

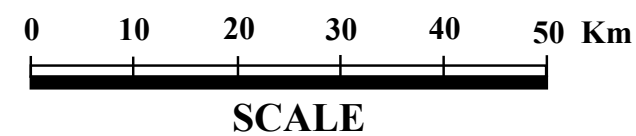
**LEGEND**

- ⊙ Capital Town of District
- Sub-District Town
- - - District Boundary
- · - · Sub-District Boundary
- Provincial Road
- District Road
- ~ River
- Irrigation Scheme
- ▒ Technical Irrigation
- ▤ Semi-Technical Irrigation

**Irrigation Scheme**

Name of Scheme	Registered Area (Ha)		Subject Area (Ha)
35. Kanjiro	1,491	ST	1,301
36. Bone-Bone	2,754	T	2,625
37. Kalaena Kanan I	6,615	T	6,332
38. Kalaena Kiri	4,671	T	3,536
39. Kalaena Kanan II	5,077	T	3,787
40. Kalena (Rt. Bendung)	2,730	T	2,154
41. Kuri-Kuri, Kasambi	3,000	ST	3,000

T : Technical Irrigation  
ST : Semi-Technical Irrigation



The Study on Comprehensive Recovery Program  
of Irrigation Agriculture

Japan International Cooperation Agency

**Location Map of Irrigation Schemes  
in Luwu Utara District**

I. PROJECT FUNDAMENTALS									
<b>I.1 General</b>									
(1) Code Number	: 73220168			(7) Number of Farmers	: 875				
(2) Name of Irrigation Scheme	: Kanjiro			(8) Water Resource River	: Sungai Kanjiro				
(3) District (Kabupaten)	: Luwu Utara			(9) Catchment Area (km <sup>2</sup> )	: 120				
(4) Sub-district (Kecamatan)	: Sukamaju			(10) Completion / Last Rehabilitation Year	: 1939/1994				
(5) Registered Area (ha)	: 1,491								
(6) Technical Level	: Semi Technical								
<b>I.2 Availability of Reports/Documents &amp; References (A : Available, B : Available but partially, C : Not available/ No plan)</b>									
a. Design Reports of Existing System(Full set)		b. Irrigation diagram			c. As-built drawings		d. Structure lists & diagram		
B		A			B		A		
e. Rehabilitation plan & its references		f. Crops and yield data			g. Cropping Calender		h. WUAs data		
C		A			A		13		
II. SUBJECT AREA FOR REHABILITATION PLAN									
<b>II.1 Present and Planned Land Use</b>									
Category	Present (ha)		Plan (ha)		Increment (ha)				
a. Irrigated paddy field	1,198		1,301		103				
b. Rainfed paddy field	103		0		-103				
c. Upland Field	0		0		0				
d. Uncultivated Land	0		0		0				
e. Non-irrigable	0		0		0				
Total	1,301		1,301		0				
III. AGRICULTURE									
<b>III.1 Present/Before Project Condition</b>									
(1) Irrigation Performance and Crop Production									
Season	Cropped Area in Irrigated Paddy Field				Annual Intensity	Irrigated Paddy Yield (GKG ton/ha)	Crop Production (ton) 1/		
	Paddy (ha)	Palawija	Others (ha)	Total (ha)			Paddy	Palawija	Others
Season I (wet)	1,157			1,157	97%	3.5	4,307		
Season II (dry I)				0				21	
Season III (dry II)	1,157			1,157	97%	4.0	4,628		
Total/Annual	2,314	0	0	2,314	193%	3.8	8,935	21	0
1/: Irrigated & rainfed paddy & palawija									
(2) Problems and Constraints									
<i>A. Irrigation &amp; Agriculture Performances</i>									
- High irrigation performances attained; however water shortage in dry season reported; existence of rainfed field (103ha)									
- Double cropping of paddy practiced almost in the entire irrigated area; paddy yield levels low to moderate; palawija not introduced yet									
<i>B. Primary Constraint Identified through the Inventory Survey by the JICA Study</i>									
- Irrigation & Drainage:		Water shortage at on-farm level in dry season			- Palawija Marketing:		-		
- Agronomic Issues:		Infestation of pest & diseases			- Farmers Organizations:		-		
- Paddy Marketing		Low marketing prices			- Extension Services:		Implementation of extension programs is limited		
<b>III.2 Development Plan</b>									
(1) Development Approaches									
- Expansion of irrigated area & ensuring year round irrigation water supply at on-farm level through rehabilitation & upgrading									
- Double cropping of paddy in the entire scheme; productivity increase of paddy through intensification; introduction of palawija in dry season I									
- Strengthening of extension activities tailored to area specific needs; empowerment of farmer groups (KTs) to establish agri-business oriented KT's									
(2) Planned Irrigation Performances and Crop Production									
Season	Cropped Area in Irrigated Paddy Field				Annual Intensity	Irrigated Paddy Yield (GKG ton/ha)	Crop Production (ton)		
	Paddy (ha)	Palawija	Others (ha)	Total (ha)			Paddy	Palawija	Others
Season I (wet)	1,301			1,301	100%	4.5	5,855		
Season II (dry I)		260		260	20%			1,300	
Season III (dry II)	1,301			1,301	100%	5.0	6,505		
Total/Annual	2,602	260	0	2,862	220%	4.8	12,360	1,300	0
Annual Increment	288	260	0	548	27%	1.0	3,425	1,279	0
IV. WUAs									
<b>IV.1 Existing Condition</b>									
(1) Number	a. Target;	17	b. Established;	0	c. Not yet;	17	Registered		0
Performance	a. Developed;	0	b. Under developing;	0	c. Not yet;	0	Not yet registered		0
(2) Problems and Constraints									
<input type="checkbox"/> Operation <input type="checkbox"/> Maintenance <input checked="" type="checkbox"/> Management									
(3) Causes of Problems and Constraints									
- Late start of WUA establishment promotion.									
<b>IV.2 Development Plan</b>									
(1) Proposed Countermeasures									
- Acceleration of WUA establishment.									
(2) Development Plan									
- WUA empowerment program.									

