,294	827	7.5	BRATES	2	298	350-410	37kw
					BRATES	3	80	250-292	11kw
3	SRP-II	743	475	45.0	NDS	2	184	400-350-500	160kw
					LOTRU	3	36	125	37kw
4	SRP-III	1,188	759	54.0	NDS	2	294	350-300-430	250kw
					NC	3	57	125-100-250	55kw
5	SRP-IV	2,431	1,554	41.0	NDS	4	389	500-450-610	6kv/400kw
					NDS	3	1,308	800-600-950	6kv/800kw
6	SRP-V	6,140	3,924	41.0	NDS	4	1,334	800-600-910	6kv/800kw
					NDS	2	218	400-350-500	110kw
7	SRP-VI	883	564	36.0	LOTRU	3	43	125	30kw
					MV	4	941	602C	6kv/400kw
8	SRP-VII	6,773	3,761	25.0	BRATES	2	387	440-445	110kw
					BRATES	3	76	250-292	37kw
9	SRP-VIII	1,797	1,002	18.0	NDS	2	427	500-450-640	200kw
					NC	3	78	200-150-315	37kw
10	SRP-IX	1,996	1,088	31.0	NDS	2	427	500-450-640	200kw
					NC	3	78	200-150-315	37kw

Note: BRATES: horizontal-axial single-stage volute type mixed flow pump
 NDS, NC, LOTRU: horizontal-axial single-stage volute type centrifugal flow pump
 MV: vertical-axial multi-stage mixed flow pump

Table 4.7.2 Summary of Distribution Canal (CD)

Name of CD	Race No.	Design Discharge (m ³ /s)	Ranges		Canal Length		No. of Water Table Regulators	Spillway Control Gates	No. of Drops	Remarks
			from	to	Race (m)	Total (m)				
CD.1	I	0.827	SRP-IA	SPP.3A-1	1,150	5,100	2	1		Spillway
	II	0.391	SPP.3A-1	SPP.3A-2	1,655					
	III	0.268	SPP.3A-2	SPP.3A-3	2,295					
CD.2	I	1.763	SRP-I	SRP-II	3,300	7,105	3	1	1	Spillway to Carecna R.
	II	0.750	SRP-II	SPP.2	2,500					
	III	0.269	SPP.2	SPP.1	1,305					
CD.3	I	0.475	SRP-II	SPP.3-2	2,260	2,260		1		
CD.4	I	3.924	SRP-Vn	SRP-IV	2,465	7,950	2	1		
	II	2.043	SRP-IV	SRP-I	4,785					
	III	0.500	SRP-I	Carecna R.	700					
CD.5	I	1.554	SRP-IV	SRP-III	1,500	4,070	1	1		
	II	0.309	SRP-III	SPP.6	2,570					
CD.6	I	0.466	SRP-III	SPP.8	1,060	4,535	1	1		
	II	0.300	SPP.8	Crecna R.	3,475					
CD.6A	I	0.293	SRP-III	SPP.12	1,920	1,920		1		
CD.7	I	5.334	SRP-Vn	SRP-VII	5,745	12,645	4	1	3	Spillway
	II	0.737	SRP-VII	SPP.17A	3,000					
	III	0.459	SPP.17A	SPP.19	705					
	IV	0.300	SPP.19	Putna R.	3,195					
CD.8	I	1.145	SRP-VII	SRP-VI	3,010	3,010		1		SPP.14A SPP.18A
CD.8A	I	2.616	SRP-VII	SRP-VIII	3,900	12,550	5	1	4	Drain to Drainage Canal
	II	1.072	SRP-VIII	SPP.24	4,650					
	III	0.692	SPP.24	SPP.29	1,500					
	IV	0.281	SPP.29	SPP.30	2,500					
CD.9	I	0.564	SRP-VI	SPP.16	3,450	3,450		1		
CD.10	I	1.002	SRP-VIII	SPP.18-2	2,285	5,595	2	1	2	
	II	0.707	SPP.18-2	SPP.23	2,510					
	III	0.429	SPP.23	SPP.31	800					
CD.11	I	1.008	SRP-IX	SPP.28	2,500	6,180	2	1		Spillway
	II	0.512	SPP.28	SPP.25	1,500					
	III	0.300	SPP.25	Putna R.	2,180					
Total						76,370	22	13	10	

Table 4.7.3 River/Drain Crossing Structures (Siphon)

No. of Syphon	Name of CD	Crossing Length (m)	Flow Capacity (m ³ /s)	Syphon Demention Dia.(m) X No.	Name of River/Drain
1	CD.2	195	0.75	1.10 X 1	Domosita Secata R.
2	- do -	95	0.75	1.10 X 1	Boulai R.
3	CD.4	148	3.924	1.50 X 3	
4	- do -	175	2.043	1.30 X 2	Zapodia Mica R.
5	- do -	109	1.763	1.20 X 2	
6	CD.6	40	0.466	1.00 X 1	Zapodia Mica R.
7	- do -	100	5.334	1.70 X 3	
8	CD.7	30	0.737	1.1- X 1	
9	- do -	175	0.459	1.00 X 1	Susita R.
10	CD.8	30	0.945	1.20 X 1	
11	- do -	30	2.616	1.50 X 2	
12	CD.8A	475	2.416	1.40 X 2	Susita R.
13	- do -	545	0.862	1.2 X 1	Putna R.
14	- do -	200	0.795	1.10 X 1	
15	CD.10	1365	0.707	1.10 X 1	Putna R.

Table 4.7.4 Field Drainage Canal

Sr. No.	Drain Length (m)		Bottom Slope	Name of River to be discharged	Sr. No.	Drain Length (m)		Bottom Slope	Name of River to be discharged
	Type I	Type II				Type I	Type II		
1	DC-1	-	1/2,000	Calimanesti Dam drain	36	DC-36	2,200	1/2,000	Marasesti
2	DC-2	3,000	1/1,000	Calimanesti Dam drain	37	DC-37	1,500	1/2,000	Marasesti
3	DC-3	900	1/2,000	Calimanesti Dam drain	38	DC-38	1,600	1/2,000	Trotus River
4	DC-4	5,200	1/1,500	Trotus River	39	DC-39	2,000	1/2,000	Susita River
5	DC-5	2,000	1/2,000	Boului River	40	DC-40	1,300	1/2,000	Zabraut River
6	DC-6	4,000	1/2,000	Boului River	41	DC-41	1,200	1/2,000	Marasesti
7	DC-7	1,500	1/2,000	Domostia River	42	DC-42	1,500	1/2,000	Marasesti
8	DC-8	1,900	1/2,000	Boului River	43	DC-43	1,500	1/1,500	Marasesti
9	DC-9	1,600	1/2,000	Boului River	44	DC-44	1,700	1/1,000	Susita River
10	DC-10	1,700	1/2,000	Boului River	45	DC-45	-	1/2,000	Susita River
11	DC-11	1,500	1/1,000	Boului River	46	DC-46	3,300	1/2,000	Putna River
12	DC-12	1,600	1/1,500	Carecna River	47	DC-47	-	2,400	Susita River
13	DC-13	-	1/2,000	Boului River	48	DC-48	-	2,900	Putna River
14	DC-14	2,800	1/2,000	Crecna River	49	DC-49	2,200	1/1,500	Susita River
15	DC-15	-	1/2,000	Siret River	50	DC-50	2,300	1/1,500	Putna River
16	DC-16	4,800	1/2,000	Calimanesti Dam drain	51	DC-51	1,600	1/2,000	Susita River
17	DC-17	1,300	1/2,000	Calimanesti	52	DC-52	2,200	1/2,000	Putna River
18	DC-18	1,300	1/2,000	Zabraut River	53	DC-53	-	500	Putna River
19	DC-19	2,100	1/2,000	Carecna River	54	DC-54	-	2,400	Soimu D.
20	DC-20	2,000	1/2,000	Calimanesti	55	DC-55	-	3,000	Soimu D.
21	DC-21	1,100	1/1,500	Calimanesti	56	DC-56	-	2,000	Cocaina Noua D.
22	DC-22	1,000	1/1,500	Zabraut River	57	DC-57	-	2,700	Cocaina Noua D.
23	DC-23	1,300	1/1,500	Carecna River	58	DC-58	-	1,900	Putna River
24	DC-24	1,300	1/2,000	Calimanesti	59	DC-59	-	1,400	Soimu D.
25	DC-25	700	1/1,500	Calimanesti	60	DC-60	-	2,700	Soimu D.
26	DC-26	1,200	1/2,000	Calimanesti	61	DC-61	-	1,800	Putna River
27	DC-27	1,400	1/1,500	Calimanesti	62	DC-62	700	1,600	Soimu D.
28	DC-28	1,300	1/2,000	Zabraut River	63	DC-63	600	500	Soimu D.
29	DC-29	2,000	1/2,000	Marasesti	64	DC-64	-	1,700	Soimu D.
30	DC-30	2,000	1/1,500	Marasesti	65	DC-65	-	1,800	Soimu D.
31	DC-31	800	1/2,000	Marasesti	66	DC-66	1,300	1,800	Putna River
32	DC-32	900	1/2,000	Marasesti	67	DC-67	2,500	-	Soimu D.
33	DC-33	1,900	1/2,000	Marasesti	68	DC-68	-	3,200	Soimu D.
34	DC-34	2,000	1/1,500	Susita River	69	DC-69	-	4,900	Soimu D.
35	DC-35	1,000	1/1,500	Susita River					Soimu D.
		1,600	1/1,500	Zabraut River					
	Subtotal	20,000					27,900		
	Total	45,100					47,900		
							43,000		
							88,100		

