

## 9. 農家レベルでの経済計算

農家レベルでの経済計算書：表 A-2-1 ～ 表 A-2-15

運営維持管理費：表 A-3、表 A-4

表 A-2-1-1 Annual Production Cost per Hectare Under Present Conditions at Bongo I

Description	Unit Price (Rp.)	Paddy				Palawija						
		Wet Season		Semi-wet Season		Soybeans		Green Beans		Maize		
		Q	V	Q	V	Q	V	Q	V	Q	V	
<b>1 Farm Inputs</b>												
(1) Seed (kg)												
- Paddy	2,200	35	77,000	35	77,000							
- Soybeans	5,500					50	275,000					
- Green Beans	7,000							35	245,000			
- Maize	2,300									35	80,500	
(2) Fertilizers (Kg)												
- Urea	1,200	100	120,000	100	120,000	25	30,000	50	60,000	50	60,000	
- TSP	1,950	60	117,000	60	117,000	25	48,750	50	97,500	0	0	
- KCL	1,950	40	78,000	40	78,000	0	0	0	0	0	0	
(3) Agro - Chemical (Ltr)												
- Insecticide	59,000	1	59,000	1	59,000	1	59,000	1	59,000	1	59,000	
<b>Sub - Total</b>			451,000		451,000		412,750		461,500		199,500	
<b>2 Labour (day)</b>												
(1) Man Power	12,500	83	1,037,500	83	1,037,500	35	437,500	35	437,500	35	437,500	
(2) Draft Power	25,000	10	250,000	10	250,000	8	200,000	8	200,000	8	200,000	
<b>Sub - Total</b>			1,287,500		1,287,500		637,500		637,500		637,500	
<b>3 Misellaneous Cost</b> (Equipment, Tax, etc.)												
+ 10% of (1 + 2)			173,850		173,850		105,025		109,900		83,700	
<b>Total</b>			1,912,350		1,912,350		1,155,275		1,208,900		920,700	
<b>C Cropping Intensity</b>		1	1,912,350	0.5	956,175	0.15	173,291	0.15	181,335	0.2	184,140	
<b>Ground Total</b>	3,407,291											

表 A-2-1-2 Annual Balance per Hectare Under Present Conditions at Bongo I

Description	Unit Price (Rp./ton)	Paddy				Palawija						
		Wet Season		Semi-wet Season		Soybeans		Green Beans		Maize		
		Q	V	Q	V	Q	V	Q	V	Q	V	
<b>4 Yield Income</b>												
- Paddy	1,200,000	3.00	3,600,000	1.00	1,200,000							
- Soybeans	4,000,000					0.10	390,000					
- Green Beans	3,500,000							0.09	315,000			
- Maize	836,000									0.32	267,520	
<b>Total Income</b>	5,772,520		3,600,000		1,200,000		390,000		315,000		267,520	
<b>B Net Income</b>	2,365,229											
<b>B/C</b>	0.69											

表 A-2-2-1 Annual Crop Production Cost per Hectare with Irrigation Conditions at Bongo I

No.	Description	Unit Price (Rp.)	Paddy				Palawija						
			Wet Season		Semi-wet Season		Soybeans		Green Beans		Maize		
			Q	V	Q	V	Q	V	Q	V	Q	V	
1	<b>Farm Inputs</b>												
	(1) Seed (kg)												
	- Paddy	2,200	30	66,000	30	66,000							
	- Soybeans	5,500					45	247,500					
	- Green Beans	7,000							30	210,000			
	- Maize	2,300									30	69,000	
	(2) Fertilizers (Kg)												
	- Urea	1,200	300	360,000	300	360,000	50	60,000	75	90,000	250	300,000	
	- TSP	1,950	100	195,000	100	195,000	100	195,000	100	195,000	100	195,000	
	- KcL	1,950	75	146,250	75	146,250	50	97,500	50	97,500	75	146,250	
	(3) Agro-Chemicals (Ltr)	59,000	4	236,000	4	236,000	2	118,000	2	118,000	2	118,000	
	<b>Sub-Total</b>			1,003,250		1,003,250		718,000		710,500		828,250	
2	<b>Labours Costs (day)</b>												
	(1) Man Power	12,500	102	1,275,000	108	1,350,000	48	600,000	46	575,000	45	562,500	
	(2) Draft Power	25,000	15	375,000	15	375,000	8	200,000	8	200,000	8	200,000	
	<b>Sub-Total</b>			1,650,000		1,725,000		800,000		775,000		762,500	
3	Miscellaneous Costs : (Equipment, Tax, etc.) = 20% of (1+2)			530,650		545,650		303,600		297,000		304,350	
4	Operation Cost Rp./ Hr.	1,731	hr	84,031	hr	85,377	hr	44,540	hr	40,148	hr	53,146	
	<b>TOTAL</b>			3,267,931		3,359,277		1,866,140		1,822,648		1,948,246	
	<b>Cropping Intensity</b>		1.0	3,267,931	1.0	3,359,277	0.15	279,921	0.15	273,397	0.2	389,649	
	<b>GROUND TOTAL</b>			7,922,175		O&M Cost = Operation Cost + Replacement Cost		192,740	+	352,000	=	544,740	

\* O&M Cost: All operation cost and replacement cost of the system.

表 A-2-2-2 Annual Balance per Hectre with Irrigation Conditions at Bongo I

No.	Description	Unit Price (Rp./ton)	Paddy				Palawija						
			Wet Season		Semi-wet Season		Soybeans		Green Beans		Maize		
			Q	V	Q	V	Q	V	Q	V	Q	V	
5	<b>Yield Income</b>												
	- Paddy	1,200,000	5.50	6,600,000	6.00	7,200,000							
	- Soybeans	4,000,000					0.23	900,000					
	- Green Beans	3,500,000						0.18	630,000				
	- Maize	836,000									0.90	752,400	
	<b>Total Income</b>	16,082,400		6,600,000		7,200,000		900,000		630,000		752,400	
B	<b>Net Income</b>	8,160,225											
	<b>B/C</b>	1.03											
	<b>O&amp;M/Net Income (%)</b>	6.68											

表 A-2-3-1 Annual Crop Production Cost per Hectare with Irrigation Conditions at Bongo I (Third Year)

No.	Description	Unit Price (Rp.)	Paddy				Palawija							
			Wet Season		Semi-wet Season		Soybeans		Green Beans		Maize			
			Q	V	Q	V	Q	V	Q	V	Q	V		
1	<b>Farm Inputs</b>													
	(1) Seed (kg)													
	- Paddy	2,200	32.5	71,500	32.5	71,500								
	- Soybeans	5,500				47.5	261,250							
	- Green Beans	7,000						32.5	227,500					
	- Maize	2,300									32.5	74,750		
	(2) Fertilizers (Kg)													
	- Urea	1,200	200	240,000	200	240,000	37.5	45,000	62.5	75,000	150	180,000		
	- TSP	1,950	80	156,000	80	156,000	62.5	121,875	75	146,250	50	97,500		
	- KcL	1,950	57.5	112,125	57.5	112,125	25	48,750	25	48,750	37.5	73,125		
	(3) Agro-Chemicals (Ltr)	59,000	2.5	147,500	2.5	147,500	1.5	88,500	1.5	88,500	1.5	88,500		
	<b>Sub-Total</b>			727,125		727,125		565,375		586,000		513,875		
2	<b>Labours Costs (day)</b>													
	(1) Man Power	12,500	92.5	1,156,250	95.5	1,193,750	41.5	518,750	40.5	506,250	40.0	500,000		
	(2) Draft Power	25,000	12.5	312,500	12.5	312,500	8.0	200,000	8.0	200,000	8.0	200,000		
	<b>Sub-Total</b>			1,468,750		1,506,250		718,750		706,250		700,000		
3	Miscellaneous Costs : (Equipment, Tax, etc.) = 20% of (1+2)			530,650		545,650		303,600		297,000		304,350		
4	Operation Cost Rp./ Hr.	1,731	49	84,031	49	85,377	26	44,540	23	40,148	31	53,146		
C	<b>TOTAL</b>			2,810,556		2,864,402		1,632,265		1,629,398		1,571,371		
	<b>Cropping Intensity</b>		1.00	2,810,556	0.75	2,148,301	0.15	244,840	0.15	244,410	0.20	314,274		
	<b>GROUND TOTAL</b>			6,114,381										
				<b>O&amp;M Cost =</b>										
				<b>Operation Cost</b>				171,396	+	352,000	=	523,396		
				<b>+ Replacement Cost</b>										

\* O&M Cost: All operation cost and replacement cost of the system.

表 A-2-3-2 Annual Balance per Hectare with Irrigation Conditions at Bongo I (Third Year)

No.	Description	Unit Price (Rp./ton)	Paddy				Palawija						
			Wet Season		Semi-wet Season		Soybeans		Green Beans		Maize		
			Q	V	Q	V	Q	V	Q	V	Q	V	
5	<b>Yield Income</b>												
	- Paddy	1,200,000	4.25	5,100,000	3.51	4,207,500							
	- Soybeans	4,000,000				0.16	645,000						
	- Green Beans	3,500,000						0.14	472,500				
	- Maize	836,000									0.61	509,960	
	<b>Total Income</b>	10,934,960		5,100,000		4,207,500		645,000		472,500		509,960	
B	<b>Net Income</b>	4,820,579											
	<b>B/C</b>	0.79											
	<b>O&amp;M/Net Income (%)</b>	10.86											

表 A-2-4-1 Annual Production Cost per Hectare Under Present Conditions at Bongo III

Description	Unit Price (Rp.)	Paddy				Palawija				Maize		
		Wet Season		Semi-wet Season		Soybeans		Green Beans		Q	V	
		Q	V	Q	V	Q	V	Q	V	Q	V	
<b>1 Farm Inputs</b>												
(1) Seed (kg)												
- Paddy	2,200	35	77,000	35	77,000							
- Soybeans	5,500					50	275,000					
- Green Beans	7,000							35	245,000			
- Maize	2,300									35	80,500	
(2) Fertilizers (Kg)												
- Urea	1,200	100	120,000	100	120,000	25	30,000	50	60,000	50	60,000	
- TSP	1,950	60	117,000	60	117,000	25	48,750	50	97,500	0	0	
- KCL	1,950	40	78,000	40	78,000	0	0	0	0	0	0	
(3) Agro - Chemical (Ltr)												
- Insecticide	59,000	1	59,000	1	59,000	1	59,000	1	59,000	1	59,000	
<b>Sub - Total</b>			451,000		451,000		412,750		461,500		199,500	
<b>2 Labour (day)</b>												
(1) Man Power	12,500	83	1,037,500	83	1,037,500	35	437,500	35	437,500	35	437,500	
(2) Draft Power	25,000	10	250,000	10	250,000	8	200,000	8	200,000	8	200,000	
<b>Sub - Total</b>			1,287,500		1,287,500		637,500		637,500		637,500	
<b>3 Misellaneous Cost</b> (Equipment, Tax, etc.)												
+ 10% of (1+2)			173,850		173,850		105,025		109,900		83,700	
<b>Total</b>			1,912,350		1,912,350		1,155,275		1,208,900		920,700	
<b>C Cropping Intensity</b>		1	1,912,350	0.5	956,175	0.15	173,291	0.15	181,335	0.2	184,140	
<b>Ground Total</b>	3,407,291											

表 A-2-4-2 Annual Balance per Hectare Under Present Conditions at Bongo III

Description	Unit Price (Rp./ton)	Paddy				Palawija				Maize		
		Wet Season		Semi-wet Season		Soybeans		Green Beans		Q	V	
		Q	V	Q	V	Q	V	Q	V	Q	V	
<b>4 Yield Income</b>												
- Paddy	1,200,000	3.00	3,600,000	1.00	1,200,000							
- Soybeans	4,000,000					0.10	390,000					
- Green Beans	3,500,000							0.09	315,000			
- Maize	836,000									0.32	267,520	
<b>Total Income</b>	5,772,520		3,600,000		1,200,000		390,000		315,000		267,520	
<b>B Net Income</b>	2,365,229											
<b>B/C</b>	0.69											

表 A-2-5-1 Annual Crop Production Cost per Hectare with Irrigation Conditions at Bongo III

No.	Description	Unit Price (Rp.)	Paddy				Palawija						
			Wet Season		Semi-wet Season		Soybeans		Green Beans		Maize		
			Q	V	Q	V	Q	V	Q	V	Q	V	
1	<b>Farm Inputs</b>												
	(1) Seed (kg)												
	- Paddy	2,200	30	66,000	30	66,000							
	- Soybeans	5,500					45	247,500					
	- Green Beans	7,000							30	210,000			
	- Maize	2,300									30	69,000	
	(2) Fertilizers (Kg)												
	- Urea	1,200	300	360,000	300	360,000	50	60,000	75	90,000	250	300,000	
	- TSP	1,950	100	195,000	100	195,000	100	195,000	100	195,000	100	195,000	
	- KcL	1,950	75	146,250	75	146,250	50	97,500	50	97,500	75	146,250	
	(3) Agro-Chemicals (Ltr)	59,000	4	236,000	4	236,000	2	118,000	2	118,000	2	118,000	
	<b>Sub-Total</b>			1,003,250		1,003,250		718,000		710,500		828,250	
2	<b>Labours Costs (day)</b>												
	(1) Man Power	12,500	102	1,275,000	108	1,350,000	48	600,000	46	575,000	45	562,500	
	(2) Draft Power	25,000	15	375,000	15	375,000	8	200,000	8	200,000	8	200,000	
	<b>Sub-Total</b>			1,650,000		1,725,000		800,000		775,000		762,500	
3	Miscellaneous Costs : (Equipment, Tax, etc.) = 20% of (1+2)			530,650		545,650		303,600		297,000		304,350	
4	Operation Cost Rp./ Hr.	2,489	49	120,832	49	122,768	26	64,046	23	57,731	31	76,422	
C	<b>TOTAL</b>			3,304,732		3,396,668		1,885,646		1,840,231		1,971,522	
	<b>Cropping Intensity</b>		1.0	3,304,732	1.0	3,396,668	0.15	282,847	0.15	276,035	0.2	394,304	
	<b>GROUND TOTAL</b>			8,038,586		O&M Cost = Operation Cost 277,151 + Replacement Cost 384,000 = 661,151							

\* O&M Cost: All operation cost and replacement cost of the system.