**V. IRRIGATION FACILITY**

**V.1 Existing Condition**

- (1) Overall Irrigation System : C (A: Functioning well, B: Partially deteriorated, C: Not functioning well, D: Serious condition for operation)  
Water Resources Facility : C Main Canal System : C Secondary Canal System : D On-farm : C
- (2) Water Resources Facility
- |                            |                         |                         |                |   |     |
|----------------------------|-------------------------|-------------------------|----------------|---|-----|
| a. Type of facility        | : Headworks             | e. Scouring sluice gate | : 1 nos.       | i. Condition  | : C |
| b. Type of weir            | : Gabion weir           | f. Intake gate          | : 2 nos.       | (A: Functioning well, B: Partially deteriorated, C: Not functioning well, D: Serious condition for operation) |     |
| c. Length of weir          | : 20 m                  | g. Settling basin       | : provided     | (no info.: no information)  |     |
| d. Design intake discharge | : 2.6 m <sup>3</sup> /s | h. Inspection bridge    | : not provided |   |     |

(3) Irrigation Canal and Inspection Road

Canal	Lined (m)	Unlined (m)	Total (m)	Structure (nos)	Inspection road (m)	Condition
Main	3,278	2,673	5,951	41	2,077	C
Secondary	3,649	4,280	7,929	36	2,500	D

(A: Functioning well, B: Partially deteriorated, C: Not functioning well, D: Serious condition for operation)

(4) Major Problems and Constrains

- Water Resources Facility
  - Physical operational problem on flood/scouring sluice gate(s) of headworks
  - Insufficient diversion water due to sedimentation in front of intake
  - Physical operational problem on intake gate(s)
- Irrigation Canal and Related Structure
  - Sedimentation or obstruction of water flow
  - Collapse of canal
  - Difficulty on maintenance of earth canal
  - Difficulty on O&M

(5) Causes of Major Problems and Constraints

- Water Resources Facility
  - Improper design, installation and/or maintenance of flood/scouring sluice gate(s); breakdown of hoist, stem, guide frame or leaf
  - Sedimentation in front of intake
  - Improper design, installation and/or maintenance of intake gate(s); breakdown of hoist, stem, guide frame or leaf
- Irrigation Canal and Related Structure
  - Insufficient function of settling basin(sediments), improper management of canal (sediments, water plant)
  - Improper maintenance; insufficient nos. of cross drain, berm width, or catch drain; and/or steep slope of canal
  - Fallen down and collapse of side slope, water plants or weed at inside of canal
  - No provision or damage of inspection road, difficulty on passing of inspection road due to damage, broken

**V.2 Development Plan**

(1) Proposed Countermeasures for Major Problems

- Water Resources Facility
  - Replacement of control system or damaged equipment of flood/scouring sluice gate(s)
  - Dredging or flushing of sediment, proper gate operation of headworks and intake
  - Replacement of intake gate(s)
- Irrigation Canal and Related Structure
  - Removal of sediment soil and foreign materials from canal, grass cutting
  - Redesign of canal section; provision of cross drain, proper width of berm, catch drain, and/or proper slope
  - Provision of concrete lining
  - Provision or repair of inspection road with all weather type/pavement

(2) Water Resources Facility

Dam/Headworks body : large rehabilitation Intake, civil : large rehabilitation Intake, mechanical : large rehabilitation  
Settling basin : replacement or new

(3) Irrigation Canal and Related Structure

	Works	No rehabilitation	Rehabilitation	New construction	Total
Canal (m)	Main	0	5,177	518	5,695
	Secondary	0	6,898	1,380	8,278
Structure (nos)	Main	0	36	7	43
	Secondary	0	31	11	42

(4) On-farm Development

(Unit: ha)

a. Potential Irrigated paddy field	1,198	d. Non-potential paddy field	0
b. Potential non-irrigated paddy field	103	e. Non-potential non-paddy field	0
c. Potential non-paddy field	0	Total	1,301

(5) Rehabilitation Cost (Direct Cost)

(Unit: Million Rp.)

W.R.F	Irrigation	Drainage	On-Farm Develop.	Project Facility	Total	Cost per ha
2,249	17,652	1,765	2,720	1,260	25,646	19.7

(W.R.F: Water Resources Facility, Develop.: Development)

**VI. PROJECT EVALUATION**

**VI.1 EIRR**

**VI.2 Prioritization Scoring**




Evaluation Index		Full Score	Score	Evaluation Index		Full Score	Score	Total Score
Irrigation System	Utilization of Irrigation Potential	10.0	5.0	Agricultural Productivity	20.0	14.0	68.5	
	Urgency	25.0	21.0	Social Problem	15.0	10.5		
	Sustainability	15.0	9.0	Economic Impact	15.0	9.0		

**VI.3 Priority Group**

**VI.4 Priority Ranking in the Province**

Scheme	Kanjiro	District	Luwu Utara	
Technical Level	Semi-technical	Registered Area	1,491 ha	Year of Construction 1939/94
 <p>SS.35.144</p>		<p><u>Category</u> Irrigation (Headworks)</p> <hr/> <p><u>Structure</u> Retaining Wall</p> <hr/> <p><u>Condition</u>  <input type="checkbox"/> A    <input type="checkbox"/> B    <input checked="" type="checkbox"/> C    <input type="checkbox"/> D</p> <hr/> <p><u>Problems</u> Fallen down, incline or washed away of retaining wall of weir; sedimentation in front of intake.</p>		
 <p>SS.35.145</p>		<p><u>Category</u> Irrigation (Headworks)</p> <hr/> <p><u>Structure</u> Intake Gate</p> <hr/> <p><u>Condition</u>  <input type="checkbox"/> A    <input type="checkbox"/> B    <input checked="" type="checkbox"/> C    <input type="checkbox"/> D</p> <hr/> <p><u>Problems</u> Leakage from gate leaf; insufficient strength against design load due to rust, decay of steel material; problem on management due to lack of periodically maintenance</p>		
 <p>SS.33.148</p>		<p><u>Category</u> Irrigation (Main Canal)</p> <hr/> <p><u>Structure</u> Earth Canal</p> <hr/> <p><u>Condition</u>  <input type="checkbox"/> A    <input type="checkbox"/> B    <input checked="" type="checkbox"/> C    <input type="checkbox"/> D</p> <hr/> <p><u>Problems</u> Sedimentation; collapse of canal; leakage from canal; difficulty on maintenance of earth canal; no inspection road.</p>		