Table 4.7.5 Rural and Operation and Maintenance Roads in the Project

Category	Road No.	Length		Effective Width (m)	Type of Pavement	No. of Structures Required				Remarks		
		Improvement (m)	New (m)			CD-C	DC-C	BD-C	GW-C			
Artery Road	DJ206H	2,000	-	5.50	Asphalt	1	-	1	-	-	DN2 - Domnesti	
	37	9,400	-	5.50	Asphalt	2	-	1	-	-	Ciorani - DN2 - Movilita	
	DJ204E	9,500	-	5.50	Asphalt	-	-	1	-	-	DN2 - Panciu	
	DJ205E	10,400	-	5.50	Asphalt	2	-	1	-	-	Tifesti - DN2 - Main Canal	
	29	2,000	-	5.50	Gravel	-	-	-	-	-	DN2 - R. Domosita	
Secondary Roads	No.1	7,000	-	5.50	Gravel	1	-	1	-	-	DN2 - Paunesti	
	26	4,800	-	5.50	Gravel	1	-	1	-	-	DJ206H - Ruginesi	
	35	10,000	-	5.50	Gravel	1	-	1	-	-	Domnesti - Main Canal	
	No.2	10,300	-	5.50	Gravel	-	-	1	-	-	Padureni - DN2 - Movilita	
	No.3	6,500	-	5.50	Gravel	2	-	-	-	-	DN2 - DJ205F	
Operation and Maintenance Road	No.4	10,200	-	5.50	Gravel	1	-	1	-	-	Bolotesti - Main feed canal	
	No.5	3,000	-	5.50	Gravel	-	-	-	-	-	Odobesti - DN2D	
	PR 1	-	8,000	5.50	Gravel	-	-	-	-	1	R. Domosita - No.1 - DJ206H - R. Carecna	
	PR 2	-	9,600	5.50	Gravel	-	-	-	-	2	R. Domosita - No.1 - DJ206H - R. Carecna	
	PR 3	-	4,500	5.50	Gravel	-	-	-	-	1	- Domnesti	
Total	PR 4	-	6,700	5.50	Gravel	-	-	-	-	1	R. Carecna - 37 - No.2	
	PR 5	-	7,300	5.50	Gravel	-	-	-	-	1	R. Carecna - 37 - No.2	
	PR 6	-	6,700	5.50	Gravel	-	-	-	-	3	37 - No.2	
	PR 7	-	2,000	5.50	Gravel	1	1	-	-	-	PR 5 - PR 6	
	PR 8	-	6,500	5.50	Gravel	-	-	-	-	-	R. Zabrut - DJ204E - DJ205F	
	PR 9	-	6,300	5.50	Gravel	-	-	-	-	2	DJ204E - No.3 - DJ205F	
	PR 10	-	8,600	5.50	Gravel	-	-	-	-	2	R. Zabrut - DJ204E - No.3 - DJ205F	
	PR 11	-	3,900	5.50	Gravel	-	-	-	-	-	R. Susira - DJ205E - R. Putna	
	PR 12	-	4,000	5.50	Gravel	-	-	-	-	-	R. Susira - DJ205E - R. Putna	
	PR 13	-	4,400	5.50	Gravel	-	-	-	-	-	R. Susira - DJ205E - R. Putna	
	PR 14	-	2,200	5.50	Gravel	-	-	-	-	-	R. Putna - No.4 - DN2D	
	PR 15	-	3,600	5.50	Gravel	-	-	-	-	-	R. Putna - No.4 - DN2D	
	PR 16	-	6,600	5.50	Gravel	-	-	-	-	-	R. Putna - No.4 - DN2D	
	PR 17	-	6,200	5.50	Gravel	-	1	-	-	-	DN2D - DJ205A	
	Total		53,800	97,100			7	2	5	13		

Notes: CD-C: Distribution Canal Crossing
 DC-C: Drainage Canal Crossing
 BD-C: Boundary Canal Crossing
 GW-C: Grassed Waterway Crossing
 DN2: National Motor Highway No. 2
 DN2D: National Road No. 2D
 R Putna: the Putna River

Table 5.3.1 Summary of Construction Cost

Description	Amount			Total (US\$)
	F/C (US\$)	L/C (Lei)	Total (Lei)	
I. Preparatory Works	515,181	5,117,641,110	6,020,754,248	3,434,543
II. Pumping Station	947,640	9,413,543,262	11,074,756,778	6,317,602
III. Conveyance Pipe Works	0	0	0	0
IV. Irrigation Canal Works	3,205,631	31,843,669,850	37,463,141,000	21,370,873
V. Booster Pumping Station	1,139,933	11,323,715,437	13,322,018,162	7,599,554
VI. Farm Land Irrigation Fac.	3,815,103	37,897,964,000	44,585,840,000	25,434,022
VII. Drainage Canal Works	174,212	1,730,562,600	2,035,956,000	1,161,412
VIII. Farm Road Works	594,627	5,906,826,800	6,949,208,000	3,964,180
IX. Reclamation Works	74,622	741,266,300	872,078,000	497,477
X. Soil Conservation Works	291,964	2,900,273,950	3,412,087,000	1,946,427
XI. Project Office	59,897	595,000,000	700,000,000	399,315
Total	10,818,811	107,470,463,309	126,435,839,188	72,125,407

Note : US\$ 1.00 = Lei 1,753

Table 5.3.2 Project Cost

Description	Amount			
	F/C (US\$)	L/C (Lei)	Total (Lei)	Total (US\$)
I. Construction Cost				
I.1 Lot - A	2,961,929	29,422,813,481	34,615,074,684	19,746,192
I.2 Lot - B	2,876,035	28,569,573,255	33,611,262,653	19,173,567
I.3 Lot - C	3,336,439	33,143,068,552	38,991,845,355	22,242,924
I.4 Lot - D	1,644,409	16,335,008,021	19,217,656,496	10,962,725
Sub-total	10,818,811	107,470,463,309	126,435,839,188	72,125,407
II. Land Acquisition Cost	0	10,818,000,000	10,818,000,000	6,171,135
III. O/M Equipment Procurement Cost	494,200	43,317,000	909,650,000	518,910
IV. Administration Cost	0	2,641,800,000	2,641,800,000	1,507,017
V. Consulting Service	2,327,750	3,132,158,000	7,212,704,000	4,114,492
Sub-total (I. to V.)	13,640,761	124,105,738,309	148,017,993,188	84,436,961
VI. Physical Contingency	1,364,076	12,410,573,831	14,801,799,319	8,443,696
VII. TOTAL (Project cost)	15,004,837	136,516,312,140	162,819,792,507	92,880,657

Note : US\$ 1.00 = Lei 1,753

Table 5.3.3 Annual Disbursement of Project Cost

(Unit: US\$)