表 A-2-5-2 Annual Balance per Hectare with Irrigation Conditions at Bongo III

No.	Description	Unit Price (Rp./ton)	Paddy				Palawija						
			Wet Season		Semi-wet Season		Soybeans		Green Beans		Maize		
			Q	V	Q	V	Q	V	Q	V	Q	V	
5	<b>Yield Income</b>												
	- Paddy	1,200,000	5.50	6,600,000	6.00	7,200,000							
	- Soybeans	4,000,000					0.23	900,000					
	- Green Beans	3,500,000							0.18	630,000			
	- Maize	836,000									0.90	752,400	
	<b>Total Income</b>	16,082,400		6,600,000		7,200,000		900,000		630,000		752,400	
B	<b>Net Income</b>	8,043,814											
	<b>B/C</b>	1.00											
	<b>O&amp;M/Net Income (%)</b>	8.22											

表 A-2-6-1 Annual Crop Production Cost per Hectare with Irrigation Conditions at Bongo III (Third Year)

No.	Description	Unit Price (Rp.)	Paddy				Palawija						
			Wet Season		Semi-wet Season		Soybeans		Green Beans		Maize		
			Q	V	Q	V	Q	V	Q	V	Q	V	
1	<b>Farm Inputs</b>												
	(1) Seed (kg)												
	- Paddy	2,200	32.5	71,500	32.5	71,500							
	- Soybeans	5,500				47.5	261,250						
	- Green Beans	7,000						32.5	227,500				
	- Maize	2,300								32.5	74,750		
	(2) Fertilizers (Kg)												
	- Urea	1,200	200	240,000	200	240,000	37.5	45,000	62.5	75,000	150	180,000	
	- TSP	1,950	80	156,000	80	156,000	62.5	121,875	75	146,250	50	97,500	
	- KcL	1,950	57.5	112,125	57.5	112,125	25	48,750	25	48,750	37.5	73,125	
	(3) Agro-Chemicals (Ltr)	59,000	2.5	147,500	2.5	147,500	1.5	88,500	1.5	88,500	1.5	88,500	
	<b>Sub-Total</b>			727,125		727,125		565,375		586,000		513,875	
2	<b>Labours Costs (day)</b>												
	(1) Man Power	12,500	92.5	1,156,250	95.5	1,193,750	41.5	518,750	40.5	506,250	40.0	500,000	
	(2) Draft Power	25,000	12.5	312,500	12.5	312,500	8.0	200,000	8.0	200,000	8.0	200,000	
	<b>Sub-Total</b>			1,468,750		1,506,250		718,750		706,250		700,000	
3	Miscellaneous Costs : (Equipment, Tax, etc.) = 20% of (1+2)			530,650		545,650		303,600		297,000		304,350	
4	Operation Cost Rp./ Hr.	2,489	49	120,832	49	122,768	26	64,046	23	57,731	31	76,422	
	<b>TOTAL</b>			2,847,357		2,901,793		1,651,771		1,646,981		1,594,647	
	<b>Cropping Intensity</b>		1.00	2,847,357	0.75	2,176,345	0.15	247,766	0.15	247,047	0.20	318,929	
	<b>GROUND TOTAL</b>			6,221,444		<b>O&amp;M Cost =</b> Operation Cost 246.459 + 384.000 = <b>630,459</b> + Replacement Cost							

\* O&M Cost: All operation cost and replacement cost of the system.

表 A-2-6-2 Annual Balance per Hectare with Irrigation Conditions at Bongo III (Third Year)

No.	Description	Unit Price (Rp./ton)	Paddy				Palawija						
			Wet Season		Semi-wet Season		Soybeans		Green Beans		Maize		
			Q	V	Q	V	Q	V	Q	V	Q	V	
5	<b>Yield Income</b>												
	- Paddy	1,200,000	4.25	5,100,000	3.51	4,207,500							
	- Soybeans	4,000,000				0.16	645,000						
	- Green Beans	3,500,000						0.14	472,500				
	- Maize	836,000								0.61	509,960		
	<b>Total Income</b>	10,934,960		5,100,000		4,207,500		645,000		472,500		509,960	
B	<b>Net Income</b>	4,713,516											
	<b>B/C</b>	0.76											
	<b>O&amp;M/Net Income (%)</b>	13.38											

表 A-2-7-1 Annual Production Cost per Hectare Under Present Conditions at Ranometo

Description	Unit Price (Rp.)	Paddy				Palawija						
		Wet Season		Semi-wet Season		Soybeans		Groundnuts		Maize		
		Q	V	Q	V	Q	V	Q	V	Q	V	
<b>1 Farm Inputs</b>												
(1) Seed (kg)												
- Paddy	2,200	35	77,000									
- Soybeans	5,500											
- Groundnuts	7,750											
- Maize	2,300											
(2) Fertilizers (Kg)												
- Urea	1,200	100	120,000									
- TSP	1,950	60	117,000									
- KCL	1,950	40	78,000									
(3) Agro - Chemical (Ltr)												
- Insecticide	59,000	1	59,000									
<b>Sub - Total</b>			451,000									
<b>2 Labour (day)</b>												
(1) Man Power	12,500	83	1,037,500									
(2) Draft Power	25,000	10	250,000									
<b>Sub - Total</b>			1,287,500									
<b>3 Misellaneous Cost</b> (Equipment, Tax, etc.)												
+ 10 % of ( 1 + 2 )			173,850									
<b>Total</b>			1,912,350									
<b>C Cropping Intensity</b>		1	1,912,350									
<b>Ground Total</b>	1,912,350											

表 A-2-7-2 Annual Balance per Hectare Under Present Conditions at Ranometo

Description	Unit Price (Rp./ton)	Paddy				Palawija						
		Wet Season		Semi-wet Season		Soybeans		Green Beans		Maize		
		Q	V	Q	V	Q	V	Q	V	Q	V	
<b>4 Yield Income</b>												
- Paddy	1,200,000	2.50	3,000,000									
- Soybeans	4,100,000											
- Groundnuts	4,400,000											
- Maize	891,000											
<b>Total Income</b>	3,000,000		3,000,000									
<b>B Net Income</b>	1,087,650											
<b>B/C</b>	0.57											



表 A-2-8-1 Annual Crop Production Cost per Hectare with Irrigation Conditions at Ranometo

No.	Description	Unit Price (Rp.)	Paddy				Palawija						
			Wet Season		Semi-wet Season		Soybeans		Groundnuts		Maize		
			Q	V	Q	V	Q	V	Q	V	Q	V	
1	Farm Inputs												
	(1) Seed (kg)												
	- Paddy	2,200	30	66,000	30	66,000							
	- Soybeans	5,500				45	247,500						
	- Groundnuts	7,750						60	465,000				
	- Maize	2,300								30	69,000		
	(2) Fertilizers (Kg)												
	- Urea	1,200	300	360,000	300	360,000	50	60,000	50	60,000	250	300,000	
	- TSP	1,950	100	195,000	100	195,000	100	195,000	100	195,000	100	195,000	
	- KcL	1,950	75	146,250	75	146,250	50	97,500	50	97,500	75	146,250	
	(3) Agro-Chemicals (Ltr)	59,000	4	236,000	4	236,000	2	118,000	2	118,000	2	118,000	
	Sub-Total			1,003,250		1,003,250		718,000		935,500		828,250	
2	Labours Costs (day)												
	(1) Man Power	12,500	102	1,275,000	108	1,350,000	48	600,000	48	600,000	45	562,500	
	(2) Draft Power	25,000	15	375,000	15	375,000	8	200,000	8	200,000	8	200,000	
	Sub-Total			1,650,000		1,725,000		800,000		800,000		762,500	
3	Miscellaneous Costs : (Equipment, Tax, etc.) = 20% of (1+2)			530,650		545,650		303,600		297,000		304,350	
			hr		hr		hr		hr		hr		
4	Operation Cost Rp./ Hr.	1,315	36	47,514	45	59,054	8	10,413	13	16,990	15	19,228	
	<b>TOTAL</b>			3,231,414		3,332,954		1,832,013		2,049,490		1,914,328	
	<b>Cropping Intensity</b>		1.0	3,231,414	1.0	3,332,954	0.15	274,802	0.15	307,424	0.2	382,866	
	<b>GROUND TOTAL</b>			7,946,126		<b>O&amp;M Cost =</b> <b>Operation Cost</b> 114,525 + 416,667 = <b>531,191</b> <b>+ Replacement Cost</b>							

\* O&M Cost: All operation cost and replacement cost of the system.

表 A-2-8-2 Annual Balance per Hectare with Irrigation Conditions at Ranometo

No.	Description	Unit Price (Rp./ton)	Paddy				Palawija						
			Wet Season		Semi-wet Season		Soybeans		Groundnuts		Maize		
			Q	V	Q	V	Q	V	Q	V	Q	V	
5	Yield Income												
	- Paddy	1,200,000	5.50	6,600,000	6.00	7,200,000							
	- Soybeans	4,100,000				0.23	922,500						
	- Groundnuts	4,400,000						0.23	990,000				
	- Maize	891,000								0.90	801,900		
	<b>Total Income</b>	16,514,400		6,600,000		7,200,000		922,500		990,000		801,900	
B	<b>Net Income</b>	8,568,274											
	<b>B/C</b>	1.08											
	<b>O&amp;M/Net Income (%)</b>	6.20											

表 A-2-9-1 Annual Crop Production Cost per Hectare with Irrigation Conditions at Ranometo (Third Year)

No.	Description	Unit Price (Rp.)	Paddy				Palawija					
			Wet Season		Semi-wet Season		Soybeans		Groundnuts		Maize	
			Q	V	Q	V	Q	V	Q	V	Q	V
1	<b>Farm Inputs</b>											
	(1) Seed (kg)											
	- Paddy	2,200	32.5	71,500	15	33,000						
	- Soybeans	5,500					47.5	261,250				
	- Groundnuts	7,750							62.5	484,375		
	- Maize	2,300									32.5	74,750
	(2) Fertilizers (Kg)											
	- Urea	1,200	200	240,000	150	180,000	25	30,000	25	30,000	125	150,000
	- TSP	1,950	80	156,000	50	97,500	50	97,500	50	97,500	50	97,500
	- KcL	1,950	57.5	112,125	37.5	73,125	25	48,750	25	48,750	37.5	73,125
	(3) Agro-Chemicals (Ltr)	59,000	2.5	147,500	2.0	118,000	1.0	59,000	1.0	59,000	1.0	59,000
	<b>Sub-Total</b>			727,125		501,625		496,500		719,625		454,375
2	<b>Labours Costs (day)</b>											
	(1) Man Power	12,500	92.5	1,156,250	54.0	675,000	24.0	300,000	24.0	300,000	22.5	281,250
	(2) Draft Power	25,000	12.5	312,500	7.5	187,500	4.0	100,000	4.0	100,000	4.0	100,000
	<b>Sub-Total</b>			1,468,750		862,500		400,000		400,000		381,250
3	Miscellaneous Costs : (Equipment, Tax, etc.) = 20% of (1+2)			530,650		545,650		303,600		297,000		304,350
4	Operation Cost Rp./ Hr.	1,315	hr	47,514	hr	59,054	hr	10,413	hr	16,990	hr	19,228
	<b>TOTAL</b>			2,774,039		1,968,829		1,210,513		1,433,615		1,159,203
	<b>Cropping Intensity</b>		1.00	2,774,039	0.50	984,415	0.08	90,788	0.08	107,521	0.10	115,920
	<b>GROUND TOTAL</b>			4,489,351		O&M Cost = Operation Cost + Replacement Cost		81,020	+	416,667	=	497,686

\* O&M Cost: All operation cost and replacement cost of the system.

表 A-2-9-2 Annual Balance per Hectare with Irrigation Conditions at Ranometo (Third Year)

No.	Description	Unit Price (Rp./ton)	Paddy				Palawija					
			Wet Season		Semi-wet Season		Soybeans		Groundnuts		Maize	
			Q	V	Q	V	Q	V	Q	V	Q	V
5	<b>Yield Income</b>											
	- Paddy	1,200,000	4.00	4,800,000	2.20	2,640,000						
	- Soybeans	4,100,000					0.08	330,563				
	- Groundnuts	4,400,000							0.08	346,500		
	- Maize	891,000									0.31	271,755
	<b>Total Income</b>	8,388,818		4,800,000		2,640,000		330,563		346,500		271,755
B	<b>Net Income</b>	3,899,467										
	<b>B/C</b>	0.87										
	<b>O&amp;M/Net Income (%)</b>	12.76										

表 A-2-10-1 Annual Production Cost per Hectare Under Present Conditions at Kalembukaha

Description	Unit Price (Rp.)	Paddy				Palawija							
		Wet Season		Semi-wet Season		Groundnuts		Green Beans		Maize			
		Q	V	Q	V	Q	V	Q	V	Q	V		
<b>1 Farm Inputs</b>													
(1) Seed (kg)													
- Paddy	2,200	35	77,000										
- Groundnuts	7,750					65	503,750						
- Green Beans	7,000							35	245,000				
- Maize	2,300									35	80,500		
(2) Fertilizers (Kg)													
- Urea	1,200	100	120,000			25	30,000	50	180,000	50	60,000		
- TSP	1,950	60	117,000			25	48,750	50	292,500	0	0		
- KCL	1,950	40	78,000			0	0	0	0	0	0		
(3) Agro - Chemical (Ltr)													
- Insecticide	59,000	1	59,000			1	59,000	1	59,000	1	59,000		
<b>Sub - Total</b>			451,000				641,500		776,500		199,500		
<b>2 Labour (day)</b>													
(1) Man Power	12,500	83	1,037,500			35	437,500	35	437,500	35	437,500		
(2) Draft Power	25,000	10	250,000			8	200,000	8	200,000	8	200,000		
<b>Sub - Total</b>			1,287,500				637,500		637,500		637,500		
<b>3 Misellaneous Cost</b> (Equipment, Tax, etc.)													
+ 10 % of ( 1 + 2 )			173,850				127,900		141,400		83,700		
<b>Total</b>			1,912,350				1,406,900		1,555,400		920,700		
<b>C Cropping Intensity</b>		1	1,912,350			0.3	422,070	0.3	466,620	0.4	368,280		
<b>Ground Total</b>	3,169,320												

表 A-2-10-2 Annual Balance per Hectare Under Present Conditions at Kalembukaha

Description	Unit Price (Rp./ton)	Paddy				Palawija							
		Wet Season		Semi-wet Season		Groundnuts		Green Beans		Maize			
		Q	V	Q	V	Q	V	Q	V	Q	V		
<b>4 Yield Income</b>													
- Paddy	1,200,000	2.00	2,400,000										
- Groundnuts	2,500,000					0.24	600,000						
- Green Beans	5,000,000							0.18	900,000				
- Maize	800,000									0.70	563,200		
<b>Total Income</b>	4,463,200		2,400,000				600,000		900,000		563,200		
<b>B Net Income</b>	1,293,880												
<b>B/C</b>	0.41												

表 A-2-11-1 Annual Crop Production Cost per Hectare with Irrigation Conditions at Kalembukaha

No.	Description	Unit Price (Rp.)	Paddy				Palawija						
			Wet Season		Semi-wet Season		Groundnuts		Green Beans		Maize		
			Q	V	Q	V	Q	V	Q	V	Q	V	
1	<b>Farm Inputs</b>												
	(1) Seed (kg)												
	- Paddy	2,200	30	66,000	30	66,000							
	- Groundnuts	7,750					60	465,000					
	- Green Beans	7,000							30	210,000			
	- Maize	2,300									30	69,000	
	(2) Fertilizers (Kg)												
	- Urea	1,200	300	360,000	300	360,000	50	60,000	75	90,000	250	300,000	
	- TSP	1,950	100	195,000	100	195,000	100	195,000	100	195,000	100	195,000	
	- KcL	1,950	75	146,250	75	146,250	50	97,500	50	97,500	75	146,250	
	(3) Agro-Chemicals (Ltr)	59,000	4	236,000	4	236,000	2	118,000	2	118,000	2	118,000	
	<b>Sub-Total</b>			1,003,250		1,003,250		935,500		710,500		828,250	
2	<b>Labours Costs (day)</b>												
	(1) Man Power	12,500	102	1,275,000	108	1,350,000	48	600,000	46	575,000	45	562,500	
	(2) Draft Power	25,000	15	375,000	15	375,000	8	200,000	8	200,000	8	200,000	
	<b>Sub-Total</b>			1,650,000		1,725,000		800,000		775,000		762,500	
3	Miscellaneous Costs : (Equipment, Tax, etc.) = 20% of (1+2)			530,650		545,650		303,600		297,000		304,350	
4	Operation Cost Rp./ Hr.	1,864	hr	125,310	hr	75,082	hr	143,520	hr	136,270	hr	189,864	
	<b>TOTAL</b>			3,309,210		3,348,982		2,182,620		1,918,770		2,084,964	
C	<b>Cropping Intensity</b>		1.0	3,309,210	1.0	3,348,982	0.15	327,393	0.15	287,816	0.2	416,993	
	<b>GROUND TOTAL</b>			8,557,060									
								<b>O&amp;M Cost =</b>					
								280,334	+	866,667	=	1,147,000	
								<b>+ Replacement Cost</b>					

\* O&M Cost: All operation cost and replacement cost of the system.