Condition: A: Functioning well, B: Partially deteriorated, C: Not functioning well, D: Serious condition for operation

Scheme	Kanjiro	District	Luwu Utara	
Technical Level	Semi-technical	Registered Area	1,491 ha	Year of Construction 1939/94
 <p>SS.35.161</p>		<p><u>Category</u> Irrigation (Main Canal)</p> <p><u>Structure</u> Division Structure</p> <p><u>Condition</u>  <input type="checkbox"/> A    <input type="checkbox"/> B    <input type="checkbox"/> C    <input checked="" type="checkbox"/> D</p> <p><u>Problems</u> Steel gates are out of service; lower function due to sedimentation in front of structure.</p>		
		<p><u>Category</u> Ariculture, On-Farm</p> <p><u>Activity</u> Paddy Cultivation</p> <p><u>Condition</u>  <input type="checkbox"/> A    <input type="checkbox"/> B    <input checked="" type="checkbox"/> C    <input type="checkbox"/> D</p> <p><u>Problems</u> Low density of on-farm canals and farm roads.</p>		
		<p><u>Category</u> Ariculture, On-Farm</p> <p><u>Activity</u> Treshering</p> <p><u>Condition</u>  <input type="checkbox"/> A    <input type="checkbox"/> B    <input checked="" type="checkbox"/> C    <input type="checkbox"/> D</p> <p><u>Problems</u> Low density of on-farm canals and farm roads.</p>		

Condition: A: Functioning well, B: Partially deteriorated, C: Not functioning well, D: Serious condition for operation

I. PROJECT FUNDAMENTALS									
<b>I.1 General</b>									
(1) Code Number	: 73220169			(7) Number of Farmers	: 2,229				
(2) Name of Irrigation Scheme	: Bone-Bone			(8) Water Resource River	: Bone-Bone				
(3) District (Kabupaten)	: Luwu Utara			(9) Catchment Area (km <sup>2</sup> )	: 46				
(4) Sub-district (Kecamatan)	: Bone-Bone			(10) Completion / Last Rehabilitation Year	: 1975/1983				
(5) Registered Area (ha)	: 2,754								
(6) Technical Level	: Technical								
<b>I.2 Availability of Reports/Documents &amp; References (A : Available, B : Available but partially, C : Not available/ No plan)</b>									
a. Design Reports of Existing System(Full set)		b. Irrigation diagram			c. As-built drawings		d. Structure lists & diagram		
B		A			B		A		
e. Rehabilitation plan & its references		f. Crops and yield data			g. Cropping Calender		h. WUAs data		
C		A			A		29		
II. SUBJECT AREA FOR REHABILITATION PLAN									
<b>II.1 Present and Planned Land Use</b>									
Category	Present (ha)		Plan (ha)		Increment (ha)				
a. Irrigated paddy field	2,625		2,625		0				
b. Rainfed paddy field	0		0		0				
c. Upland Field	0		0		0				
d. Uncultivated Land	0		0		0				
e. Non-irrigable	0		0		0				
Total	2,625		2,625		0				
III. AGRICULTURE									
<b>III.1 Present/Before Project Condition</b>									
(1) Irrigation Performance and Crop Production									
Season	Cropped Area in Irrigated Paddy Field				Annual Intensity	Irrigated Paddy Yield (GKG ton/ha)	Crop Production (ton)		
	Paddy (ha)	Palawija	Others (ha)	Total (ha)			Paddy	Palawija	Others
Season I (wet)	2,625			2,625	100%	4.0	10,500		
Season II (dry I)				0					
Season III (dry II)	2,005			2,005	76%	4.0	8,020		
Total/Annual	4,630	0	0	4,630	176%	4.0	18,520	0	0
(2) Problems and Constraints									
<i>A. Irrigation &amp; Agriculture Performances</i>									
- High irrigation performances attained; poor drainage problem reported									
- Double cropping of paddy practiced in most of the entire irrigated area; paddy yield levels still low; palawija not introduced yet									
<i>B. Primary Constraint Identified through the Inventory Survey by the JICA Study</i>									
- Irrigation & Drainage:		Poor drainage			- Palawija Marketing:		Low marketing prices		
- Agronomic Issues:		Damage caused by rat			- Farmers Organizations:		Managerial capacity of KT's are limited		
- Paddy Marketing		Low marketing prices			- Extension Services:		Extension activities of PPL's are limited		
<b>III.2 Development Plan</b>									
(1) Development Approaches									
- Ensuring year round irrigation water supply at on-farm level through rehabilitation									
- Double cropping of paddy in the entire scheme; productivity increase of paddy through further intensification; introduction of palawija in dry season I									
- Strengthening of extension activities tailored to area specific needs; empowerment of farmer groups (KT's) to establish agri-business oriented KT's									
(2) Planned Irrigation Performances and Crop Production									
Season	Cropped Area in Irrigated Paddy Field				Annual Intensity	Irrigated Paddy Yield (GKG ton/ha)	Crop Production (ton)		
	Paddy (ha)	Palawija	Others (ha)	Total (ha)			Paddy	Palawija	Others
Season I (wet)	2,625			2,625	100%	5.0	13,125		
Season II (dry I)		263		263	10%			1,315	
Season III (dry II)	2,625			2,625	100%	5.0	13,125		
Total/Annual	5,250	263	0	5,513	210%	5.0	26,250	1,315	0
Annual Increment	620	263	0	883	34%	1.0	7,730	1,315	0
IV. WUAs									
<b>IV.1 Existing Condition</b>									
(1) Number	a. Target;	29	b. Established;	21	c. Not yet;	8	Registered		0
Performance	a. Developed;	0	b. Under developing;	13	c. Not yet;	8	Not yet registered		21
(2) Problems and Constraints									
<input type="checkbox"/> Operation <input type="checkbox"/> Maintenance <input checked="" type="checkbox"/> Management									
(3) Causes of Problems and Constraints									
- No close coordination with District WRS.									
- Less internal coordination of WUA.									
<b>IV.2 Development Plan</b>									
(1) Proposed Countermeasures									
- Improvement of internal coordination.									
(2) Development Plan									
- WUA empowerment training.									