Work Item	Project Year						Total L/C & F/C
	2nd Year	3rd Year	4th Year	5th Year	6th Year	Total	
I Construction Phase I							
Land Acquisition	F/C	0	0	3,924,000	0	0	0
	L/C	0	1,311,000	0	0	0	5,245,000
Lot A	F/C	0	0	1,693,000	1,269,000	0	2,962,000
	L/C	0	0	9,591,000	7,193,000	0	16,784,000
Lot B	F/C	0	0	1,079,000	1,438,000	360,000	2,877,000
	L/C	0	0	6,112,000	8,149,000	2,037,000	16,298,000
Lot C	F/C	0	0	834,000	1,668,000	834,000	3,336,000
	L/C	0	0	4,727,000	9,453,000	4,727,000	18,907,000
Sub-total	F/C	0	0	3,606,000	4,375,000	1,154,000	9,175,000
	L/C	0	1,311,000	24,364,000	24,795,000	6,764,000	57,234,000
II Construction Phase II							
Land Acquisition	F/C	0	0	0	0	0	0
	L/C	0	0	926,000	0	0	926,000
Lot D	F/C	0	0	206,000	822,000	617,000	1,645,000
	L/C	0	0	1,165,000	4,659,000	3,494,000	9,318,000
Sub-total	F/C	0	0	206,000	822,000	617,000	1,645,000
	L/C	0	0	2,091,000	4,659,000	3,494,000	10,244,000
III O/M Equipment Procurement							
	F/C	0	0	0	494,200	0	494,200
	L/C	0	0	0	24,710	0	24,710
IV Administration							
	F/C	0	0	0	0	0	0
	L/C	198,000	323,000	431,000	431,000	215,000	1,508,000
V Consultant Service							
	F/C	0	949,500	419,288	559,850	399,200	2,327,838
	L/C	0	506,175	413,109	468,063	399,306	1,786,653
Sub-total (I - V)	F/C	0	949,500	4,231,288	6,251,050	2,210,200	13,642,038
	L/C	108,000	2,140,175	27,299,109	30,377,773	10,872,306	70,797,363
VI Physical Contingency							
	F/C	0	94,950	423,129	625,105	221,020	1,364,204
	L/C	10,800	214,018	2,729,911	3,037,777	1,087,231	7,079,736
VII Sub-total	F/C	0	1,044,450	4,654,417	6,876,155	2,431,220	15,006,242
	L/C	118,800	2,354,193	30,029,020	33,415,550	11,959,537	77,877,099
VIII Price Escalation (3% per annual)							
	F/C	0	96,849	584,170	1,095,193	471,784	2,247,996
	L/C	7,235	218,297	3,768,907	5,322,231	2,320,776	11,637,445
IX Total	F/C	0	1,141,299	5,238,587	7,971,348	2,903,004	17,254,238
	L/C	126,035	2,572,490	33,797,926	38,737,781	14,280,312	89,514,544
	Total	\$126,035	\$3,713,788	\$39,036,514	\$46,709,129	\$17,183,316	\$106,768,782

Table 6.3.1 Cash Flow of Economic Cost and Benefit (ENPV and E. B/C)

(Unit: thou. US\$)

Year in Order	Cost				Benefit			Present Value	
	Const. Cost	Replace- ment Cost	O/M Cost	Total	Irrigation	Soil Consav.	Total	Cost	Benefit
-7	2,299	0	0	2,299	0	0	0	10,192	0
-6	7,860	0	0	7,860	0	0	0	28,927	0
-5	4,154	0	0	4,154	0	0	0	12,691	0
-4	320	0	0	320	0	0	0	812	0
-3	181	0	0	181	0	0	0	381	0
-2	157	0	0	157	0	0	0	274	0
-1	175	0	0	175	0	0	0	254	0
0	184	0	0	184	0	0	0	222	0
1	0	0	0	0	0	0	0	0	0
2	98	0	0	98	0	0	0	81	0
3	8,042	0	0	8,042	0	0	0	5,542	0
4	31,359	0	0	31,359	0	0	0	17,941	0
5	33,842	0	978	34,820	9,475	99	9,575	16,538	4,547
6	12,052	0	2,797	14,849	27,090	323	27,412	5,855	10,808
7	0	0	4,217	4,217	40,841	582	41,424	1,380	13,559
8	0	0	4,913	4,913	47,585	786	48,372	1,335	13,144
9	0	0	5,112	5,112	49,510	990	50,500	1,153	11,391
10	0	0	5,112	5,112	49,510	1,120	50,630	957	9,481
11	0	0	5,112	5,112	49,510	1,141	50,651	795	7,874
12	0	0	5,112	5,112	49,510	1,141	50,651	660	6,537
13	0	0	5,112	5,112	49,510	1,141	50,651	548	5,426
14	0	0	5,112	5,112	49,510	1,141	50,651	455	4,505
15	0	0	5,112	5,112	49,510	1,141	50,651	377	3,740
16	0	0	5,112	5,112	49,510	1,141	50,651	313	3,105
17	0	0	5,112	5,112	49,510	1,141	50,651	260	2,577
18	0	0	5,112	5,112	49,510	1,141	50,651	216	2,140
19	0	0	5,112	5,112	49,510	1,141	50,651	179	1,776
20	0	1,270	5,112	6,382	49,510	1,141	50,651	186	1,474
21	0	0	5,112	5,112	49,510	1,141	50,651	124	1,224
22	0	0	5,112	5,112	49,510	1,141	50,651	103	1,016
23	0	0	5,112	5,112	49,510	1,141	50,651	85	844
24	0	0	5,112	5,112	49,510	1,141	50,651	71	700
25	0	0	5,112	5,112	49,510	1,141	50,651	59	581
26	0	0	5,112	5,112	49,510	1,141	50,651	49	483
27	0	0	5,112	5,112	49,510	1,141	50,651	40	401
28	0	0	5,112	5,112	49,510	1,141	50,651	34	333
29	0	0	5,112	5,112	49,510	1,141	50,651	28	276
30	0	2,117	5,112	7,229	49,510	1,141	50,651	33	229
31	0	0	5,112	5,112	49,510	1,141	50,651	19	190
32	0	0	5,112	5,112	49,510	1,141	50,651	16	158
33	0	0	5,112	5,112	49,510	1,141	50,651	13	131
34	0	0	5,112	5,112	49,510	1,141	50,651	11	109
35	0	1,270	5,112	6,382	49,510	1,141	50,651	11	90
36	0	0	5,112	5,112	49,510	1,141	50,651	8	75
37	0	0	5,112	5,112	49,510	1,141	50,651	6	62
38	0	0	5,112	5,112	49,510	1,141	50,651	5	52
39	0	0	5,112	5,112	49,510	1,141	50,651	4	43
40	0	0	5,112	5,112	49,510	1,141	50,651	4	36
41	0	0	5,112	5,112	49,510	1,141	50,651	3	30
42	0	0	5,112	5,112	49,510	1,141	50,651	2	25
43	0	0	5,112	5,112	49,510	1,141	50,651	2	20
44	0	0	5,112	5,112	49,510	1,141	50,651	2	17
45	0	0	5,112	5,112	49,510	1,141	50,651	1	14
46	0	0	5,112	5,112	49,510	1,141	50,651	1	12
47	0	0	5,112	5,112	49,510	1,141	50,651	1	10
48	0	0	5,112	5,112	49,510	1,141	50,651	1	8
49	0	0	5,112	5,112	49,510	1,141	50,651	1	7
50	0	-423	5,112	4,689	49,510	1,141	50,651	1	6
Total	100,723	4,234	227,610	332,567	2,204,422	49,538	2,253,959	109,260	109,264

E. B / C = 1.00004
 ENPV = 4.05
 E I R R = 20.45900

Table 6.4.1 Cash Flow of Financial Cost and Benefit (FNPV and F.B/C)

(Unit: thou. US\$)