表 A-2-11-2 Annual Balance per Hectare with Irrigation Conditions at Kalembukaha

No.	Description	Unit Price (Rp./ton)	Paddy				Palawija						
			Wet Season		Semi-wet Season		Groundnuts		Green Beans		Maize		
			Q	V	Q	V	Q	V	Q	V	Q	V	
5	<b>Yield Income</b>												
	- Paddy	1,200,000	5.50	6,600,000	6.00	7,200,000							
	- Groundnuts	2,500,000					0.23	562,500					
	- Green Beans	5,000,000							0.18	900,000			
	- Maize	800,000									0.90	720,000	
	<b>Total Income</b>	15,982,500		6,600,000		7,200,000		562,500		900,000		720,000	
B	<b>Net Income</b>	7,425,440											
	<b>B/C</b>	0.87											
	<b>O&amp;M/Net Income (%)</b>	15.45											

表 A-2-12-1 Annual Crop Production Cost per Hectare with Irrigation Conditions at Kalembukaha (Third Year)

No.	Description	Unit Price (Rp.)	Paddy				Palawija						
			Wet Season		Semi-wet Season		Groundnuts		Green Beans		Maize		
			Q	V	Q	V	Q	V	Q	V	Q	V	
1	<b>Farm Inputs</b>												
	(1) Seed (kg)												
	- Paddy	2,200	32.5	71,500	32.5	71,500							
	- Groundnuts	7,750					62.5	484,375					
	- Green Beans	7,000							32.5	227,500			
	- Maize	2,300									32.5	74,750	
	(2) Fertilizers (Kg)												
	- Urea	1,200	200	240,000	200	240,000	37.5	45,000	62.5	75,000	150	180,000	
	- TSP	1,950	80	156,000	80	156,000	62.5	121,875	75	146,250	50	97,500	
	- KcL	1,950	57.5	112,125	57.5	112,125	25	48,750	25	48,750	37.5	73,125	
	(3) Agro-Chemicals (Ltr)	59,000	2.5	147,500	2.5	147,500	1.5	88,500	1.5	88,500	1.5	88,500	
	<b>Sub-Total</b>			727,125		727,125		788,500		586,000		513,875	
2	<b>Labours Costs (day)</b>												
	(1) Man Power	12,500	92.5	1,156,250	54.0	675,000	41.5	518,750	40.5	506,250	40.0	500,000	
	(2) Draft Power	25,000	12.5	312,500	7.5	187,500	8.0	200,000	8.0	200,000	8.0	200,000	
	<b>Sub-Total</b>			1,468,750		862,500		718,750		706,250		700,000	
3	Miscellaneous Costs : (Equipment, Tax, etc.) = 20% of (1+2)			530,650		545,650		303,600		297,000		304,350	
4	Operation Cost Rp./ Hr.	1,864	hr	125,310	hr	75,082	hr	143,520	hr	136,270	hr	189,864	
	<b>TOTAL</b>			2,851,835		2,210,357		1,954,370		1,725,520		1,708,089	
	<b>Cropping Intensity</b>		1.00	2,851,835	0.50	1,105,179	0.23	449,505	0.23	396,870	0.30	512,427	
	<b>GROUND TOTAL</b>			6,182,482				O&M Cost = Operation Cost 284,162 + + Replacement Cost 866,667 = 1,150,829					

\* O&M Cost: All operation cost and replacement cost of the system.

表 A-2-12-2 Annual Balance per Hectre with Irrigation Conditions at Kalembukaha (Third Year)

No.	Description	Unit Price (Rp./ton)	Paddy				Palawija						
			Wet Season		Semi-wet Season		Groundnuts		Green Beans		Maize		
			Q	V	Q	V	Q	V	Q	V	Q	V	
5	<b>Yield Income</b>												
	- Paddy	1,200,000	3.75	4,500,000	2.06	2,475,000							
	- Groundnuts	2,500,000					0.26	661,250					
	- Green Beans	5,000,000							0.21	1,035,000			
	- Maize	800,000									0.94	751,200	
	<b>Total Income</b>	9,422,450		4,500,000		2,475,000		661,250		1,035,000		751,200	
B	<b>Net Income</b>	3,239,968											
	<b>B/C</b>	0.52											
	<b>O&amp;M/Net Income (%)</b>	35.52											

表 A-2-13-1 Annual Production Cost per Hectare Under Present Conditions at Nawangkewa

Description	Unit Price (Rp.)	Paddy				Palawija							
		Wet Season		Semi-wet Season		Groundnuts		Green Beans		Maize			
		Q	V	Q	V	Q	V	Q	V	Q	V		
<b>1 Farm Inputs</b>													
(1) Seed (kg)													
- Paddy	2,200												
- Groundnuts	7,750					65	503,750						
- Green Beans	7,000							35	245,000				
- Maize	2,300									35	80,500		
(2) Fertilazers (Kg)													
- Urea	1,200					35	30,000	150	180,000	50	60,000		
- TSP	1,950					20	48,750	150	292,500	0	0		
- KCL	1,950					0	0	0	0	0	0		
(3) Agro - Chemical (Ltr)													
- Insecticide	59,000					1	59,000	1	59,000	1	59,000		
<b>Sub - Total</b>							641,500		776,500		199,500		
<b>2 Labour (day)</b>													
(1) Man Power	12,500					35	437,500	35	437,500	35	437,500		
(2) Draft Power	25,000					8	200,000	8	200,000	8	200,000		
<b>Sub - Total</b>							637,500		637,500		637,500		
<b>3 Misellaneous Cost</b> (Equipment, Tax, etc.)													
+ 10% of ( 1 + 2 )							127,900		141,400		83,700		
<b>Total</b>							1,406,900		1,555,400		920,700		
<b>C Cropping Intensity</b>						0.3	422,070	0.3	466,620	0.4	368,280		
<b>Ground Total</b>	1,256,970												

表 A-2-13-2 Annual Balance per Hectare Under Present Conditions at Nawangkewa

Description	Unit Price (Rp./ton)	Paddy				Palawija							
		Wet Season		Semi-wet Season		Groundnuts		Green Beans		Maize			
		Q	V	Q	V	Q	V	Q	V	Q	V		
<b>4 Yield Income</b>													
- Paddy	1,200,000												
- Groundnuts	4,100,000					0.18	738,000						
- Green Beans	2,000,000							0.30	600,000				
- Maize	1,000,000									0.80	800,000		
<b>Total Income</b>	2,138,000						738,000		600,000		800,000		
<b>B Net Income</b>	881,030												
<b>B/C</b>	0.70												

表 A-2-14-1 Annual Crop Production Cost per Hectare with Irrigation Conditions at Nawangkewa

No.	Description	Unit Price (Rp.)	Paddy				Palawija							
			Wet Season		Semi-wet Season		Groundnuts		Green Beans		Maize			
			Q	V	Q	V	Q	V	Q	V	Q	V		
1	<b>Farm Inputs</b>													
	(1) Seed (kg)													
	- Paddy	2,200												
	- Groundnuts	7,750				60	465,000							
	- Green Beans	7,000						30	210,000					
	- Maize	2,300								30	69,000			
	(2) Fertilizers (Kg)													
	- Urea	1,200				50	60,000	75	90,000	250	300,000			
	- TSP	1,950				100	195,000	100	195,000	100	195,000			
	- KcL	1,950				50	97,500	50	97,500	75	146,250			
	(3) Agro-Chemicals (Ltr)	59,000				2	118,000	2	118,000	2	118,000			
	<b>Sub-Total</b>						935,500		710,500		828,250			
2	<b>Labours Costs (day)</b>													
	(1) Man Power	12,500				48	600,000	46	575,000	45	562,500			
	(2) Draft Power	25,000				8	200,000	8	200,000	8	200,000			
	<b>Sub-Total</b>						800,000		775,000		762,500			
3	<b>Miscellaneous Costs :</b> (Equipment, Tax, etc.) = 20% of (1+2)						303,600		297,000		304,350			
4	Operation Cost Rp./ Hr.	668				hr	85	57,097	hr	77	51,124	hr	110	73,531
	<b>TOTAL</b>						2,096,197		1,833,624		1,968,631			
	<b>Cropping Intensity</b>						0.6	1,257,718	0.6	1,100,174	0.8	1,574,904		
	<b>GROUND TOTAL</b>		4,666,130											
							<b>O&amp;M Cost =</b>							
							123,757	+	733,333	=	857,090			
							<b>+ Replacement Cost</b>							

\* O&M Cost: All operation cost and replacement cost of the system.

表 A-2-14-2 Annual Balance per Hectare with Irrigation Conditions at Nawangkewa

No.	Description	Unit Price (Rp./ton)	Paddy				Palawija						
			Wet Season		Semi-wet Season		Groundnuts		Green Beans		Maize		
			Q	V	Q	V	Q	V	Q	V	Q	V	
5	<b>Yield Income</b>												
	- Paddy	1,200,000											
	- Groundnuts	4,100,000				0.90	3,690,000						
	- Green Beans	2,000,000						0.72	1,440,000				
	- Maize	1,000,000								3.60	3,600,000		
	<b>Total Income</b>	8,730,000					3,690,000		1,440,000		3,600,000		
B	<b>Net Income</b>	4,063,870											
	<b>B/C</b>	0.87											
	<b>O&amp;M/Net Income (%)</b>	21.09											

表 A-2-15-1 Annual Crop Production Cost per Hectare with Irrigation Conditions at Nawangkewa (Third Year)

No.	Description	Unit Price (Rp.)	Paddy				Palawija						
			Wet Season		Semi-wet Season		Groundnuts		Green Beans		Maize		
			Q	V	Q	V	Q	V	Q	V	Q	V	
1	<b>Farm Inputs</b>												
	(1) Seed (kg)												
	- Paddy	2,200											
	- Groundnuts	0				62.5	0						
	- Green Beans	7,000						32.5	227,500				
	- Maize	2,300								32.5	74,750		
	(2) Fertilizers (Kg)												
	- Urea	1,200				42.5	51,000	113	135,000	150	180,000		
	- TSP	1,950				60	117,000	125	243,750	50	97,500		
	- KcL	1,950				25	48,750	25	48,750	37.5	73,125		
	(3) Agro-Chemicals (Ltr)	59,000				1.5	88,500	1.5	88,500	1.5	88,500		
	<b>Sub-Total</b>						305,250		743,500		513,875		
2	<b>Labours Costs (day)</b>												
	(1) Man Power	12,500				41.5	518,750	40.5	506,250	40.0	500,000		
	(2) Draft Power	25,000				8.0	200,000	8.0	200,000	8.0	200,000		
	<b>Sub-Total</b>						718,750		706,250		700,000		
3	Miscellaneous Costs : (Equipment, Tax, etc.) = 20% of (1+2)						303,600		297,000		304,350		
4	Operation Cost Rp./ Hr.	668				hr	85	57,097	hr	77	51,124	hr	110
	<b>TOTAL</b>						1,384,697		1,797,874		1,591,756		
	<b>Cropping Intensity</b>						0.45	623,114	0.45	809,043	0.60	955,053	
	<b>GROUND TOTAL</b>			3,120,543			<b>O&amp;M Cost =</b> <b>Operation Cost</b> 92,818 + <b>733,333</b> = <b>826,151</b> <b>+ Replacement Cost</b>						

\* O&M Cost: All operation cost and replacement cost of the system.