**V. IRRIGATION FACILITY**

**V.1 Existing Condition**

- (1) Overall Irrigation System : C (A: Functioning well, B: Partially deteriorated, C: Not functioning well, D: Serious condition for operation)  
Water Resources Facility : B Main Canal System : C Secondary Canal System : D On-farm : C

(2) Water Resources Facility

- a. Type of facility : Headworks e. Scouring sluice gate : 1 nos. i. Condition : B  
b. Type of weir : Fixed weir f. Intake gate : 2 nos. (A: Functioning well, B: Partially deteriorated, C: Not functioning well, D: Serious condition for operation)  
c. Length of weir : 40 m g. Settling basin : provided  
d. Design intake discharge : 3.8 m<sup>3</sup>/s h. Inspection bridge : provided (no info.: no information)

(3) Irrigation Canal and Inspection Road

Canal	Lined (m)	Unlined (m)	Total (m)	Structure (nos)	Inspection road (m)	Condition
Main	9,771	7,207	16,978	58	16,978	C
Secondary	1,405	5,017	6,422	15	6,422	D

(A: Functioning well, B: Partially deteriorated, C: Not functioning well, D: Serious condition for operation)

(4) Major Problems and Constrains

- Water Resources Facility

- Lower strength against design load due to rust, decay of steel materials of flood/scouring sluice gate(s)  
Physical operational problem on intake gate(s)

- Irrigation Canal and Related Structure

- Sedimentation or obstruction of water flow  
Difficulty on maintenance of earth canal  
Lower function of regulating structure on canal  
Settlement/deflection on foundation of aqueduct

(5) Causes of Major Problems and Constraints

- Water Resources Facility

- No over coating on flood/scouring sluice gate(s) to prevent rust and decay  
Improper design, installation and/or maintenance of intake gate(s); breakdown of hoist, stem, guide frame or leaf

- Irrigation Canal and Related Structure

- Insufficient function of settling basin(sediments), improper management of canal (sediments, water plant)  
Fallen down and collapse of side slope, water plants or weed at inside of canal  
Deterioration of regulating structure on canal, especially gate and metal works  
Insufficient strength of foundation of aqueduct or insufficient foundation treatment

**V.2 Development Plan**

(1) Proposed Countermeasures for Major Problems

- Water Resources Facility

- Provision of overcoat or replacement of flood/scouring sluice gate(s) of headworks  
Replacement of intake gate(s)

- Irrigation Canal and Related Structure

- Removal of sediment soil and foreign materials from canal, grass cutting  
Provision of concrete lining  
Replacement and reconstruction of regulating structure on canal  
Additional foundation treatment, protection around pier of aqueduct at river bed level

(2) Water Resources Facility

- Dam/Headworks body : minor rehabilitation Intake, civil : minor rehabilitation Intake, mechanical : large rehabilitation  
Settling basin : large rehabilitation

(3) Irrigation Canal and Related Structure

	Works	No rehabilitation	Rehabilitation	New construction	Total
Canal (m)	Main	0	16,978	0	16,978
	Secondary	0	6,422	0	6,422
Structure (nos)	Main	0	58	6	64
	Secondary	0	15	3	18

(4) On-farm Development

(Unit: ha)

a. Potential Irrigated paddy field	2,625	d. Non-potential paddy field	0
b. Potential non-irrigated paddy field	0	e. Non-potential non-paddy field	0
c. Potential non-paddy field	0	Total	2,625

(5) Rehabilitation Cost (Direct Cost)

(Unit: Million Rp.)

W.R.F	Irrigation	Drainage	On-Farm Develop.	Project Facility	Total	Cost per ha
3,069	33,395	3,339	5,381	1,570	46,754	17.8

(W.R.F: Water Resources Facility, Develop.: Development)

**VI. PROJECT EVALUATION**

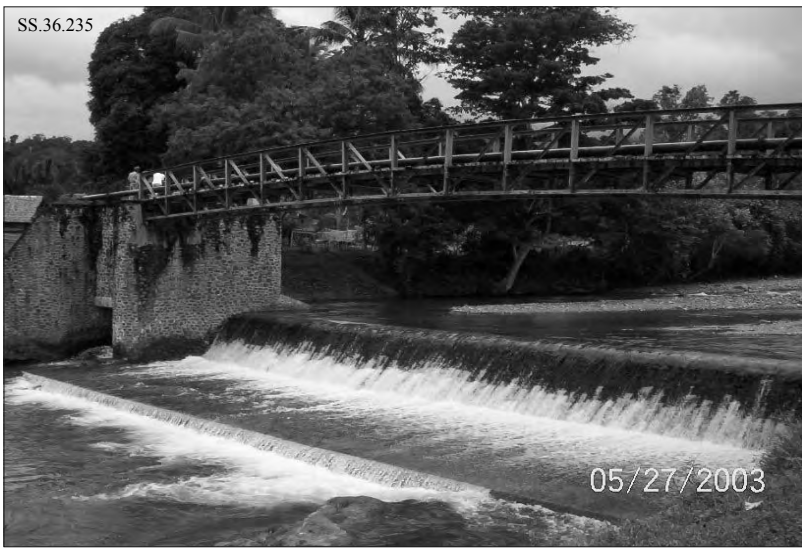


**VI.1 EIRR**

**VI.2 Prioritization Scoring**

Evaluation Index	Full Score	Score	Evaluation Index	Full Score	Score	Total Score
Irrigation System	Utilization of Irrigation Potential	10.0	- Agricultural Productivity	20.0	-	-
	Urgency	25.0	- Social Problem	15.0	-	-
	Sustainability	15.0	- Economic Impact	15.0	-	-

**VI.3 Priority Group**

**VI.4 Priority Ranking in the Province**

Scheme	Bone-Bone	District	Luwu Utara	
Technical Level	Technical	Registered Area	2,754 ha	Year of Construction 1983
SS.36.235 	<i>Category</i> Irrigation (Headworks)			
	<i>Structure</i> Fixed Weir			
	<i>Condition</i> <input type="checkbox"/> A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D			
<i>Problems</i> Insufficient diversion water due to sedimentation in front of intake.				
SS.36.243 	<i>Category</i> Irrigation (Headworks)			
	<i>Structure</i> Intake			
	<i>Condition</i> <input type="checkbox"/> A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D			
<i>Problems</i> Leakage from gate leaf; insufficient strength against design load due to rust, decay of steel material; problem on management due to lack of periodically maintenance				
SS.36.249 	<i>Category</i> Irrigation (Main Canal)			
	<i>Structure</i> Masonry Lined Canal			
	<i>Condition</i> <input type="checkbox"/> A <input type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/> D			
<i>Problems</i> Sedimentation; leakage from lined canal; crack on lined canal; deflection of lining toward inside of canal; less maintenance; and no inspection road.				