Year in Order	Cost				Benefit			Present Value	
	Const. Cost	Replac- ement Cost	O/M Cost	Total	Irrigation	Soil Consav.	Total	Cost	Benefit
1	0	0	0	0	0	0	0	0	0
2	119	0	0	119	0	0	0	92	0
3	3,399	0	0	3,399	0	0	0	2,015	0
4	34,683	0	0	34,683	0	0	0	15,827	0
5	40,292	0	1,117	41,409	7,387	73	7,460	14,548	2,621
6	14,391	0	3,195	17,586	21,119	236	21,355	4,756	5,776
7	0	0	4,817	4,817	31,840	426	32,266	1,003	6,719
8	0	0	5,612	5,612	37,097	576	37,673	900	6,039
9	0	0	5,839	5,839	38,598	725	39,322	721	4,853
10	0	0	5,839	5,839	38,598	820	39,418	555	3,746
11	0	0	5,839	5,839	38,598	835	39,433	427	2,885
12	0	0	5,839	5,839	38,598	835	39,433	329	2,221
13	0	0	5,839	5,839	38,598	835	39,433	253	1,710
14	0	0	5,839	5,839	38,598	835	39,433	195	1,316
15	0	0	5,839	5,839	38,598	835	39,433	150	1,013
16	0	0	5,839	5,839	38,598	835	39,433	116	780
17	0	0	5,839	5,839	38,598	835	39,433	89	601
18	0	0	5,839	5,839	38,598	835	39,433	68	462
19	0	0	5,839	5,839	38,598	835	39,433	53	356
20	0	1,500	5,839	7,339	38,598	835	39,433	51	274
21	0	0	5,839	5,839	38,598	835	39,433	31	211
22	0	0	5,839	5,839	38,598	835	39,433	24	162
23	0	0	5,839	5,839	38,598	835	39,433	19	125
24	0	0	5,839	5,839	38,598	835	39,433	14	96
25	0	0	5,839	5,839	38,598	835	39,433	11	74
26	0	0	5,839	5,839	38,598	835	39,433	8	57
27	0	0	5,839	5,839	38,598	835	39,433	7	44
28	0	0	5,839	5,839	38,598	835	39,433	5	34
29	0	0	5,839	5,839	38,598	835	39,433	4	26
30	0	2,500	5,839	8,339	38,598	835	39,433	4	20
31	0	0	5,839	5,839	38,598	835	39,433	2	15
32	0	0	5,839	5,839	38,598	835	39,433	2	12
33	0	0	5,839	5,839	38,598	835	39,433	1	9
34	0	0	5,839	5,839	38,598	835	39,433	1	7
35	0	1,500	5,839	7,339	38,598	835	39,433	1	5
36	0	0	5,839	5,839	38,598	835	39,433	1	4
37	0	0	5,839	5,839	38,598	835	39,433	0	3
38	0	0	5,839	5,839	38,598	835	39,433	0	2
39	0	0	5,839	5,839	38,598	835	39,433	0	2
40	0	0	5,839	5,839	38,598	835	39,433	0	1
41	0	0	5,839	5,839	38,598	835	39,433	0	1
42	0	0	5,839	5,839	38,598	835	39,433	0	1
43	0	0	5,839	5,839	38,598	835	39,433	0	1
44	0	0	5,839	5,839	38,598	835	39,433	0	1
45	0	0	5,839	5,839	38,598	835	39,433	0	0
46	0	0	5,839	5,839	38,598	835	39,433	0	0
47	0	0	5,839	5,839	38,598	835	39,433	0	0
48	0	0	5,839	5,839	38,598	835	39,433	0	0
49	0	0	5,839	5,839	38,598	835	39,433	0	0
50	0	-500	5,839	5,339	38,598	835	39,433	0	0
Total	92,884	5,000	259,979	357,863	1,718,552	36,262	1,754,814	42,283	42,289

F. B / C = 1.00013
 FNPV = 5.70
 F I R R = 29.89000

Table 6.6.1 Environmental Impacts

		INITIAL STATE	IMPACT ELEMENTS OF THE PROJECT		
		ENVIRONMENTAL CONDITIONS OF THE INITIAL STATE	IMPACT OF CONSTRUCTION OF IRRIGATION WORKS	IMPACT OF IRRIGATION ACTIVITIES	IMPACT OF AGRICULTURAL DEVELOPMENT
MAJOR IMPACT SOURCES		<ul style="list-style-type: none"> Existing irrigation civil works like the Main Canal and the Calimanesti dam Upstream industrial sources of water pollution 	<ul style="list-style-type: none"> Secondary canals for irrigation and drainage 	<ul style="list-style-type: none"> Irrigation water is periodically contaminated by industrial pollutants; method of irrigation (sprinkler) 	<ul style="list-style-type: none"> Use of water for industrial and domestic purpose; increased wastewater and solid waste; increased use of agrochemical; development of commercial activity /cattle breeding activity
NATURAL ENVIRONMENT	GROUND-WATER	<ul style="list-style-type: none"> Shallow groundwater in river corridors and plain; Discharge in Siret river down-stream of the Study Area 	<ul style="list-style-type: none"> Irrigation canals are a pathway for contamination of groundwater by industrial pollutants; However this mainly concerns the main canal, with underground passages at level of Siret tributaries; effect of secondary works is minor 	<ul style="list-style-type: none"> Ground infiltration of contaminated water through irrigation of crop fields might induce severe degradation of groundwater quality; It is the major impact of the Project on environment 	<ul style="list-style-type: none"> Increased use of groundwater for satisfying new industrial and domestic demand; effects on water table; increased rate of contamination by surface pollution sources
	WATER QUALITY	<ul style="list-style-type: none"> Water quality seems acceptable from yearly average, but is not complying with required irrigation criteria in several cases (industrial pollutants); Trends toward better quality due to policy, legislation, and present economic circumstances 	<ul style="list-style-type: none"> Ground infiltration of contaminated water through conveyance of irrigation water; eutrophication of main canals; sedimentation of drainage canals; transport of nutrients in water downstream 	<ul style="list-style-type: none"> Contamination of groundwater on site due to the use of irrigation water and agrochemical; pollution of surface water downstream, directly (irrigation) or indirectly (groundwater discharge); 	<ul style="list-style-type: none"> Impairment of water quality due to new industrial / domestic pollution sources on site; Effects increased downstream due to low dilution of pollutants (increased use of water sources upstream)
	MORPHOLOGY / SOILS	<ul style="list-style-type: none"> Soil losses due to wind and mainly pluvial erosion; sheet erosion in plain, gully erosion in hills; Climatic aggressivity 	<ul style="list-style-type: none"> Risk of waterlogging and sedimentation / erosion if drainage is not adapted to local situations 	<ul style="list-style-type: none"> Irrigation might induce sheet erosion through increased humidity of soils (slopes more than 2 - 3%); contamination of soil by heavy metals 	x
	NATURAL ECOSYSTEMS	<ul style="list-style-type: none"> Natural land is mainly degraded land (pasture, erosion) and riverbeds of Siret tributaries; In existence of protective areas within the Study Area; Calimanesti dam might be a new habitat for birds; 	<ul style="list-style-type: none"> Irrigation Project concerns interfluvial land in the cultivated plain area; planned secondary works will not have effects on natural habitats 	<ul style="list-style-type: none"> Irrigation exclusively deals with agricultural land and has no predictable effects on surrounding (mainly upstream) natural environment 	<ul style="list-style-type: none"> Agricultural development is more likely to induce effects on natural environment through waste disposal siting
	WILDLIFE	<ul style="list-style-type: none"> Siret river is an important corridor for migration of birds (only passage); Fishes affected by water pollution; Mammals of forest habitat and small mammal species on site 	<ul style="list-style-type: none"> At initial state, main canal could be a major obstacle between Siret and hills for mammal species; Effects of the Project through remaining works is negligible 	<ul style="list-style-type: none"> Possible contribution to impairment of aquatic wildlife downstream by direct / indirect contamination of surface water 	<ul style="list-style-type: none"> Possible contribution to impairment of aquatic wildlife downstream by direct / indirect contamination of surface water
SOCIAL ENVIRONMENT	USE OF RESOURCES	<ul style="list-style-type: none"> Use of groundwater sources; problem of water scarcity in upper hills villages; forest managed by ROMSILVA 	x	x	<ul style="list-style-type: none"> Increased risk of water shortage / conflicts; drastic increase of cost of water supply; water resources development
	LAND USE	<ul style="list-style-type: none"> Land intensively used for human settlements and agriculture; vineyards 	<ul style="list-style-type: none"> Main canal might be an obstacle for movements of people (initial state); remaining works have no effect 	<ul style="list-style-type: none"> Increased productivity 	x
	SANITATION	<ul style="list-style-type: none"> General use of septic tanks, with probable contamination of phreatics; Non sanitary landfill sites (organic matter) 	x	<ul style="list-style-type: none"> Possible health effects through impairment of groundwater quality 	<ul style="list-style-type: none"> Increased health risk due to contamination of drinking water; more generally due to increased quantity of waste, and development of agro-industry
	USE OF AGRO-CHEMICALS	<ul style="list-style-type: none"> Use of natural fertilizers in small quantities; Agrochemical almost in existent except in vineyards (small quantities) 	x	<ul style="list-style-type: none"> Inclusion of vineyards in irrigation area might induce an increased use of pesticides in a zone with high vulnerability of groundwater 	<ul style="list-style-type: none"> Increased use of agrochemical
	LANDSCAPE CULTURAL ASSETS	<ul style="list-style-type: none"> Memorial monuments in the cultivated plain along roads; majestuous landscapes in hilly zone (Putna); wine products 	x	<ul style="list-style-type: none"> Irrigation of vineyards increases quantity but decreases quality of wine products 	<ul style="list-style-type: none"> Water resources development or siting of industry for water might induce loss of landscape value (Putna valley in particular)