表 A-2-15-2 Annual Balance per Hectre with Irrigation Conditions at Nawangkewa (Third Year)

No.	Description	Unit Price (Rp./ton)	Paddy				Palawija						
			Wet Season		Semi-wet Season		Groundnuts		Green Beans		Maize		
			Q	V	Q	V	Q	V	Q	V	Q	V	
5	<b>Yield Income</b>												
	- Paddy	1,200,000											
	- Groundnuts	4,100,000				0.47	1,937,250						
	- Green Beans	2,000,000						0.50	990,000				
	- Maize	1,000,000								1.95	1,950,000		
	<b>Total Income</b>	4,877,250					1,937,250		990,000		1,950,000		
<b>B</b>	<b>Net Income</b>	1,756,707											
	<b>B/C</b>	0.56											
	<b>O&amp;M/Net Income (%)</b>	47.03											



表 A-3 運営維持管理費 (1ha 当)

サイト	計画揚水量 (l/sec)	ポンプの揚程 (m)	エンジン出力 (ps)	燃費 (l/hr)	時間当運転費 (Rp/hr)	1ha に 10mm 灌漑する場合	
						運転時間 (hr)	運転費 (Rp)
ボンゴ I	30	23	13.5	2.60	1,731	0.9	1,558
ボンゴ III	30	32	20.0	3.86	2,489	0.9	2,240
ラノメト	24	18	8.5	1.84	1,315	1.2	1,578
カレンブカハ	12	61	13.5	2.60	1,864	2.3	4,287
ナワンゲワ	11	14	3.3	0.72	668	2.8	1,870
	作付率 (%)	年間運転時間 (hr)	年間運転費 (千 Rp)	年間更新費 (千 Rp)	年間維持管理費 (千 Rp)	年間収益 (千 Rp)	維持管理費/収益 (%)
ボンゴ I	250	111	193	352	545	8,160	6.7
ボンゴ III	250	111	277	384	661	8,044	8.2
ラノメト	250	87	114	417	531	8,568	6.2
カレンブカハ	250	150	280	867	1,147	7,425	15.5
ナワンゲワ	200	185	124	733	857	4,064	21.1

註) 収益の算定は、1-3-2 の(2)を参照

運転時間は、灌漑計画・用水計算より算出

収益は、収入から生産費（労賃を含む）を差し引いた額

解説

- カレンブカハの運転費が高いのは、地下水の静水位が低くポンプの揚程が大きくなったため。
- ナワンゲワの収益が低いのは、畑作地帯でありしかも作付け率が他のサイトと比べ小さいため。  
(類似地区：マゲパンダ、パラカヘンビ、トトマラ)
- カレンブカハとナワンゲワの更新費が高いのは、受益面積が小さいため。  
(類似地区：ラプル、マゲパンダ、パラカヘンビ、トトマラ)

表 A-4 運営維持管理費（供用開始3年目、1ha当）

サイト	計画揚水量 (l/sec)	ポンプの揚程 (m)	エンジン出力 (ps)	燃費 (l/hr)	時間当 運転費 (Rp/hr)	1haに10mm灌漑する場合	
						運転時間 (hr)	運転費 (Rp)
ボンゴ I	30	23	13.5	2.60	1,731	0.9	1,558
ボンゴ III	30	32	20.0	3.86	2,489	0.9	2,240
ラノメト	24	18	8.5	1.84	1,315	1.2	1,578
カレンブカハ	12	61	13.5	2.60	1,864	2.3	4,287
ナワンゲワ	11	14	3.3	0.72	668	2.8	1,870
	作付率 (%)	年間運 転時間 (hr)	年間運 転費 (千Rp)	年間 更新費 (千Rp)	年間維持 管理費 (千Rp)	年間 収益 (千Rp)	維持管理 費/収益 (%)
ボンゴ I	225	99	171	352	523	4,820	10.9
ボンゴ III	225	99	246	384	630	4,714	13.4
ラノメト	175	62	81	417	498	3,899	12.8
カレンブカハ	225	152	284	867	1,150	3,240	35.5
ナワンゲワ	150	139	93	733	826	1,757	47.0

註) 収益の算定は、1-3-2の(2)を参照

運転時間は、灌漑計画・用水計算より算出

収益は、収入から生産費（労賃を含む）を差し引いた

## 10. PCM ワークショップ

本調査ではコタモバグ（北スラウェシ）において4月16、17日の2日間、PCMワークショップを開催した。ワークショップの主な目的は、地下水灌漑設備の整備と水管理組合の設立により農民が従来の方法と異なる水管理及び営農方法を導入する際に、どのような問題点が発生しうるか、またこの解決策としてどのような方策が考えられるかを検討するための情報を参加型により収集することである。このため、プロジェクト形成を目的とした通常のワークショップとは異なり、参加者の構成、ワークショップの構成などについて応用的な活用を行った。したがって、本来の意味でのPCMではないが、持続可能な地下水灌漑開発計画の策定及び適正な地下水灌漑施設の設計という本調査の目的に即してPCM手法を最も効果的な形で応用した。なお、インドネシアの地理・文化的な多様性を考えれば、ワークショップをすべての地域において実施することが望ましいが、調査の時間的制約から北スラウェシにおいてのみ実施した。

### (1) 参加者

管理組合が設立された後に発生しうる問題の検討を行うため、本計画の対象サイトに近い地域における、地下水灌漑農業を行っている既存の水利組合3ヵ所を対象とし、その組合員を主な参加者とした。これら既存の組合の概要は以下のとおりである。

ワークショップに参加した水利組合の概要

組合名	所在地	設立年	組合員数	灌漑面積・ブロック数	補足
KATEES	Torian, Kakas, Minahasa	1996	43	36ha, 18 blocks	現地住民
TWB15	Bolaamong Gongdow	1997	21	25ha, 12 blocks	バリからの移民
TWG30	Bongo I, Golontaro	1997	24	30ha, 15 blocks	ジャワからの移民

これに加え、本計画の対象サイト4地域の農民代表、現地の地下水開発事務所職員の参加も得た。北スラウェシ灌漑プロジェクト事務所およびジャカルタの公共事業省からの参加も得たが、彼らにはオブザーバー兼、ワークショップ運営支援（技術的な議論での通訳補助など）の役割をお願いし、実質的には農民主体のワークショップとした。

### (2) ワークショップの構成

上記のような、本ワークショップの性格から、問題分析にほとんどの時間を割き、そのなかで必要な情報の収集ができるような方法を取った。2日間のワークショップの構成は以下のとおりである。

- 1) 各組合からの基本情報（場所、組合員数、灌漑面積、主要な作物など）の紹介
- 2) サンプル組合の農民の農業活動（地下水灌漑農業）における問題分析
- 3) 上記の問題群のうち、水管理に関連する問題のより詳細な検討
- 4) 水管理に関連する問題のうち、重要と思われる問題の解決策の検討

### (3) ワークショップの結果

ワークショップにおいては、農民の忌憚りの無い意見が交換された。その結果作成された問題系図は添付の通りである。中心問題は「農家の収支バランスがとれない」ということであり、この直接原因として、「生産量が十分でない」「生産コストが高い」「マーケティングの問題(生産物価格の変動が大きい)」の3つが挙げられた。

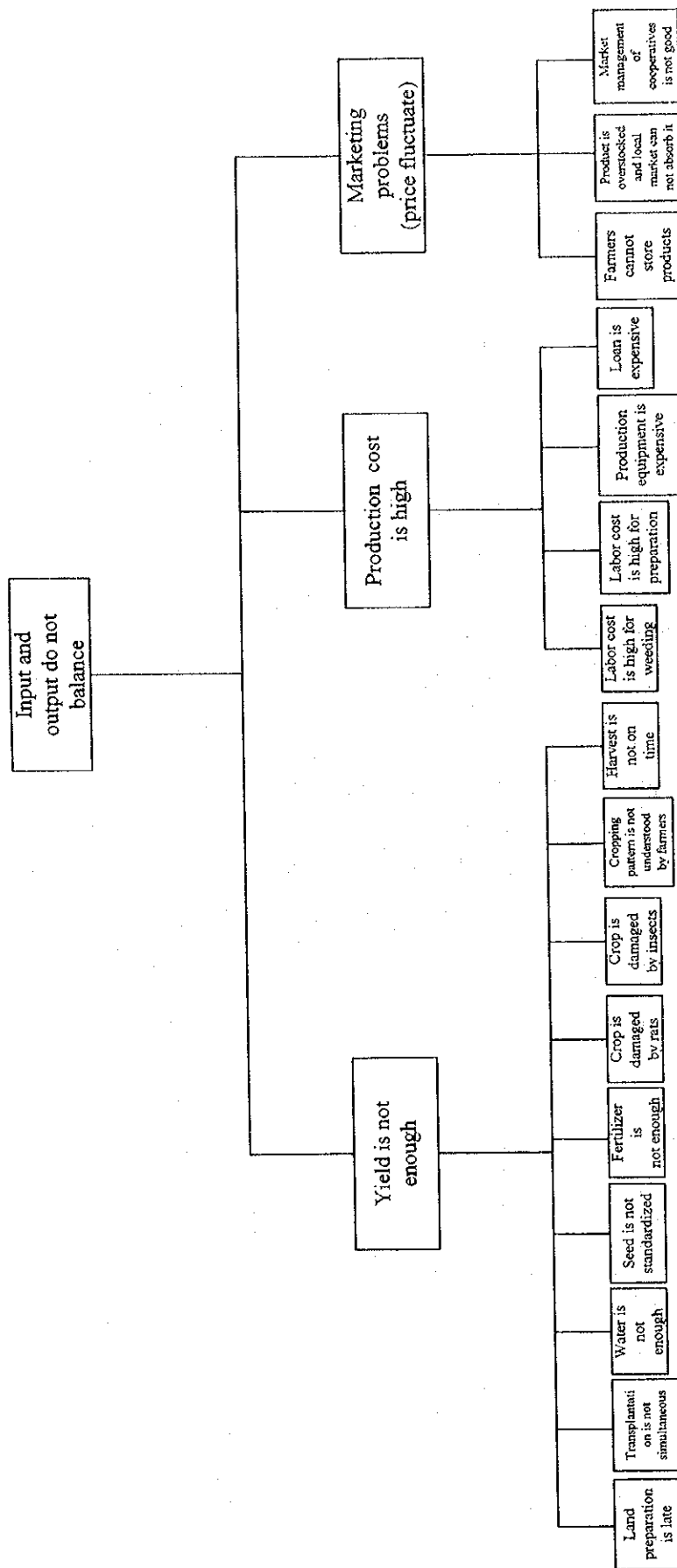
また、組合が設立された当初に直面した営農に関する問題については、以下のものがあった。

- a) 資金の不足
- b) 農業投入材の不足
- c) 新規に導入された栽培方法に見合った農業機械の不足
- d) 新たに拡大した耕地に見合う労働力の不足
- e) 運輸手段の不足
- f) 生産の増加による価格の下落
- g) 技術的指導に対する不満(技術的指導が口頭によるものが主で、もっと展示効果のあるやり方をして欲しい)

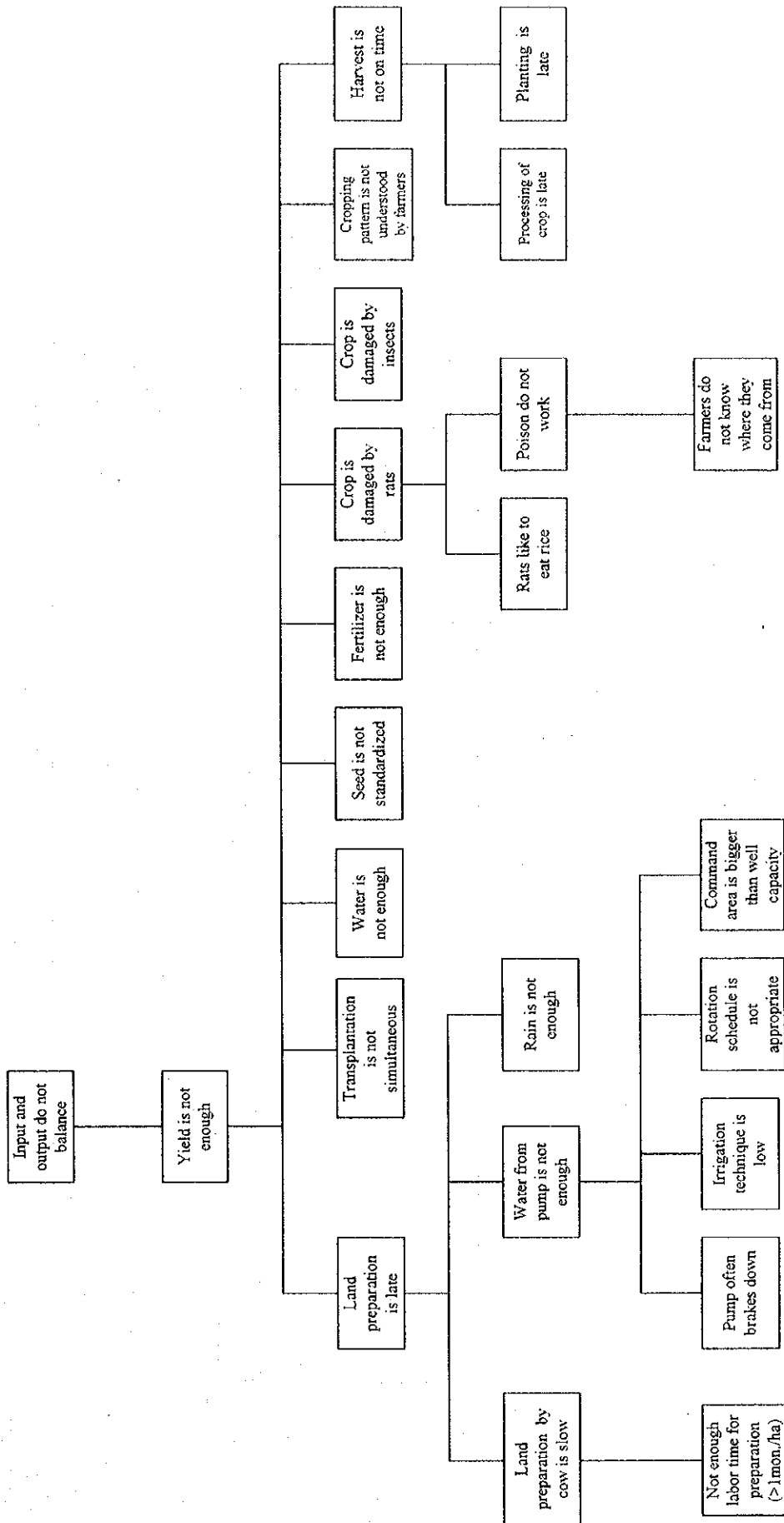
問題分析の後半において、水管理に関する問題に焦点を当てて議論を行った。ここで焦点をあてた問題は、一義的には耕地での水量の不足の問題である。これには水源からの水供給が不足しているという根元の問題と、その先の末端的な問題の二つに分けられる。前者は井戸及びポンプの能力、オペレーション(ポンプの燃料不足の問題を含む)の問題であり、後者はボックスの位置の問題があることが分かった。その結果、地下水資源の状況、裨益面積、作付け体系、土質、地形等を考慮し、可能な限りゆとりのある水源・ポンプの設計とする必要がある。また、各サイトの地理・土壌・営農条件を十分に考慮した配水設計とし、配水ボックスの配置を工夫する。

また、水利組合運営について、組合の支出に見合った適正な水料金の徴収等について種々の問題が議論された。その結果、水利費の設定は、各サイト状況に合わせて様々であってよいが、組合の運営とも関連して、水使用料が何に使われるのかメンバー農民に分かるように設定する必要性が感じられた。例えば燃料代を個人負担とするのであれば水使用料が何をカバーするのかを明確にする必要がある。