Condition: A: Functioning well, B: Partially deteriorated, C: Not functioning well, D: Serious condition for operation



Scheme	Bone-Bone	District	Luwu Utara	
Technical Level	Technical	Registered Area	2,754 ha	Year of Construction 1983
		<p><u>Category</u> Irrigation (Secondary Canal)</p> <hr/> <p><u>Structure</u> Division Structure</p> <hr/> <p><u>Condition</u>  <input type="checkbox"/> A    <input type="checkbox"/> B    <input type="checkbox"/> C    <input checked="" type="checkbox"/> D</p> <hr/> <p><u>Problems</u> Lower function of division structure due to sedimentation; physical operation problem on structure; deterioration of steel gates..</p>		
		<p><u>Category</u> Agriculture, On-Farm</p> <hr/> <p><u>Activity</u> Paddy Cultivation</p> <hr/> <p><u>Condition</u>  <input type="checkbox"/> A    <input type="checkbox"/> B    <input checked="" type="checkbox"/> C    <input type="checkbox"/> D</p> <hr/> <p><u>Problems</u> Low density of on-farm canals and farm roads.</p>		
		<p><u>Category</u> Agriculture, On-Farm</p> <hr/> <p><u>Activity</u> Secondary Crop Cultivation</p> <hr/> <p><u>Condition</u>  <input type="checkbox"/> A    <input type="checkbox"/> B    <input checked="" type="checkbox"/> C    <input type="checkbox"/> D</p> <hr/> <p><u>Problems</u></p>		

Condition: A: Functioning well, B: Partially deteriorated, C: Not functioning well, D: Serious condition for operation

I. PROJECT FUNDAMENTALS									
<b>I.1 General</b>									
(1) Code Number	: 73220170			(7) Number of Farmers	: 1,378				
(2) Name of Irrigation Scheme	: Kalaena Kanan I			(8) Water Resource River	: Kalaena				
(3) District (Kabupaten)	: Luwu Utara			(9) Catchment Area (km <sup>2</sup> )	: 254.3				
(4) Sub-district (Kecamatan)	: Mangkutana, Wotu			(10) Completion / Last Rehabilitation Year	: 1980				
(5) Registered Area (ha)	: 6,615								
(6) Technical Level	: Technical								
<b>I.2 Availability of Reports/Documents &amp; References (A : Available, B : Available but partially, C : Not available/ No plan)</b>									
a. Design Reports of Existing System(Full set)		b. Irrigation diagram			c. As-built drawings		d. Structure lists & diagram		
B		A			B		A		
e. Rehabilitation plan & its references		f. Crops and yield data			g. Cropping Calender		h. WUAs data		
C		A			A		45		
II. SUBJECT AREA FOR REHABILITATION PLAN									
<b>II.1 Present and Planned Land Use</b>									
Category	Present (ha)		Plan (ha)		Increment (ha)				
a. Irrigated paddy field	5,746		6,332		586				
b. Rainfed paddy field	586		0		-586				
c. Upland Field	0		0		0				
d. Uncultivated Land	0		0		0				
e. Non-irrigable	0		0		0				
Total	6,332		6,332		0				
III. AGRICULTURE									
<b>III.1 Present/Before Project Condition</b>									
(1) Irrigation Performance and Crop Production									
Season	Cropped Area in Irrigated Paddy Field				Annual Intensity	Irrigated Paddy Yield (GKG ton/ha)	Crop Production (ton) 1/		
	Paddy (ha)	Palawija	Others (ha)	Total (ha)			Paddy	Palawija	Others
Season I (wet)	5,581			5,581	97%	4.0	23,789		
Season II (dry I)	5,731			5,731	100%	4.0	22,924	117	
Season III (dry II)				0					
Total/Annual	11,312	0	0	11,312	197%	4.0	46,713	117	0
1/: Irrigated & rainfed paddy & palawija									
(2) Problems and Constraints									
<i>A. Irrigation &amp; Agriculture Performances</i>									
- High irrigation performances attained in irrigated area; poor drainage problem reported; existence of rainfed field (586ha)									
- Double cropping of paddy practiced almost in the entire irrigated area; paddy yield levels still low; palawija not introduced yet									
<i>B. Primary Constraint Identified through the Inventory Survey by the JICA Study</i>									
- Irrigation & Drainage:		Poor drainage			- Palawija Marketing:		-		
- Agronomic Issues:		Farmers not following recommended practices			- Farmers Organizations:		Managerial capacity of KTs are limited		
- Paddy Marketing		Low marketing prices			- Extension Services:		Shortage of operation funds of PPLs		
<b>III.2 Development Plan</b>									
(1) Development Approaches									
- Ensuring year round irrigation water supply at on-farm level through rehabilitation									
- Double cropping of paddy in the entire scheme; productivity increase of paddy through further intensification; introduction of palawija in dry season II									
- Strengthening of extension activities tailored to area specific needs; empowerment of farmer groups (KTs) to establish agri-business oriented KT's									
(2) Planned Irrigation Performances and Crop Production									
Season	Cropped Area in Irrigated Paddy Field				Annual Intensity	Irrigated Paddy Yield (GKG ton/ha)	Crop Production (ton)		
	Paddy (ha)	Palawija	Others (ha)	Total (ha)			Paddy	Palawija	Others
Season I (wet)	6,332			6,332	100%	5.0	31,660		
Season II (dry I)	6,332			6,332	100%	5.0	31,660		
Season III (dry II)		633		633	10%			3,165	
Total/Annual	12,664	633	0	13,297	210%	5.0	63,320	3,165	0
Annual Increment	1,352	633	0	1,985	13%	1.0	16,607	3,048	0
IV. WUAs									
<b>IV.1 Existing Condition</b>									
(1) Number	a. Target;	67	b. Established;	49	c. Not yet;	18	Registered		0
Performance	a. Developed;	2	b. Under developing;	29	c. Not yet;	18	Not yet registered		49
(2) Problems and Constraints									
<input type="checkbox"/> Operation <input type="checkbox"/> Maintenance <input checked="" type="checkbox"/> Management									
(3) Causes of Problems and Constraints									
- Not effective guidance to WUA.									
- No close coordination with District WRS.									
<b>IV.2 Development Plan</b>									
(1) Proposed Countermeasures									
- Encouragement of farmers to organize WUA and its federation.									
(2) Development Plan									
- WUA empowerment training.									