FIGURES

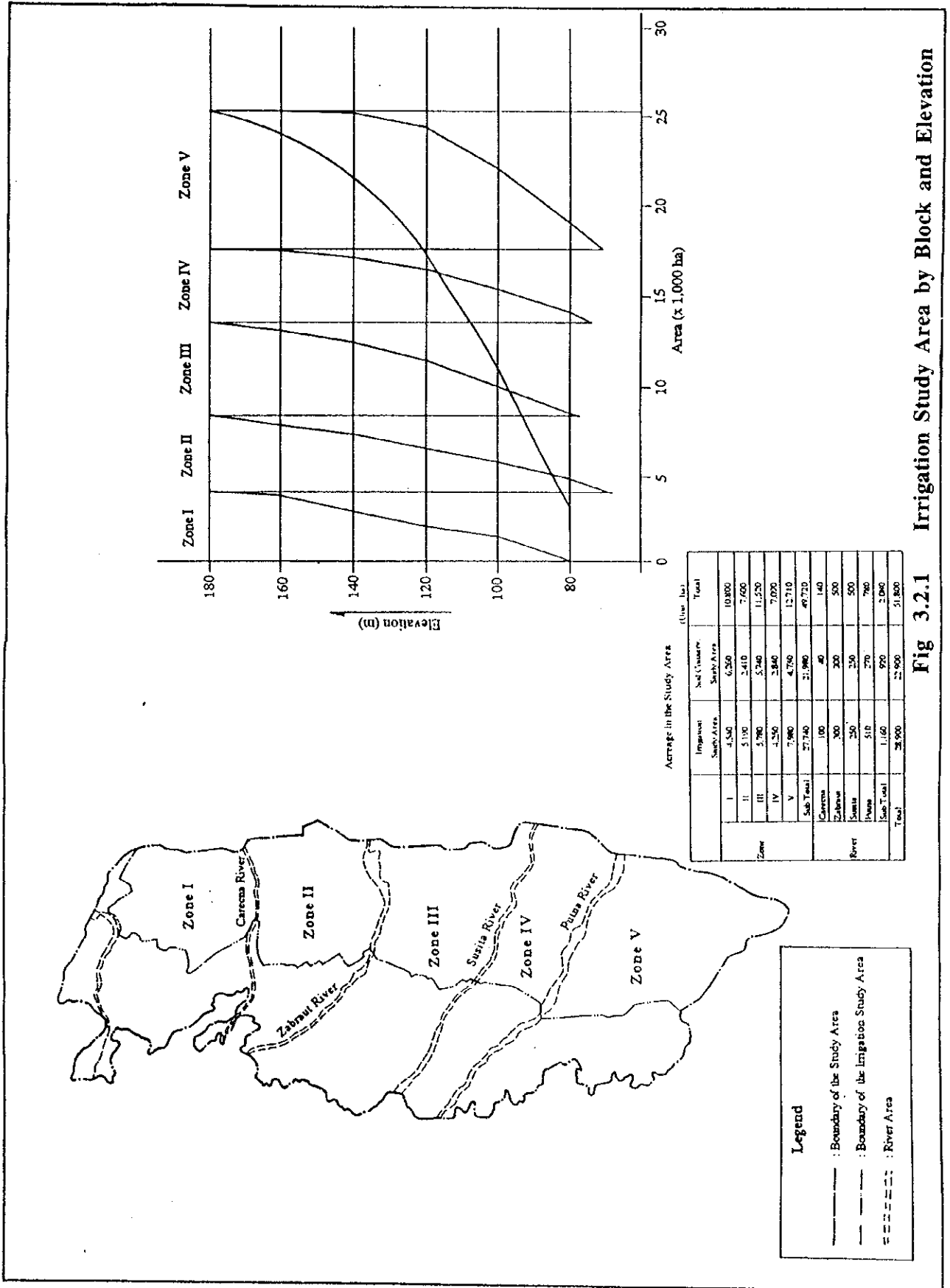
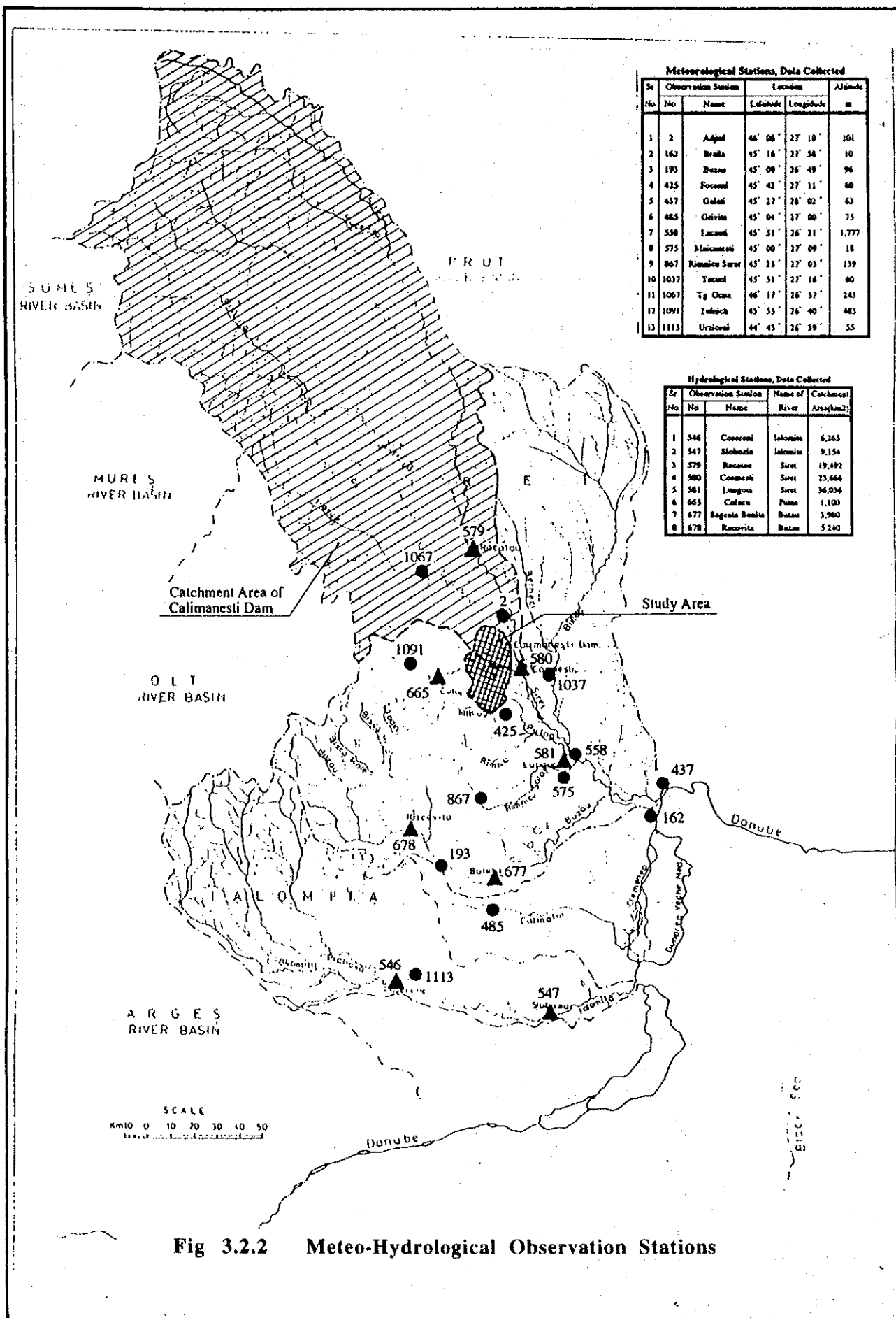
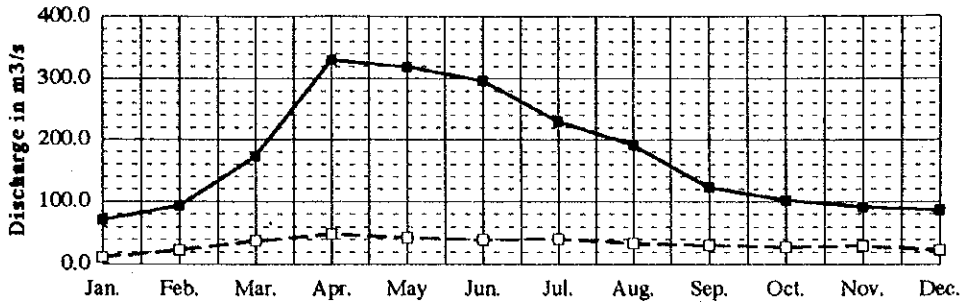