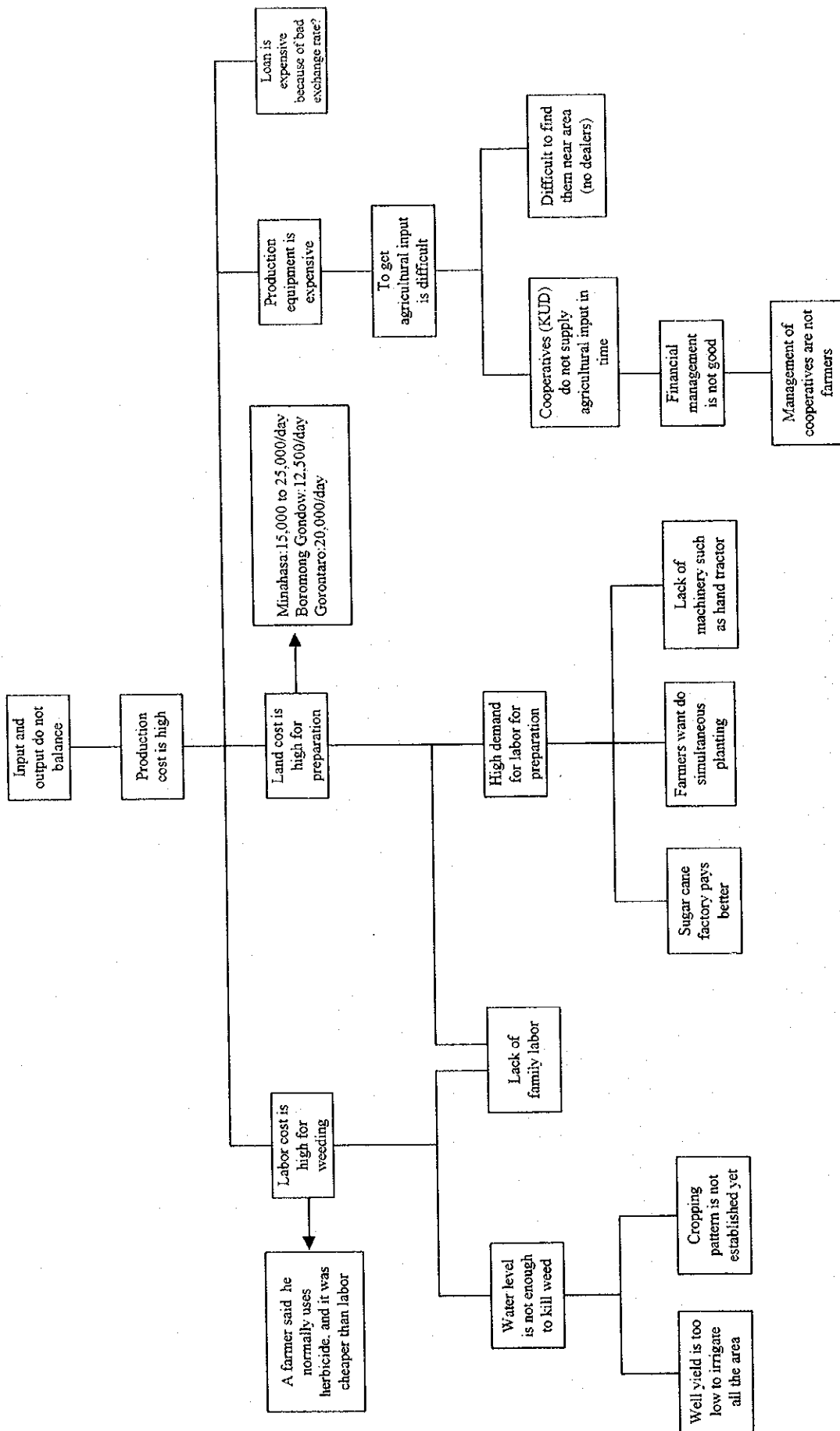
# Problems Tree (1) : Overall Framework of the Problems



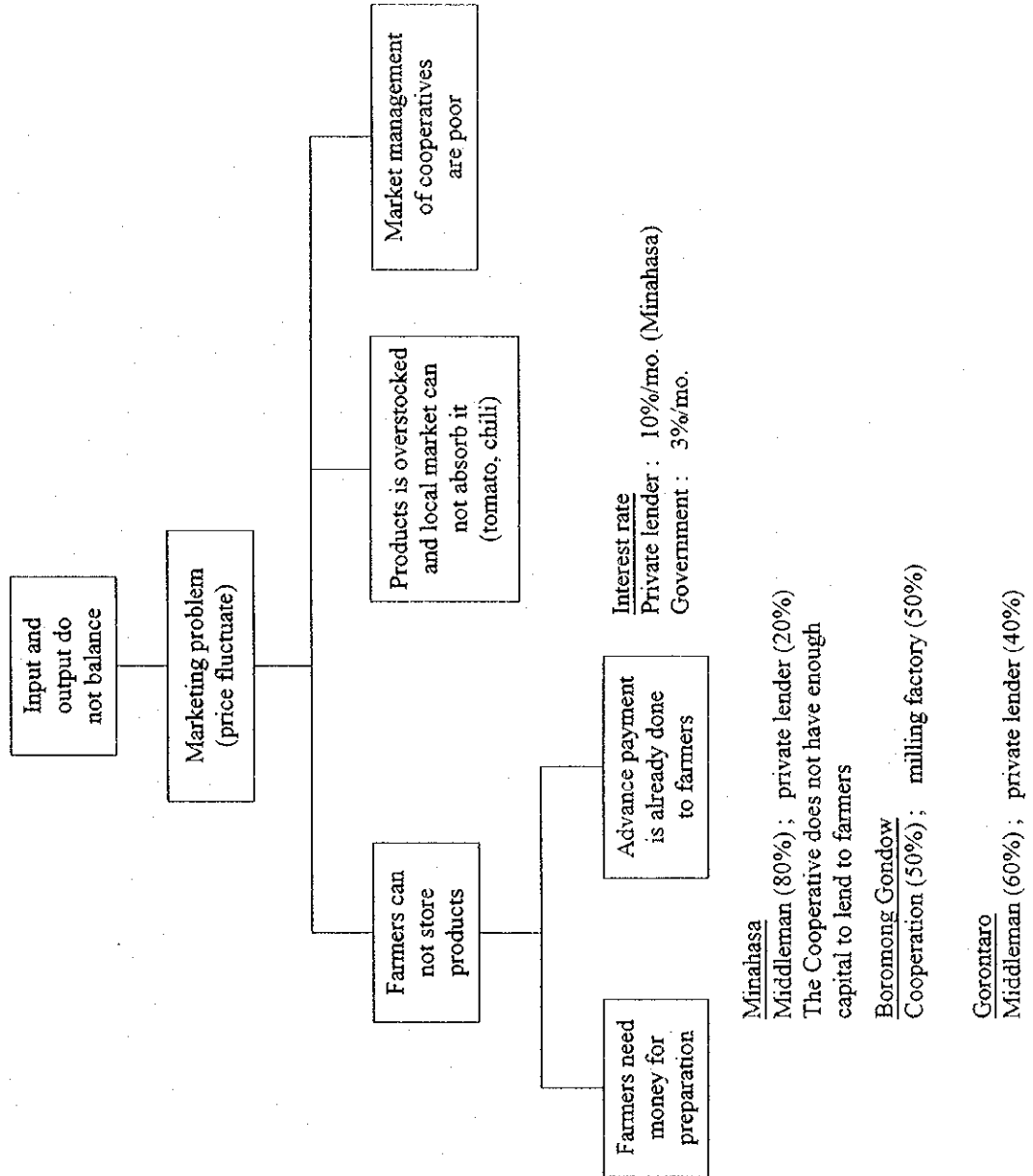
## Problems Tree (2) : Problems Relevant to Production



### Problems Tree (3) : Problems Relevant to Production Cost

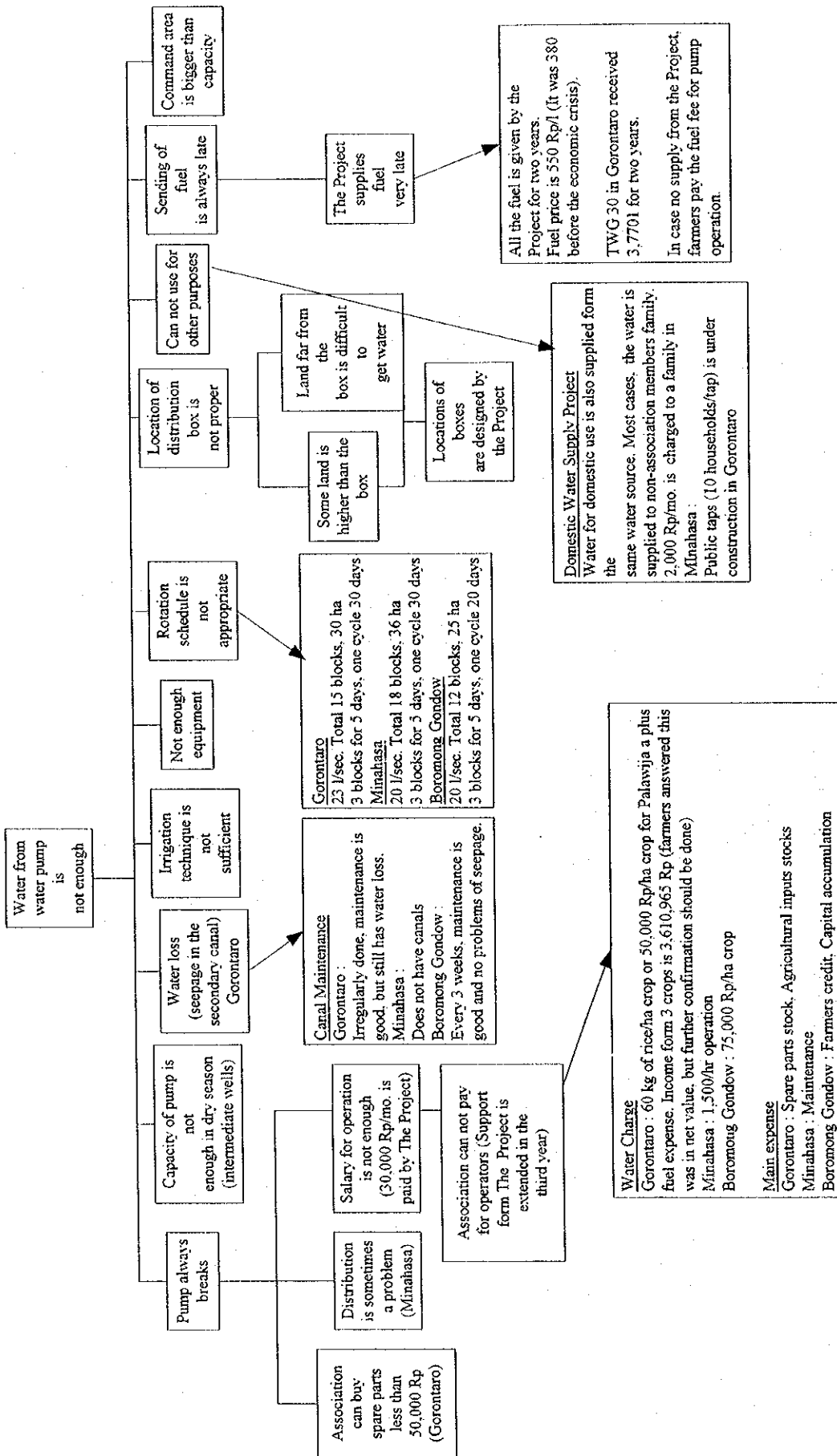


**Problems Tree (4) : Problems Relevant to Marketing**





**Problems Tree (5) :**  
**Problems Tree on Focused Issues : Water Supply and Management**  
 (under the problem of "Yield is not enough")



All the fuel is given by the Project for two years.  
 Fuel price is 550 Rp/l (It was 380 before the economic crisis).  
 TWG 30 in Gorontalo received 3,7701 for two years.  
 In case no supply from the Project, farmers pay the fuel fee for pump operation.





Domestic Water Supply Project  
 the Water for domestic use is also supplied from the same water source. Most cases, the water is supplied to non-association members family.  
 2,000 Rp/mo. is charged to a family in Minahasa :  
 Public taps (10 households/tap) is under construction in Gorontalo

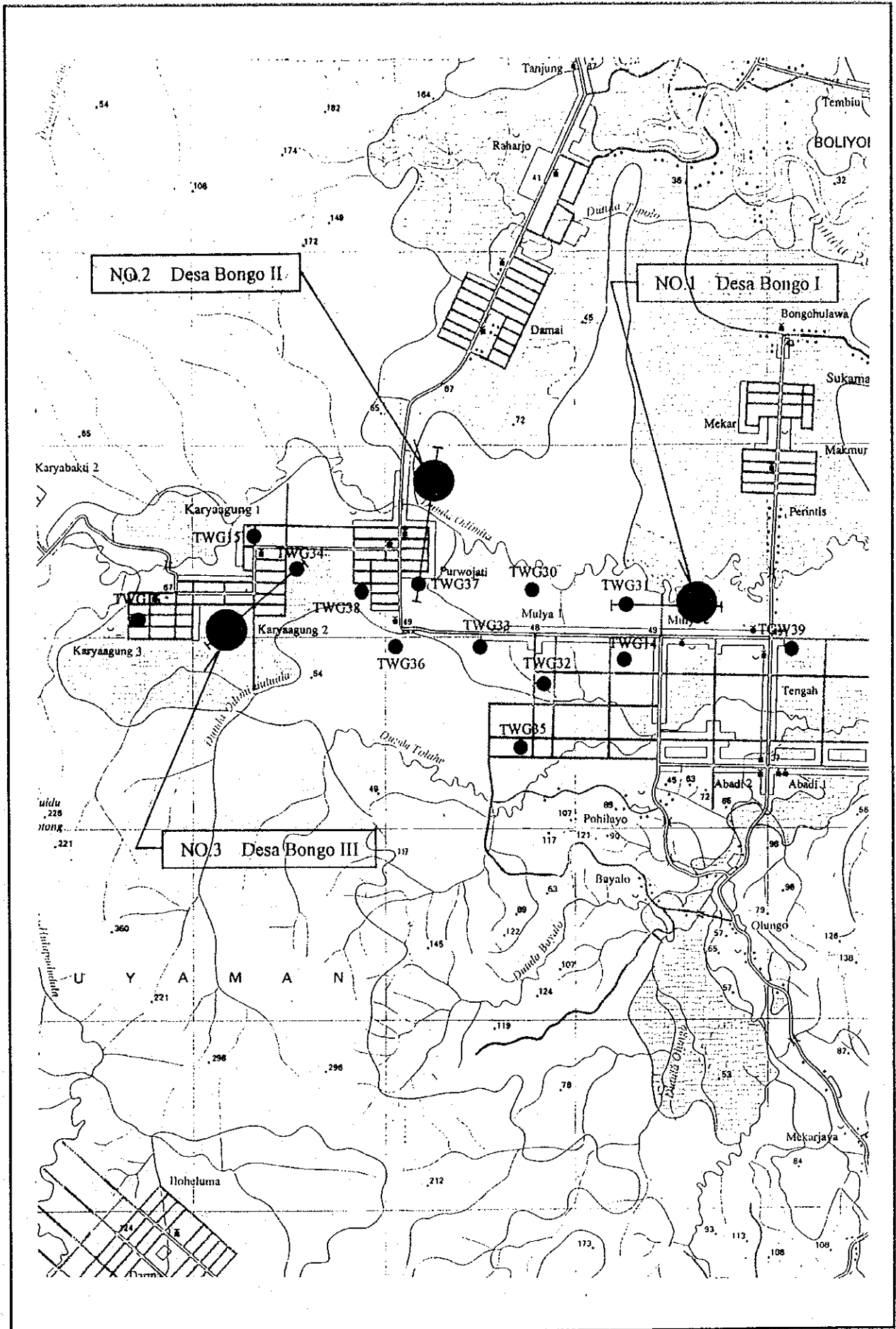
**Water Charge**  
 Gorontalo : 60 kg of rice/ha crop or 50,000 Rp/ha crop for Palawija a plus fuel expense. Income form 3 crops is 3,610,965 Rp (farmers answered this was in net value, but further confirmation should be done)  
 Minahasa : 1,500/hr operation  
 Boromong Gondow : 75,000 Rp/ha crop