**V. IRRIGATION FACILITY**

**V.1 Existing Condition**

(1) Overall Irrigation System : C (A: Functioning well, B: Partially deteriorated, C: Not functioning well, D: Serious condition for operation)  
Water Resources Facility : - Main Canal System : D Secondary Canal System : D On-farm : C

(2) Water Resources Facility  
a. Type of facility : - e. Scouring sluice gate : - i. Condition : -  
b. Type of weir : - f. Intake gate : - (A: Functioning well, B: Partially deteriorated, C: Not  
c. Length of weir : - g. Settling basin : - functioning well, D: Serious condition for operation)  
d. Design intake discharge : - h. Inspection bridge : - (no info.: no information)

(3) Irrigation Canal and Inspection Road

Canal	Lined (m)	Unlined (m)	Total (m)	Structure (nos)	Inspection road (m)	Condition	(A: Functioning well, B: Partially deteriorated, C: Not functioning well, D: Serious condition for operation)
Main	1,371	4,989	6,360	34	6,360	D	
Secondary	14,687	25,184	39,871	108	35,245	D	

(4) Major Problems and Constrains

- Water Resources Facility

-

- Irrigation Canal and Related Structure

Sedimentation or obstruction of water flow

Difficulty on maintenance of earth canal

Difficulty on O&M

(5) Causes of Major Problems and Constraints

- Water Resources Facility

-

- Irrigation Canal and Related Structure

No provision of settling basin (sediments), improper management of canal (sediments, water plant)

Fallen down and collapse of side slope, water plants or weed at inside of canal

No provision or damage of inspection road, difficulty on passing of inspection road due to damage, broken

**V.2 Development Plan**

(1) Proposed Countermeasures for Major Problems

- Water Resources Facility

-

- Irrigation Canal and Related Structure

Removal of sediment soil and foreign materials from canal, grass cutting

Provision of concrete lining

Provision or repair of inspection road with all weather type/pavement

(2) Water Resources Facility

Dam/Headworks body : -

Intake, civil : -

Intake, mechanical : -

Settling basin : -

(3) Irrigation Canal and Related Structure

	Works	No rehabilitation	Rehabilitation	New construction	Total
Canal (m)	Main	0	6,360	0	6,360
	Secondary	0	39,871	0	39,871
Structure (nos)	Main	0	34	3	37
	Secondary	0	108	22	130

(4) On-farm Development

(Unit: ha)

a. Potential Irrigated paddy field	5,746	d. Non-potential paddy field	0
b. Potential non-irrigated paddy field	586	e. Non-potential non-paddy field	0
c. Potential non-paddy field	0	Total	6,332

(5) Rehabilitation Cost (Direct Cost)

(Unit: Million Rp.)

W.R.F	Irrigation	Drainage	On-Farm Develop.	Project Facility	Total	Cost per ha	(W.R.F: Water Resources Facility, Develop.: Development)
365	78,677	7,868	13,281	2,590	102,780	16.2	

**VI. PROJECT EVALUATION**




**VI.1 EIRR**

**VI.2 Prioritization Scoring**




Evaluation Index	Full Score	Score	Evaluation Index	Full Score	Score	Total Score
Irrigation System	Utilization of Irrigation Potential	10.0	- Agricultural Productivity	20.0	-	-
	Urgency	25.0	- Social Problem	15.0	-	-
	Sustainability	15.0	- Economic Impact	15.0	-	-

**VI.3 Priority Group**

**VI.4 Priority Ranking in the Province**

Scheme	Kalaena Kanan I	District	Luwu Utara		
Technical Level	Technical	Registered Area	6,615 ha	Year of Construction	1980
		<p><u>Category</u> Irrigation (Headworks)</p> <p><u>Structure</u> Fixed Weir</p> <p><u>Condition</u>  <input type="checkbox"/> A    <input checked="" type="checkbox"/> B    <input type="checkbox"/> C    <input type="checkbox"/> D</p> <p><u>Problems</u> Crack or damage on weir crest; settlement of weir body.</p>			
		<p><u>Category</u> Main Canal</p> <p><u>Structure</u> Division Structure</p> <p><u>Condition</u>  <input type="checkbox"/> A    <input type="checkbox"/> B    <input type="checkbox"/> C    <input checked="" type="checkbox"/> D</p> <p><u>Problems</u> Lower function of division structure due to sedimentation in front of gate; physical operation problem on structure; deterioration of steel gates.</p>			
		<p><u>Category</u> Irrigation (Main Canal)</p> <p><u>Structure</u> Masonry Lined Canal</p> <p><u>Condition</u>  <input type="checkbox"/> A    <input type="checkbox"/> B    <input type="checkbox"/> C    <input checked="" type="checkbox"/> D</p> <p><u>Problems</u> Sedimentation; leakage from lined canal; crack on lined canal; deflection of lining toward inside of canal; less maintenance; and no inspection road.</p>			

Condition: A: Functioning well, B: Partially deteriorated, C: Not functioning well, D: Serious condition for operation

Scheme	Kalaena Kanan I	District	Luwu Utara		
Technical Level	Technical	Registered Area	6,615 ha	Year of Construction	1980
		<p><u>Category</u> Irrigation (Main Canal)</p> <hr/> <p><u>Structure</u> Earth Canal</p> <hr/> <p><u>Condition</u>  <input type="checkbox"/> A    <input type="checkbox"/> B    <input type="checkbox"/> C    <input checked="" type="checkbox"/> D</p> <hr/> <p><u>Problems</u> Sedimentation; collapse of canal; leakage from canal; difficulty on maintenance of earth canal; no inspection road.</p>			
		<p><u>Category</u> Ariculture, On-farm</p> <hr/> <p><u>Structure</u> On-Farm Canal</p> <hr/> <p><u>Condition</u>  <input type="checkbox"/> A    <input type="checkbox"/> B    <input checked="" type="checkbox"/> C    <input type="checkbox"/> D</p> <hr/> <p><u>Problems</u></p>			
		<p><u>Structure</u> Post-harvest Facility</p> <hr/> <p><u>Activity</u> Drying Yard and Storage</p> <hr/> <p><u>Condition</u>  <input type="checkbox"/> A    <input type="checkbox"/> B    <input checked="" type="checkbox"/> C    <input type="checkbox"/> D</p> <hr/> <p><u>Problems</u></p>			