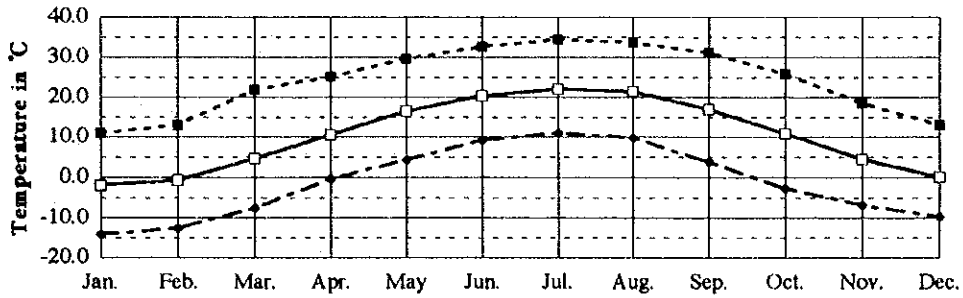
Fig 3.2.1 Irrigation Study Area by Block and Elevation



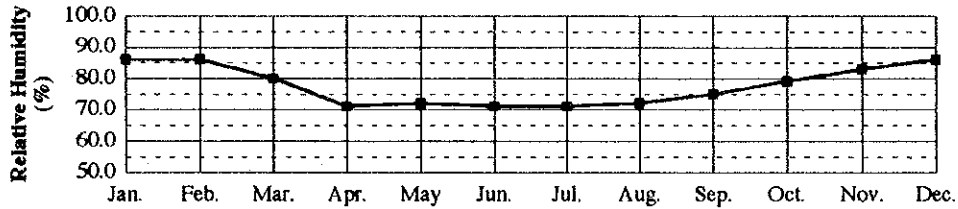
Mean Monthly Discharge of the Siret at Cosmesti (1950 - 1993)



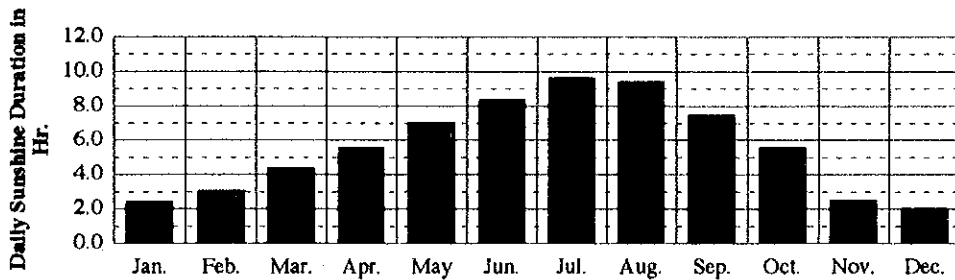
Max., Min. and Mean Monthly Temperature in Focsani (1977-1992)



Relative Humidity in Adjud (1961 - 1987)



Daily Monthly Mean Daily Sunshine Duration in Focsani (1951-1965)



Mean Monthly Precipitation in Focsani (1962-1993) and Adjud (1948-1993)

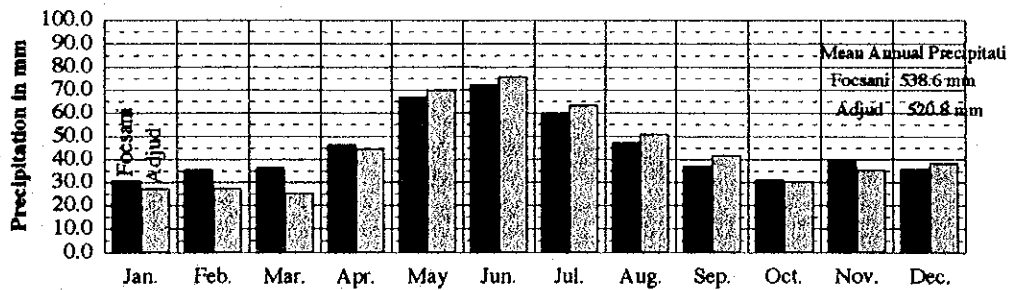


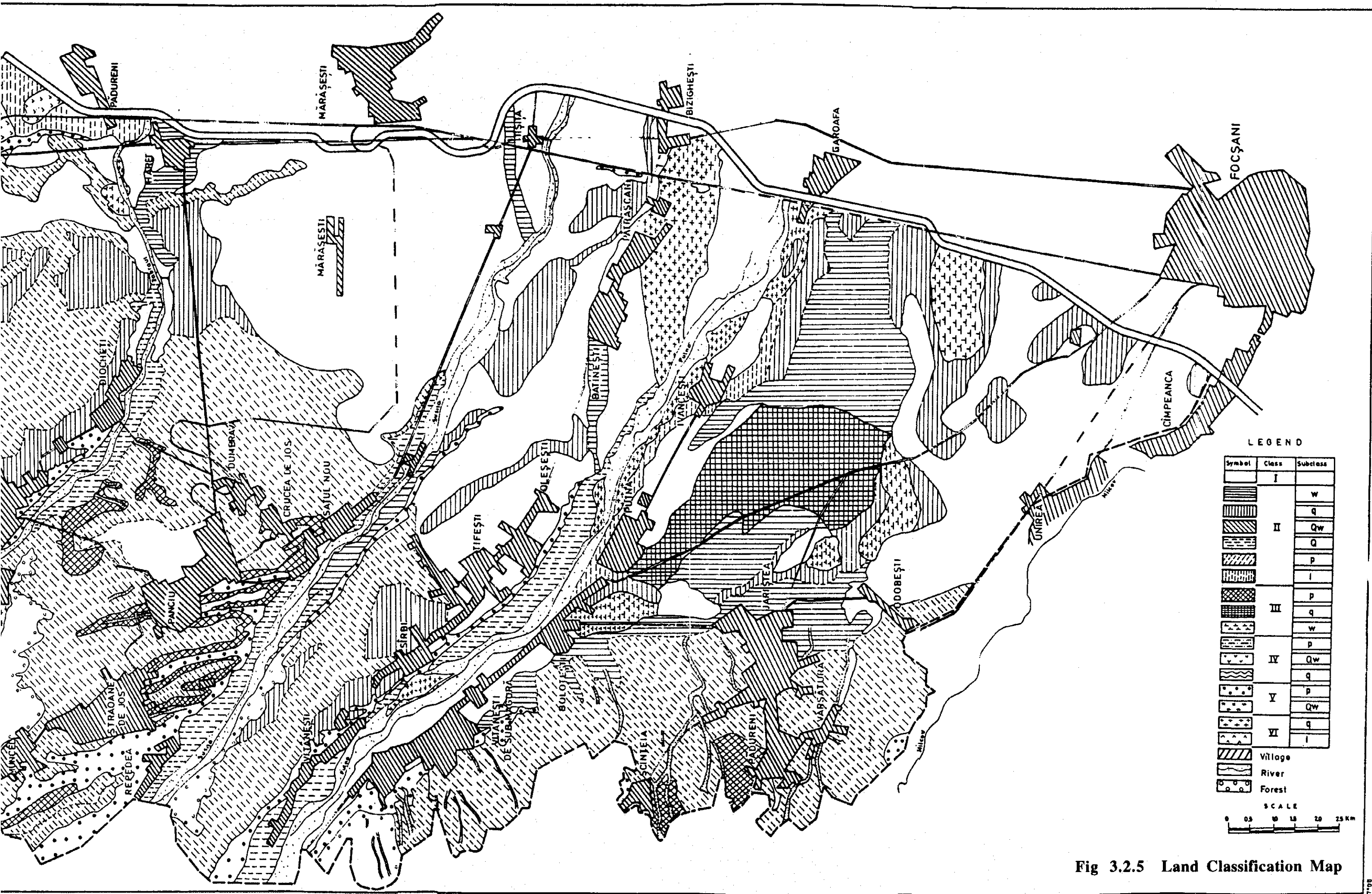
Fig 3.2.3 Summary of Meteo-Hydrological Conditions in the Study Area