**Main expense**  
 Gorontalo : Spare parts stock, Agricultural inputs stocks  
 Minahasa : Maintenance  
 Boromong Gondow : Farmers credit, Capital accumulation

## 11. 詳細位置図

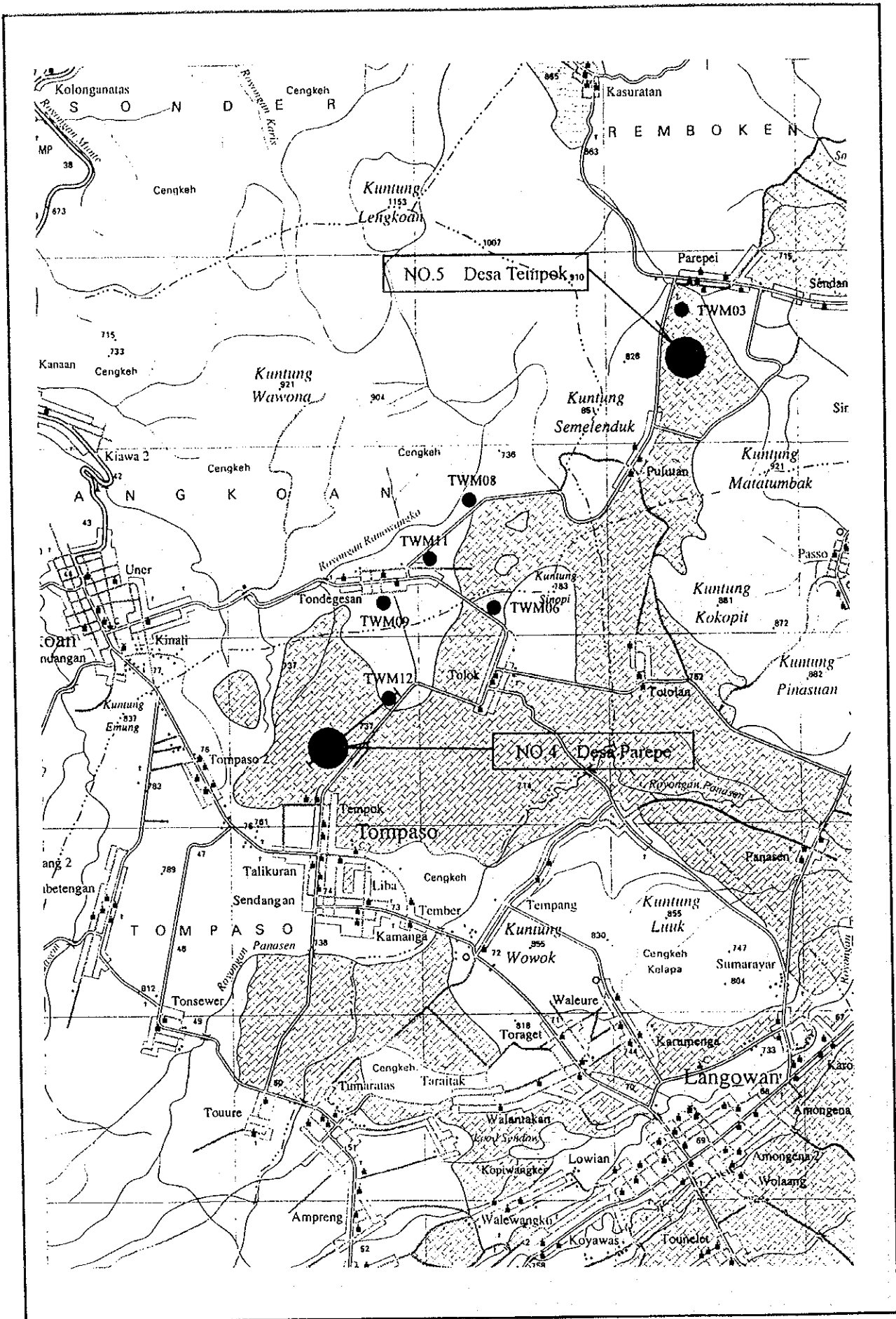
## Location Map

<u>Legend</u>	
	Proposed Project Site
	Existing Well
	Existing Well (for Pumping Test)
	Geo-electric Survey



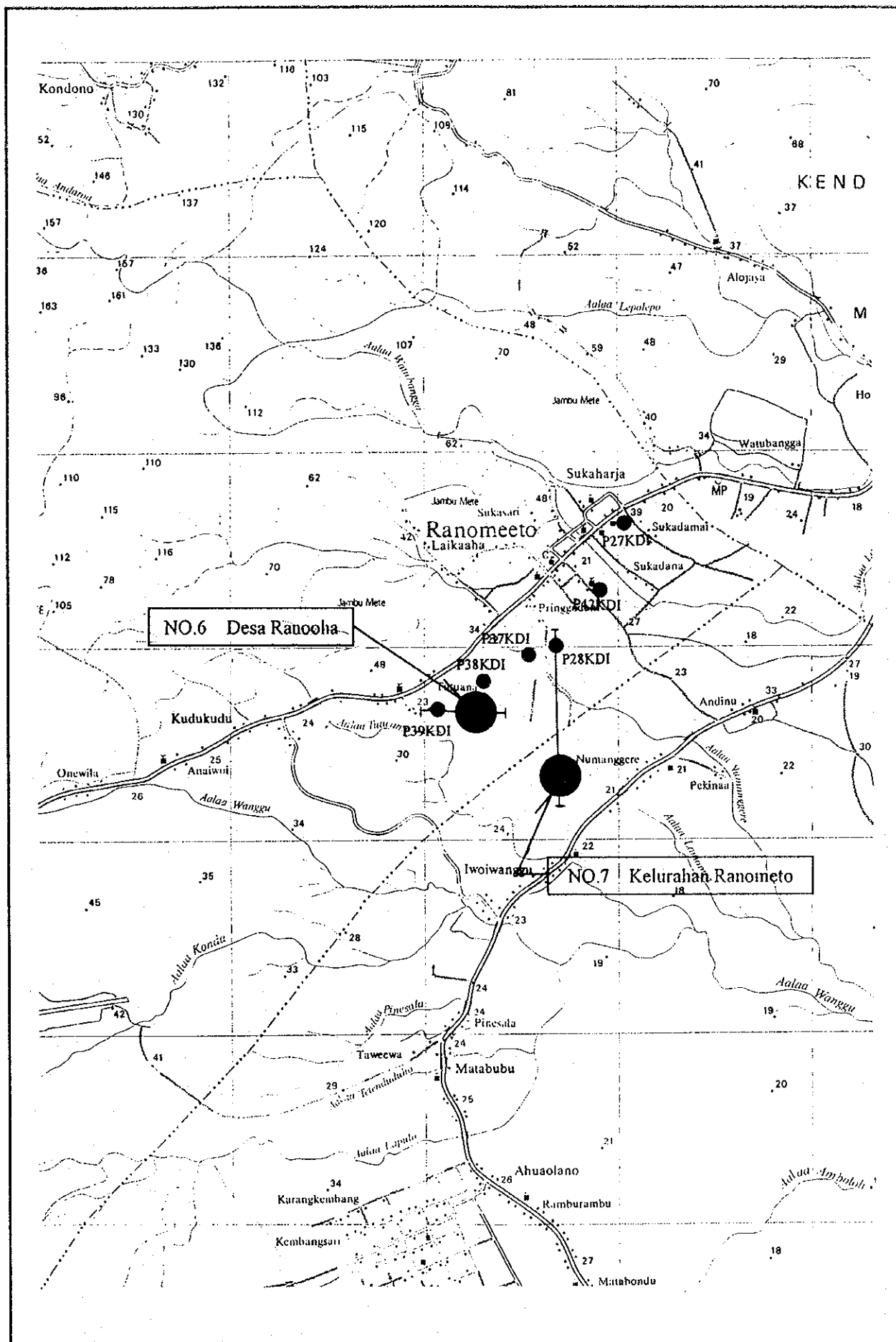
**Location Map (1/12)**

Scale = 1/50,000



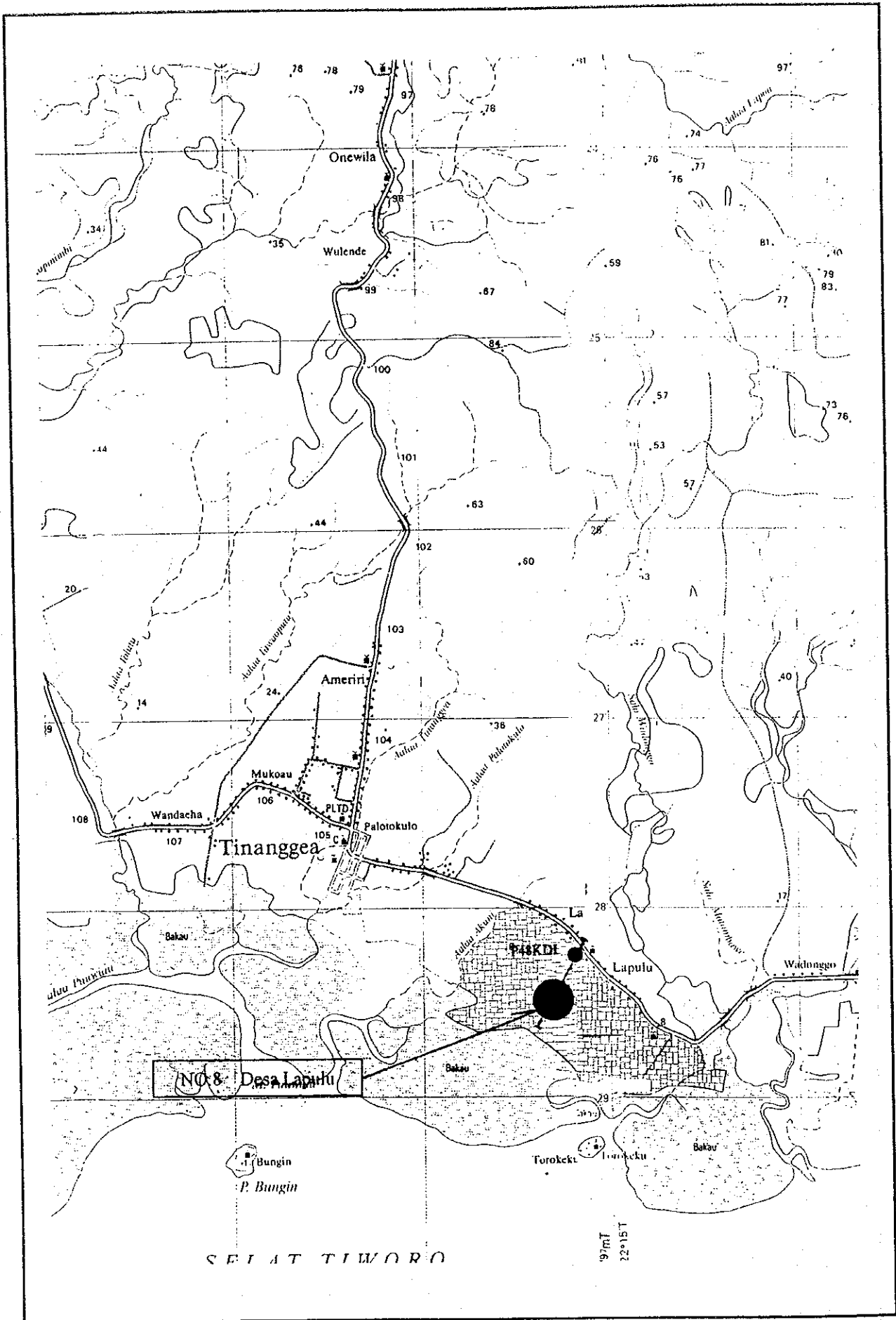
Location Map (2/12)