Condition: A: Functioning well, B: Partially deteriorated, C: Not functioning well, D: Serious condition for operation

I. PROJECT FUNDAMENTALS									
<b>I.1 General</b>									
(1) Code Number	: 73220171			(7) Number of Farmers	: 2,234				
(2) Name of Irrigation Scheme	: Kalaena Kiri			(8) Water Resource River	: Kalaena				
(3) District (Kabupaten)	: Luwu Utara			(9) Catchment Area (km <sup>2</sup> )	: 945				
(4) Sub-district (Kecamatan)	: Mangkutana			(10) Completion / Last Rehabilitation Year	: 1979/1980				
(5) Registered Area (ha)	: 4,671								
(6) Technical Level	: Technical								
<b>I.2 Availability of Reports/Documents &amp; References (A : Available, B : Available but partially, C : Not available/ No plan)</b>									
a. Design Reports of Existing System(Full set)		b. Irrigation diagram			c. As-built drawings		d. Structure lists & diagram		
B		A			B		A		
e. Rehabilitation plan & its references		f. Crops and yield data			g. Cropping Calender		h. WUAs data		
C		A			A		58		
II. SUBJECT AREA FOR REHABILITATION PLAN									
<b>II.1 Present and Planned Land Use</b>									
Category	Present (ha)		Plan (ha)		Increment (ha)				
a. Irrigated paddy field	2,959		3,536		577				
b. Rainfed paddy field	577		0		-577				
c. Upland Field	0		0		0				
d. Uncultivated Land	0		0		0				
e. Non-irrigable	0		0		0				
Total	3,536		3,536		0				
III. AGRICULTURE									
<b>III.1 Present/Before Project Condition</b>									
(1) Irrigation Performance and Crop Production									
Season	Cropped Area in Irrigated Paddy Field				Annual Intensity	Irrigated Paddy Yield (GKG ton/ha)	Crop Production (ton) 1/		
	Paddy (ha)	Palawija	Others (ha)	Total (ha)			Paddy	Palawija	Others
Season I (wet)	2,413			2,413	82%	4.0	11,095		
Season II (dry I)				0					
Season III (dry II)	2,403			2,403	81%	4.0	9,612	115	
Total/Annual	4,816	0	0	4,816	163%	4.0	20,707	115	0
1/: Irrigated & rainfed paddy & palawija									
(2) Problems and Constraints									
<i>A. Irrigation &amp; Agriculture Performances</i>									
- Substantially high irrigation performances attained in irrigated area; existence of rainfed field (577ha)									
- Double cropping of paddy practiced most of the irrigated area; paddy yield levels still low; palawija not introduced yet									
<i>B. Primary Constraint Identified through the Inventory Survey by the JICA Study</i>									
- Irrigation & Drainage: -									
- Palawija Marketing: -									
- Agronomic Issues: Infestation of pest & diseases									
- Farmers Organizations: Managerial capacity of KTs are limited									
- Paddy Marketing: Low marketing prices									
- Extension Services: Implementation of extension programs is limited									
<b>III.2 Development Plan</b>									
(1) Development Approaches									
- Expansion of irrigated area & ensuring year round irrigation water supply at on-farm level through rehabilitation & upgrading									
- Expansion of double cropped area of paddy; productivity increase of paddy through intensification; introduction of palawija in dry season II									
- Strengthening of extension activities tailored to area specific needs; empowerment of farmer groups (KTs) to establish agri-business oriented KTs									
(2) Planned Irrigation Performances and Crop Production									
Season	Cropped Area in Irrigated Paddy Field				Annual Intensity	Irrigated Paddy Yield (GKG ton/ha)	Crop Production (ton)		
	Paddy (ha)	Palawija	Others (ha)	Total (ha)			Paddy	Palawija	Others
Season I (wet)	3,536			3,536	100%	5.0	17,680		
Season II (dry I)				0					
Season III (dry II)	3,182	354		3,536	100%	5.0	15,910	1,770	
Total/Annual	6,718	354	0	7,072	200%	5.0	33,590	1,770	0
Annual Increment	1,902	354	0	2,256	37%	1.0	12,883	1,655	0
IV. WUAs									
<b>IV.1 Existing Condition</b>									
(1) Number	a. Target;	55	b. Established;	40	c. Not yet;	15	Registered		0
Performance	a. Developed;	0	b. Under developing;	22	c. Not yet;	18	Not yet registered		40
(2) Problems and Constraints									
<input checked="" type="checkbox"/> Operation <input type="checkbox"/> Maintenance <input type="checkbox"/> Management									
(3) Causes of Problems and Constraints									
- Not practice of irrigation water distribution schedule.									
<b>IV.2 Development Plan</b>									
(1) Proposed Countermeasures									
- Encouragement of farmers to organize WUA.									
(2) Development Plan									
- WUA empowerment training.									