Fig 3.2.4 Soil Map



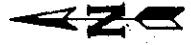


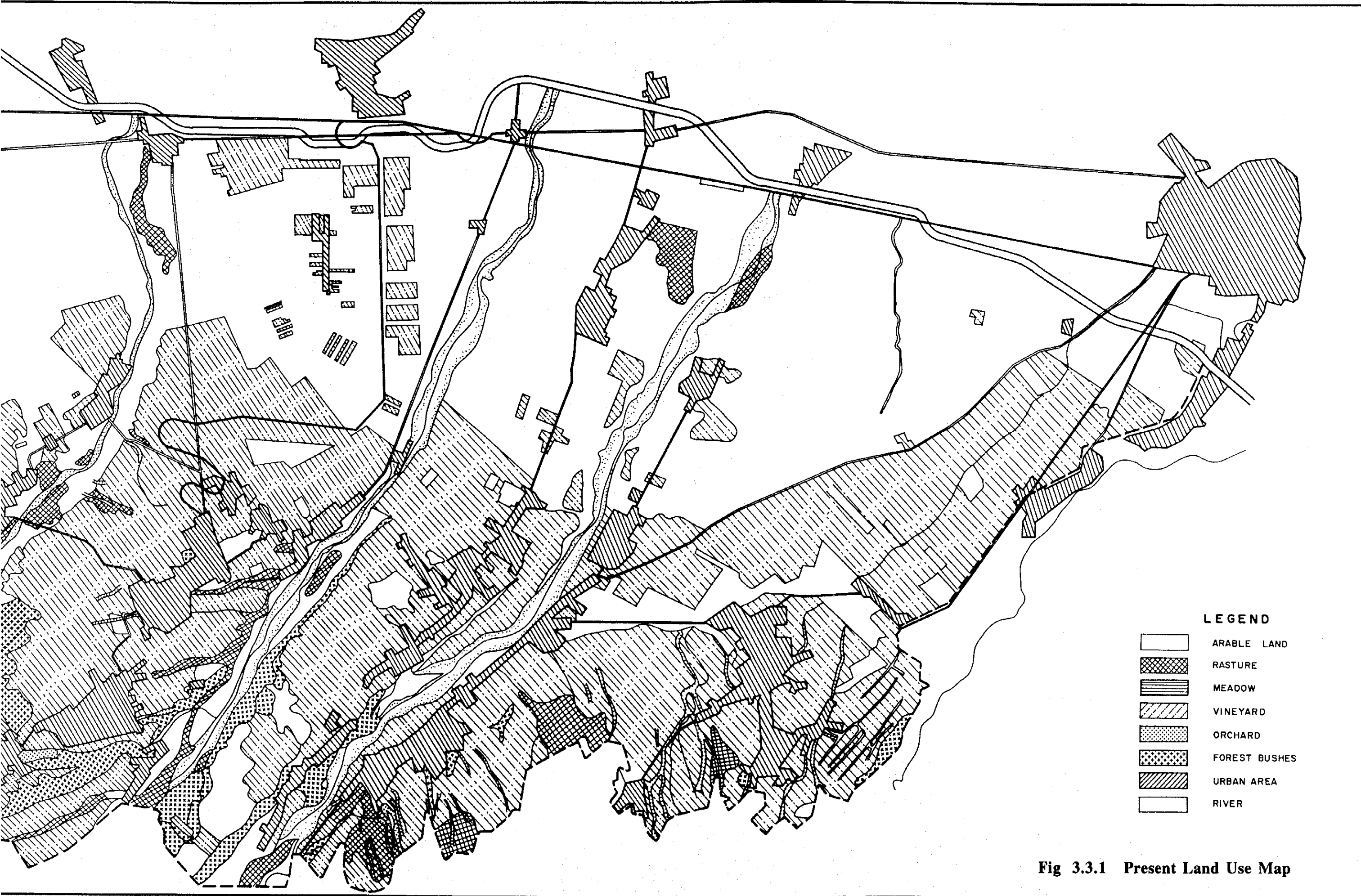
LEGEND

Symbol	Class	Subclass
[Blank]	I	
[Diagonal lines /]	II	w
[Diagonal lines \]		q
[Cross-hatch]		Qw
[Horizontal lines]		Q
[Vertical lines]		p
[Dotted]	III	i
[Cross-hatch]		p
[Diagonal lines /]		q
[Diagonal lines \]	IV	w
[Cross-hatch]		p
[Wavy lines]	V	Qw
[Dotted]		q
[Diagonal lines /]	VI	p
[Diagonal lines \]		Qw
[Dotted]	VII	q
[Diagonal lines /]		i
[Hatched pattern]	Village	
[Wavy line]	River	
[Dotted pattern]	Forest	

SCALE
0 0.5 1 1.5 2 2.5 Km

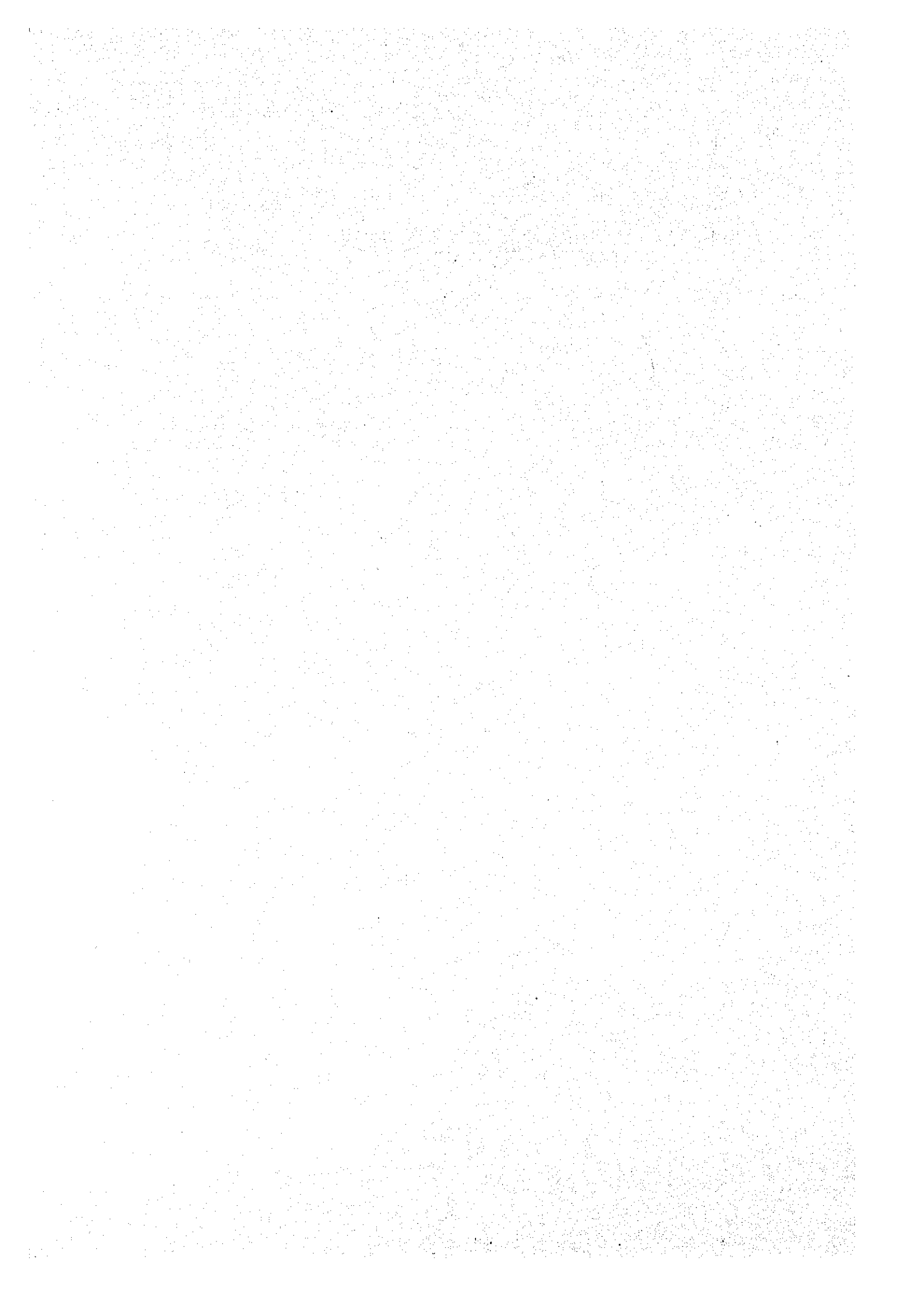
Fig 3.2.5 Land Classification Map





- LEGEND**
- ▭ ARABLE LAND
 - ▣ PASTURE
 - ▤ MEADOW
 - ▥ VINEYARD
 - ▦ ORCHARD
 - ▧ FOREST BUSHES
 - ▨ URBAN AREA
 - ▩ RIVER