Scale = 1/50,000



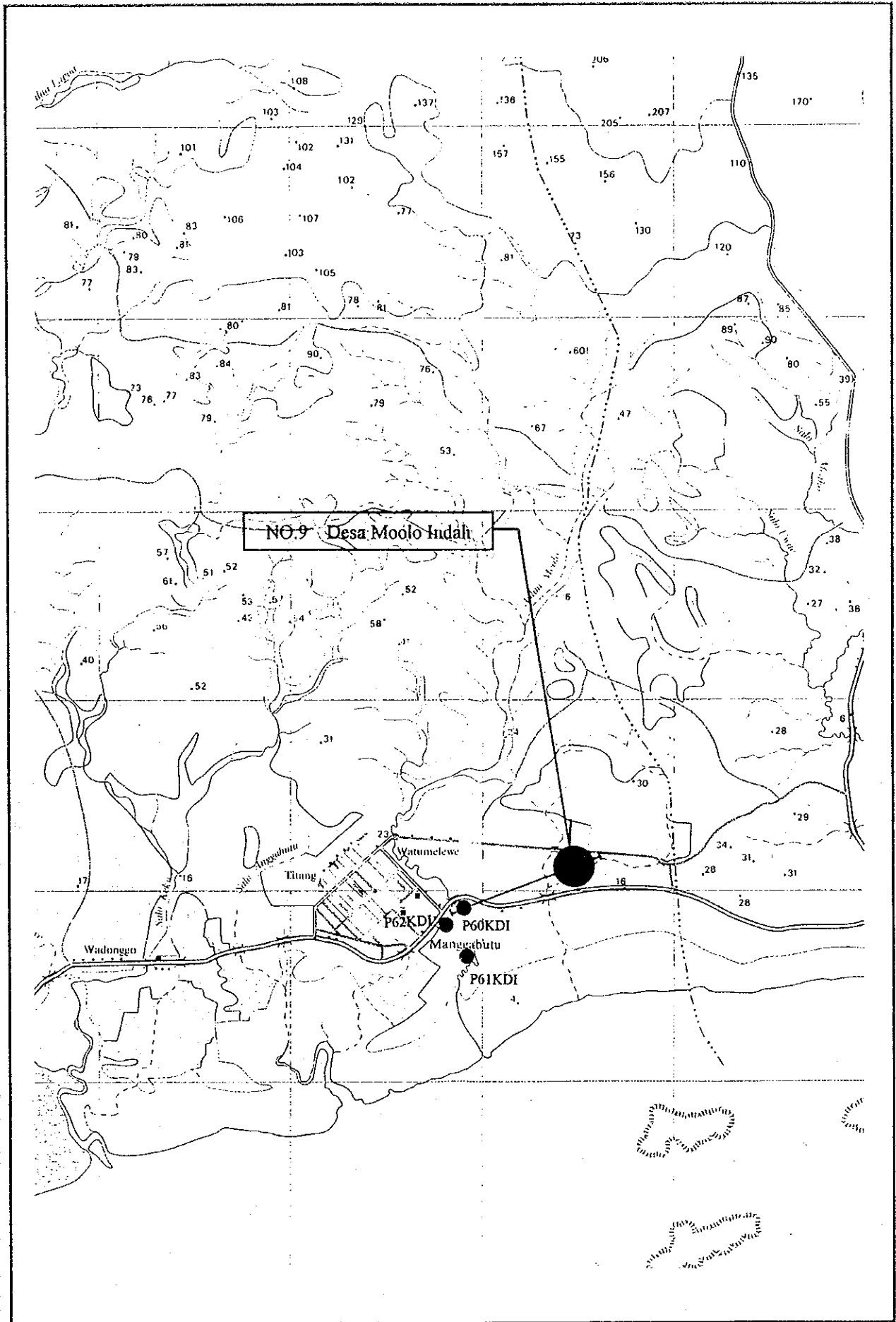
**Location Map (3/12)**

Scale = 1/50,000



Location Map (4/12)

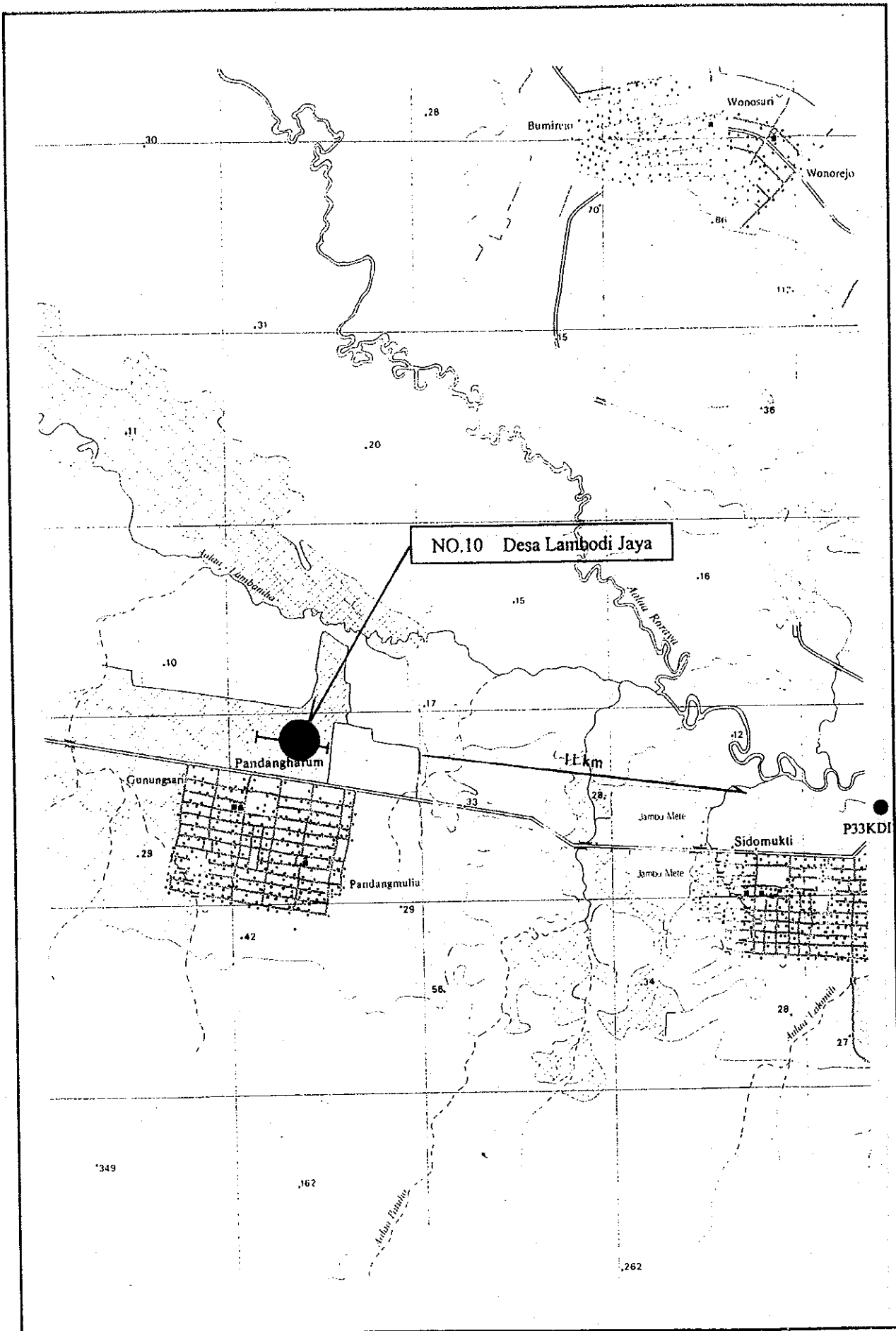
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**Location Map (5/12)**

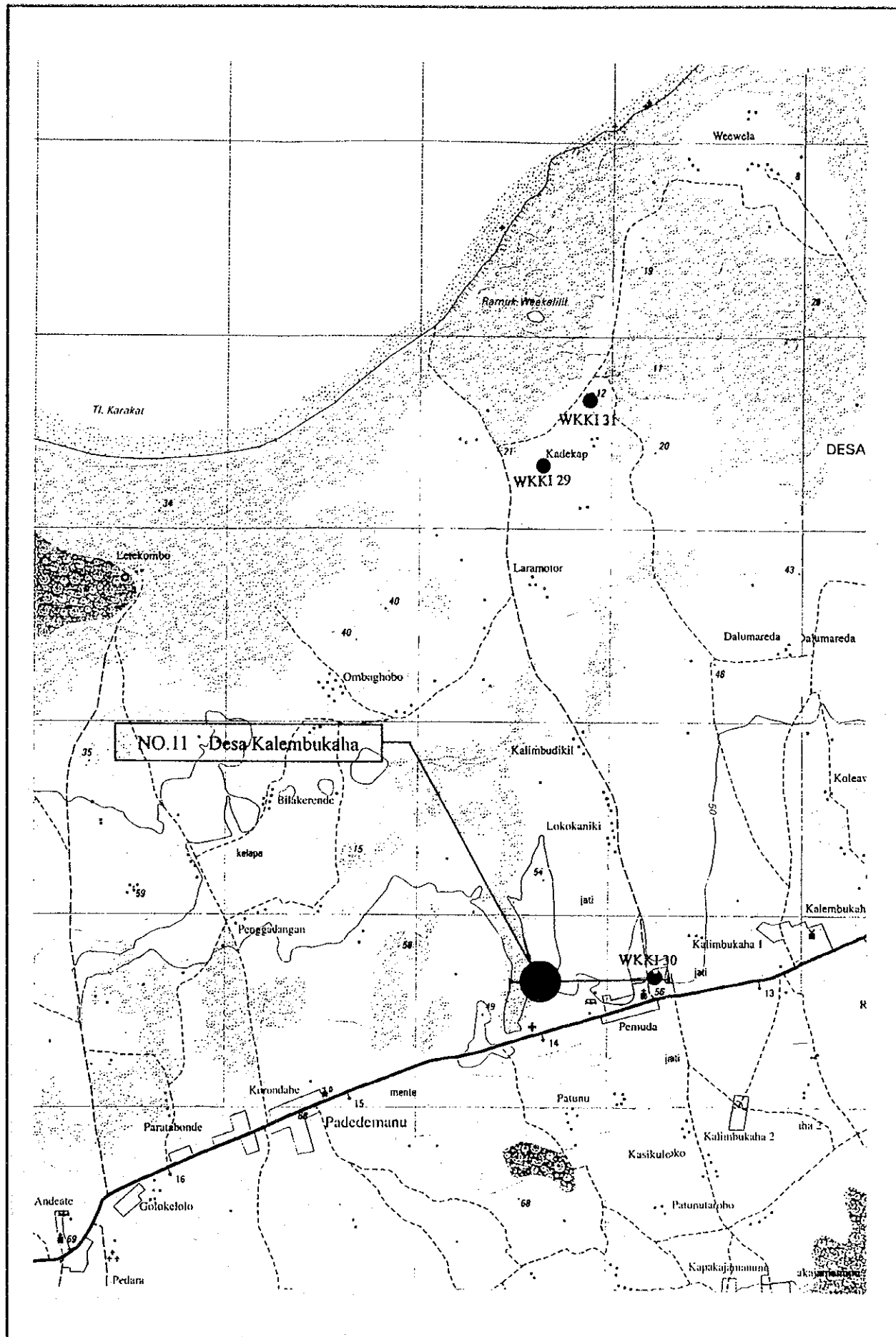
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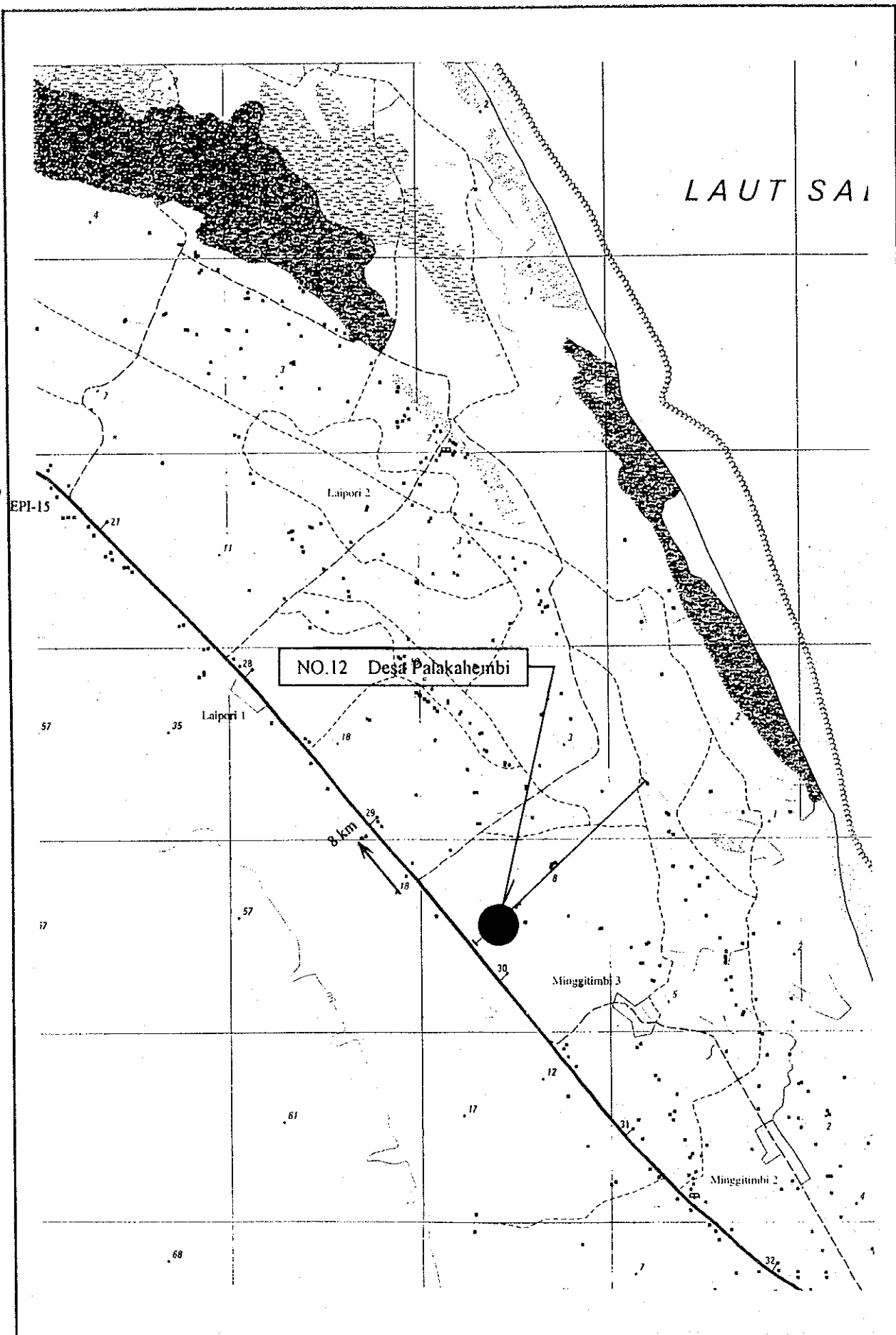
**Location Map (6/12)**