**V. IRRIGATION FACILITY**

- (1) Overall Irrigation System : C (A: Functioning well, B: Partially deteriorated, C: Not functioning well, D: Serious condition for operation)  
Water Resources Facility : B Main Canal System : D Secondary Canal System : D On-farm : C

- (2) Water Resources Facility  
a. Type of facility : Headworks e. Scouring sluice gate : 2 nos. i. Condition : B  
b. Type of weir : Fixed weir f. Intake gate : 2 nos. (A: Functioning well, B: Partially deteriorated, C: Not functioning well, D: Serious condition for operation)  
c. Length of weir : 104 m g. Settling basin : provided  
d. Design intake discharge : 8.0 m<sup>3</sup>/s h. Inspection bridge : provided (no info.: no information)

(3) Irrigation Canal and Inspection Road

Canal	Lined (m)	Unlined (m)	Total (m)	Structure (nos)	Inspection road (m)	Condition
Main	2,500	14,578	17,078	52	7,689	D
Secondary	1,000	16,306	17,306	59	10,500	D

(A: Functioning well, B: Partially deteriorated, C: Not functioning well, D: Serious condition for operation)

- (4) Major Problems and Constrains  
- Water Resources Facility  
Insufficient diversion water due to sedimentation in front of intake  
Inflow of bed loads into canal and decrease canal flow capacity

- Irrigation Canal and Related Structure  
Sedimentation or obstruction of water flow  
Impassable of inspection road along canal  
General O&M problems  
Difficulty on O&M

- (5) Causes of Major Problems and Constraints  
- Water Resources Facility  
Sedimentation in front of intake  
Insufficient function of settling basin, no proper gate operation of intake during flood  
- Irrigation Canal and Related Structure  
Insufficient function of settling basin(sediments), improper management of canal (sediments, water plant)  
Improper routine O&M works due to no or narrow wide of road, slope erosion by rainfall then in flow into canal  
No kilo and hectometer post, no structure plate or mark on structures and no identification for repair/maintenance  
No provision or damage of inspection road, difficulty on passing of inspection road due to damage, broken

**V.2 Development Plan**

- (1) Proposed Countermeasures for Major Problems  
- Water Resources Facility  
Dredging or flushing of sediment, proper gate operation of headworks and intake  
Rehabilitation of settling basin, proper gate operation of intake during flood  
- Irrigation Canal and Related Structure  
Removal of sediment soil and foreign materials from canal, grass cutting  
Provision of inspection road both main and secondary canal with pavement  
Provision of kilo, hect-m posts, marking to each structure with structure name  
Provision or repair of inspection road with all weather type/pavement

- (2) Water Resources Facility  
Dam/Headworks body : minor rehabilitation Intake, civil : minor rehabilitation Intake, mechanical : minor rehabilitation  
Settling basin : minor rehabilitation

(3) Irrigation Canal and Related Structure

	Works	No rehabilitation	Rehabilitation	New construction	Total
Canal (m)	Main	0	14,858	0	14,858
	Secondary	0	15,056	0	15,056
Structure (nos)	Main	0	45	5	50
	Secondary	0	51	10	62

(4) On-farm Development (Unit: ha)

a. Potential Irrigated paddy field	2,959	d. Non-potential paddy field	0
b. Potential non-irrigated paddy field	577	e. Non-potential non-paddy field	0
c. Potential non-paddy field	0	Total	3,536

(5) Rehabilitation Cost (Direct Cost) (Unit: Million Rp.)

W.R.F	Irrigation	Drainage	On-Farm Develop.	Project Facility	Total	Cost per ha
1,319	56,664	5,666	7,545	1,570	72,763	20.6

(W.R.F: Water Resources Facility, Develop.: Development)

**VI. PROJECT EVALUATION**


VI.1 EIRR 13.2%

**VI.2 Prioritization Scoring**

Evaluation Index	Full Score	Score	Evaluation Index	Full Score	Score	Total Score
Irrigation System	Utilization of Irrigation Potential	10.0	5.0	Agricultural Productivity	20.0	14.0
	Urgency	25.0	20.4	Social Problem	15.0	10.5
	Sustainability	15.0	8.3	Economic Impact	15.0	10.5




VI.3 Priority Group Group II: Second priority group

VI.4 Priority Ranking in the Province 14

Scheme	Kalaena Kiri	District	Luwu Utara	
Technical Level	Technical	Registered Area	4,671 ha	Year of Construction 1980
SS.38.168		<p><u>Category</u> Irrigation (Main Canal)</p> <hr/> <p><u>Structure</u> Earth Canal</p> <hr/> <p><u>Condition</u>  <input type="checkbox"/> A    <input type="checkbox"/> B    <input type="checkbox"/> C    <input checked="" type="checkbox"/> D</p> <hr/> <p><u>Problems</u> Sedimentation; collapse of canal; leakage from canal; difficulty on maintenance of earth canal; no inspection road.</p>		
SS.38.170		<p><u>Category</u> Irrigation (Main Canal)</p> <hr/> <p><u>Structure</u> Masonry Lined Canal</p> <hr/> <p><u>Condition</u>  <input type="checkbox"/> A    <input type="checkbox"/> B    <input type="checkbox"/> C    <input checked="" type="checkbox"/> D</p> <hr/> <p><u>Problems</u> Sedimentation; leakage from lined canal; crack on lined canal; deflection of lining toward inside of canal; less maintenance; and no inspection road.</p>		
SS.38.173		<p><u>Category</u> Irrigation (Secondary Canal)</p> <hr/> <p><u>Structure</u> Earth Canal</p> <hr/> <p><u>Condition</u>  <input type="checkbox"/> A    <input type="checkbox"/> B    <input type="checkbox"/> C    <input checked="" type="checkbox"/> D</p> <hr/> <p><u>Problems</u> Sedimentation; collapse of canal; leakage from canal; difficulty on maintenance of earth canal; no inspection road.</p>		

Condition: A: Functioning well, B: Partially deteriorated, C: Not functioning well, D: Serious condition for operation



Scheme	Kalaena Kiri	District	Luwu Utara	
Technical Level	Technical	Registered Area	4,671 ha	Year of Construction 1980
		<u>Category</u> Irrigation (Secondary Canal)		
		<u>Structure</u> Earth Canal		
		<u>Condition</u> <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input checked="" type="checkbox"/> D		
		<u>Problems</u> Sedimentation; leakage from lined canal; crack on lined canal; deflection of lining toward inside of canal; less maintenance; and no inspection road.		
		<u>Category</u> Ariculture, On-Farm		
		<u>Activity</u> Paddy Cultivation		
		<u>Condition</u> <input type="checkbox"/> A <input type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/> D		
		<u>Problems</u> Low density of on-farm canals and farm roads.		
		<u>Category</u> Ariculture, On-Farm		
		<u>Activity</u> Cacao Cultivation		
		<u>Condition</u> <input type="checkbox"/> A <input type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/> D		
		<u>Problems</u>		

Condition: A: Functioning well, B: Partially deteriorated, C: Not functioning well, D: Serious condition for operation