Fig 3.3.1 Present Land Use Map



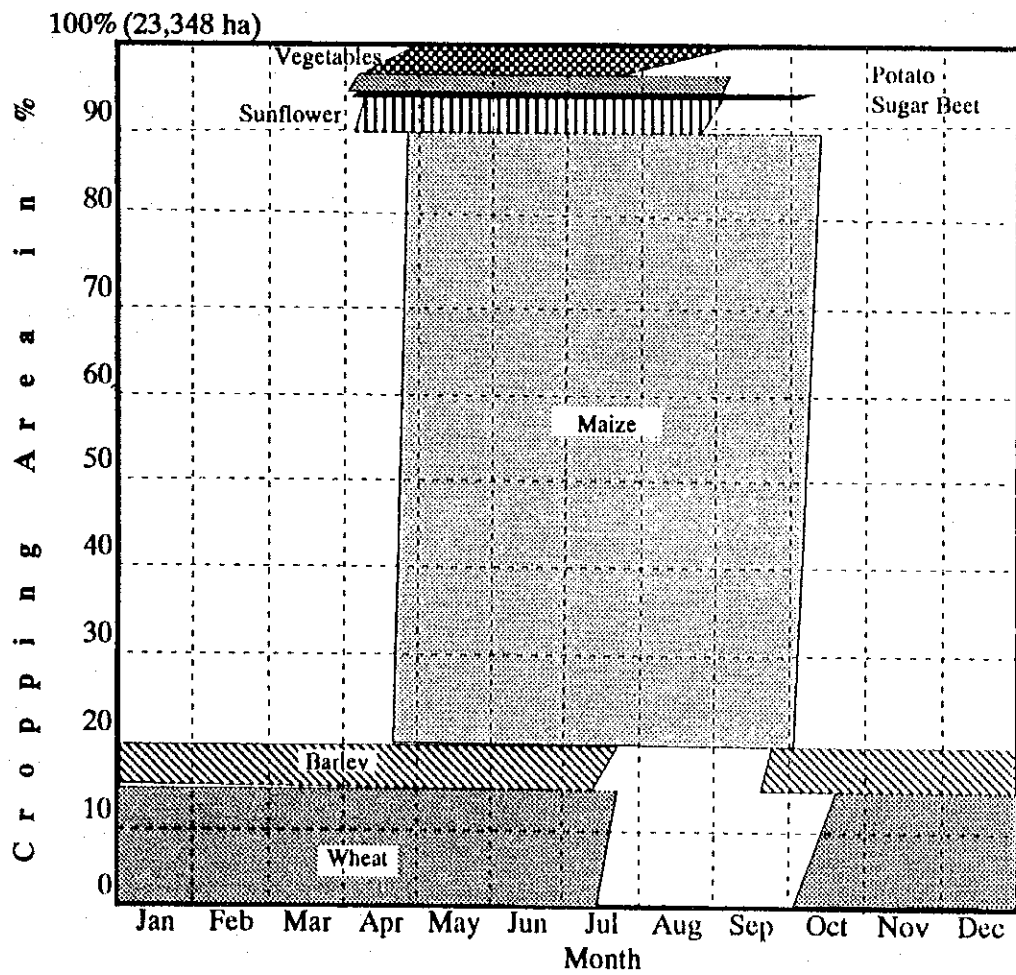
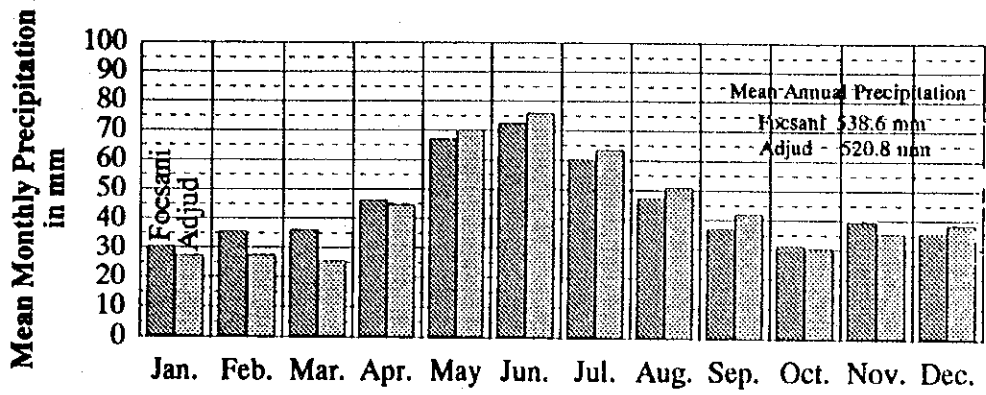


Fig 3.3.2 Present Cropping Pattern (1992)

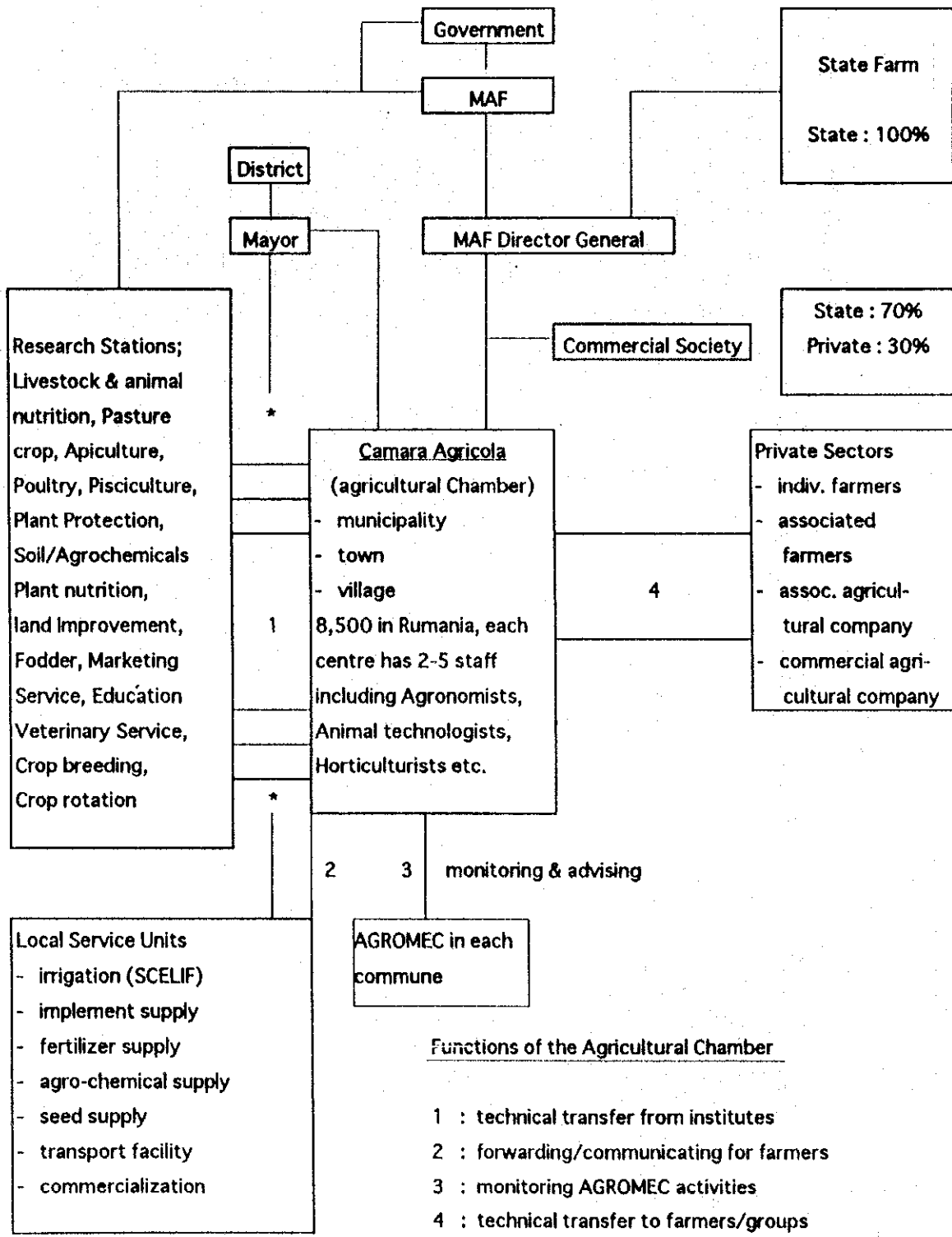


Fig 3.3.3 Agriculture Center in the Study Area