Scale = 1/50,000



**Location Map (7/12)**

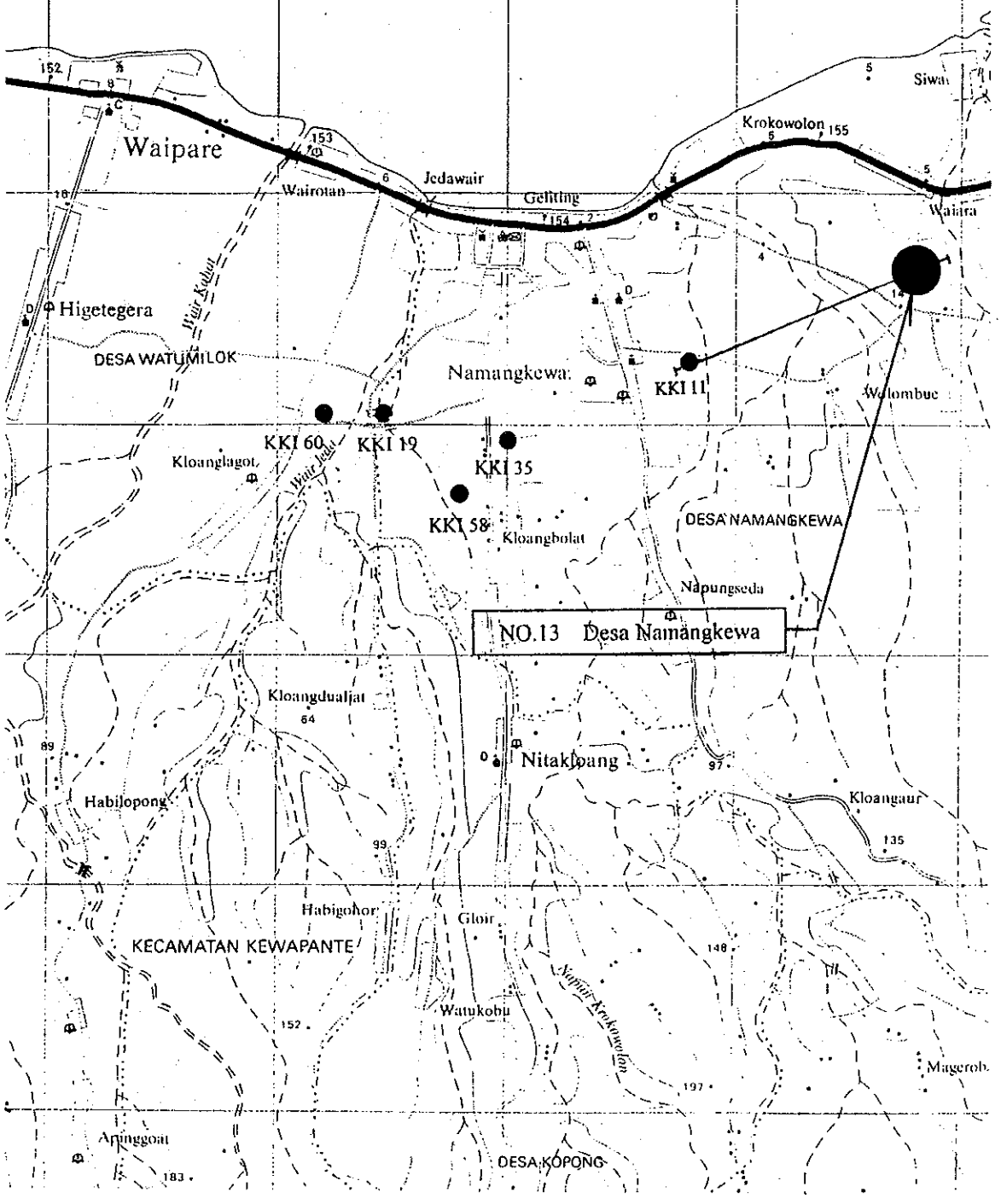
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**Location Map (8/12)**

Scale = 1/25,000

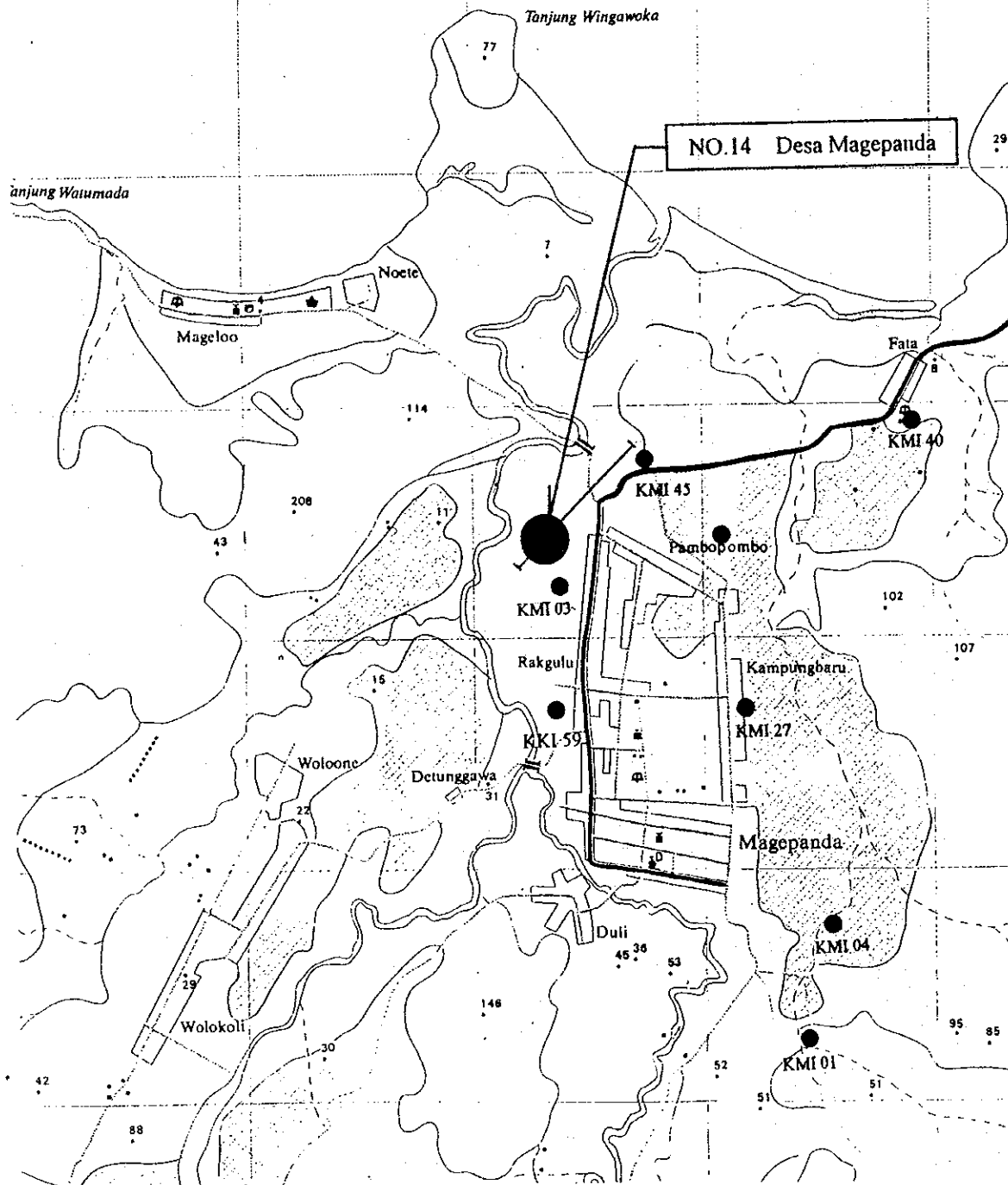
U K P E D A N G



Location Map (9/12)

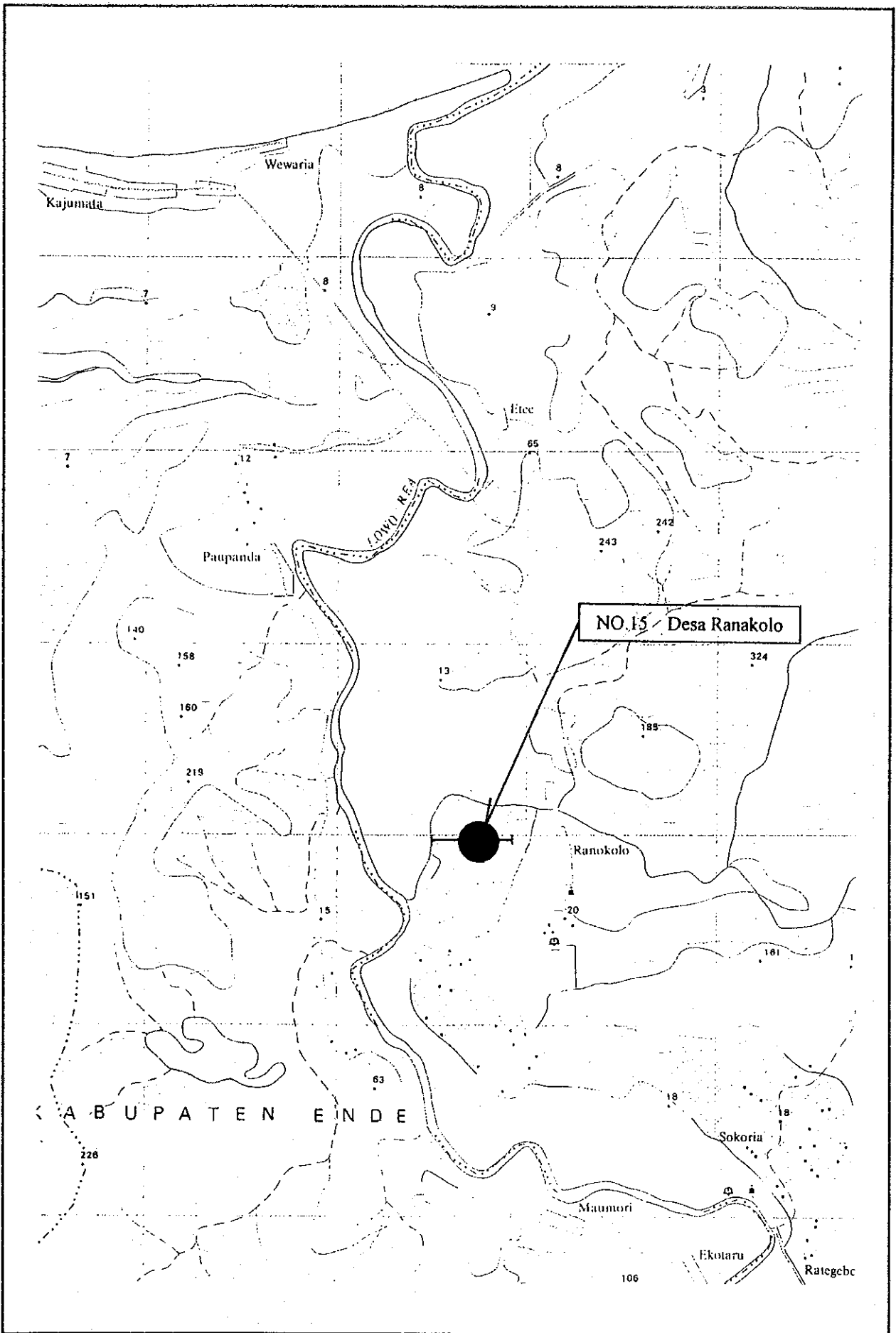
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T E L U K



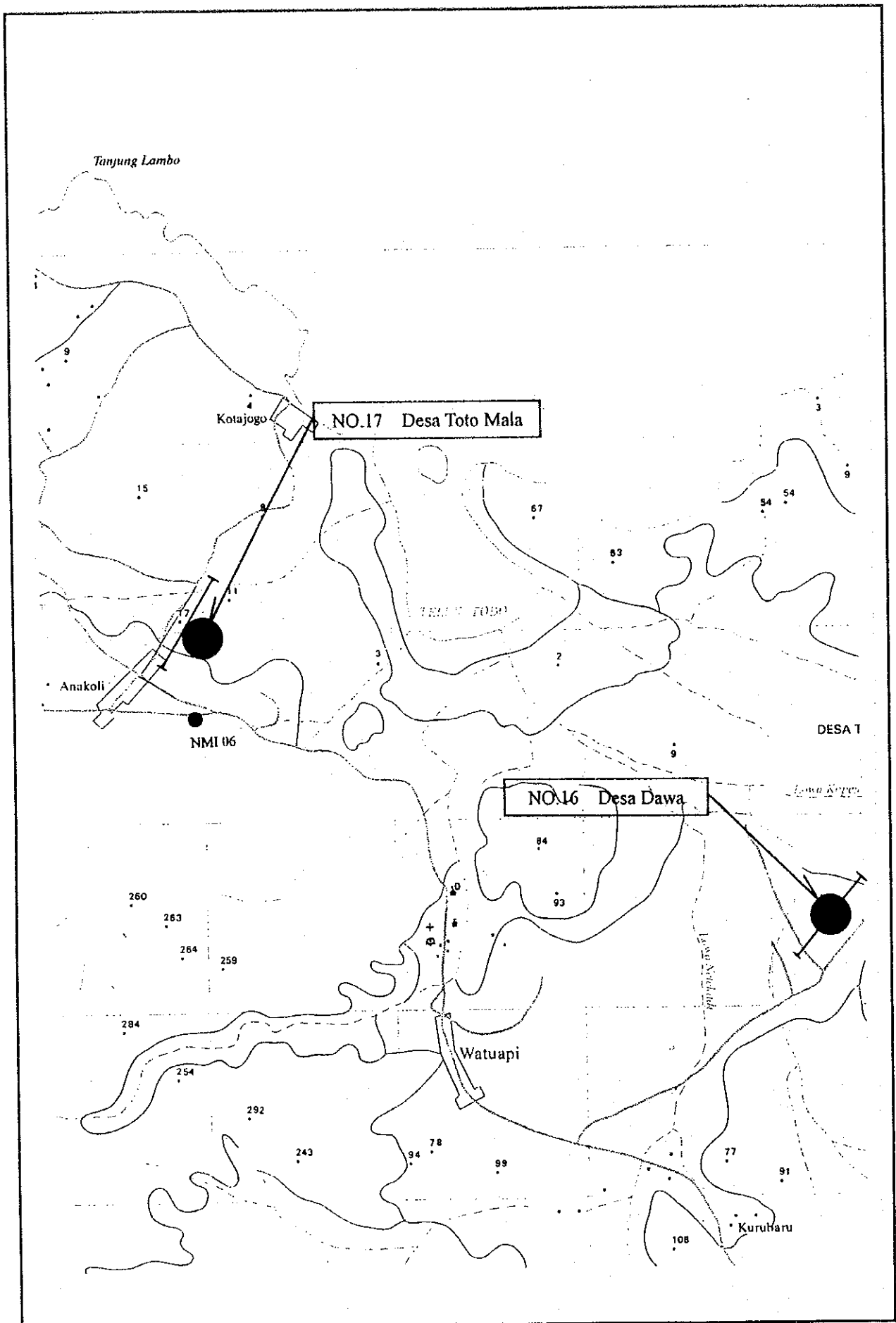
Location Map (10/12)

Scale = 1/25,000



**Location Map (11/12)**

Scale = 1/25,000



**Location Map (12/12)**

Scale = 1/25,000









