

### 1.6 Environmental mitigation costs

DESCRIPCIÓN	UNIDAD	METRADO (1)	PU(S./.) (2)	Parcial Precios Privados(S./.) (3)=(1)X(2)	FC (4)	PRECIOS PRIVADOS (S./.)					PRECIOS SOCIALES (S./.)				
						RIO CAÑETE	RIO CHINCHA	RIO PISCO	RIO MAJES CAMANA	RIO CAÑETE	RIO CHINCHA	RIO PISCO	RIO MAJES CAMANA	RIO PISCO	RIO MAJES CAMANA
<b>Número de Medidas</b>	<b>Unidad</b>					5	5	6	7	5	5	6	7	6	7
<b>Duración de obras</b>	<b>Mes</b>					18.5	30.0	26.0	38.0	18.5	30.0	26.0	38.0	26.0	38.0
1) Señalización para la entrada y salida de vehículos de	Mes	-	S./. 1,400.0	-	0.85	25,900.0	42,000.0	36,400.0	53,200.0	21,949.2	35,593.2	30,847.5	45,084.7	30,847.5	45,084.7
2) Transporte de desechos industriales a botaderos con	Mes	-	S./. 4,200.0	-	0.85	77,700.0	126,000.0	109,200.0	159,600.0	65,847.5	106,779.7	92,542.4	135,254.2	92,542.4	135,254.2
3) Tratamiento paisajístico del entorno del Proyecto	Mes	-	S./. 2,800.0	-	0.85	51,800.0	84,000.0	72,800.0	106,400.0	43,898.3	71,186.4	61,694.9	90,169.5	61,694.9	90,169.5
4) Mantenimiento de las instalaciones	Mes	-	S./. 1,960.0	-	0.85	36,260.0	58,800.0	50,960.0	74,480.0	30,728.8	49,830.5	43,186.4	63,118.6	43,186.4	63,118.6
5) Equipo de protección contra ruidos para el personal de	Mes	-	S./. 1,120.0	-	0.85	20,720.0	33,600.0	29,120.0	42,560.0	17,559.3	28,474.6	24,678.0	36,087.8	24,678.0	36,087.8
6) Actividades de gestión ambiental	Mes	-	S./. 4,480.0	-	0.85	82,880.0	134,400.0	116,480.0	170,240.0	70,237.3	113,898.3	98,711.9	144,271.2	98,711.9	144,271.2
7) Capacitación en Técnicas de Control de	Mes	-	S./. 2,520.0	-	0.85	46,620.0	75,600.0	65,520.0	95,760.0	39,508.5	64,067.8	55,525.4	81,152.5	55,525.4	81,152.5
8) Manejo de cauces y fauna acuática															
Indíces de diversidad	Monitoreo	3	S./. 672.0	S./. 2,016.0	0.85	10,080.0	10,080.0	12,096.0	14,112.0	8,542.4	8,542.4	10,250.8	11,959.3	10,250.8	11,959.3
Caudal	Monitoreo	3	S./. 588.0	S./. 1,764.0	0.85	8,820.0	8,820.0	10,584.0	12,348.0	7,474.6	7,474.6	8,989.5	10,464.4	8,989.5	10,464.4
T°, pH, OD	Monitoreo	3	S./. 571.2	S./. 1,713.6	0.85	8,568.0	8,568.0	10,281.6	11,995.2	7,261.0	7,261.0	8,713.2	10,165.4	8,713.2	10,165.4
DSO	Monitoreo	3	S./. 638.4	S./. 1,915.2	0.85	9,576.0	9,576.0	11,491.2	13,406.4	8,115.3	8,115.3	9,738.3	11,361.4	9,738.3	11,361.4
Sólidos disueltos totales	Monitoreo	3	S./. 638.4	S./. 1,915.2	0.85	9,576.0	9,576.0	11,491.2	13,406.4	8,115.3	8,115.3	9,738.3	11,361.4	9,738.3	11,361.4
Sólidos suspendidos totales	Monitoreo	3	S./. 638.4	S./. 1,915.2	0.85	9,576.0	9,576.0	11,491.2	13,406.4	8,115.3	8,115.3	9,738.3	11,361.4	9,738.3	11,361.4
9) Monitoreo de aire y ruido															
Monitoreo de emisiones gaseosas	Monitoreo	3	S./. 4,500.0	S./. 13,500.0	0.85	67,500.0	67,500.0	81,000.0	94,500.0	57,203.4	57,203.4	68,644.1	80,084.7	68,644.1	80,084.7
Monitoreo de material particulado	Monitoreo	3	S./. 5,000.0	S./. 15,000.0	0.85	75,000.0	75,000.0	90,000.0	105,000.0	63,559.3	63,559.3	76,271.2	88,983.1	76,271.2	88,983.1
Monitoreo de ruido	Monitoreo	3	S./. 3,000.0	S./. 9,000.0	0.85	45,000.0	45,000.0	54,000.0	63,000.0	38,135.6	38,135.6	45,762.7	53,389.8	45,762.7	53,389.8
<b>合計</b>						585,576.0	798,096.0	772,915.2	1,043,414.4	496,250.8	676,352.5	655,012.9	884,249.5	655,012.9	884,249.5
									3,200,001.6				2,711,865.8		2,711,865.8

1.7 Summary of direct costs

COSTO DIRECTO 直接工事費計																								
Cuenca 流域名	Puntos críticos クリティカル・ポイント	Medidas 対策	MEDIDAS ESTRUCTURALES 構造物対策・直接工事費				FORESTACIÓN Y RECUPERACIÓN VEGETAL 樹林/植生回復				IMPACTO AMBIENTAL 環境影響				CAPACITACIÓN 防災教育/能力開発				COSTOS DE REHABILITACIÓN DE INFRAESTRUCTURAS EXISTENTES 補償工事費					
			Precio 民間価格 (PP)	Precio Social 社会価格 (PS)	Precio Privado 民間価格 (PP)	Precio Social 社会価格 (PS)	Precio Privado 民間価格 (PP)	Precio Social 社会価格 (PS)	Precio Privado 民間価格 (PP)	Precio Social 社会価格 (PS)	Precio Privado 民間価格 (PP)	Precio Social 社会価格 (PS)	Precio Privado 民間価格 (PP)	Precio Social 社会価格 (PS)	Precio Privado 民間価格 (PP)	Precio Social 社会価格 (PS)	Precio Privado 民間価格 (PP)	Precio Social 社会価格 (PS)						
Rio Cafete カニエテ河	Ca-1	4.2-5.2 km	Dique con revestimiento	2,002,424	1,607,460	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Ca-2	6.7-8.3 km	Dique con revestimiento	5,457,362	4,546,668	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Ca-3	10.1-11.2 km	Descolmatación de cause, dique con revestimiento	3,696,057	3,066,042	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Ca-4	24.6-25.0 km	Descolmatación de cause, dique con revestimiento	1,619,416	1,341,709	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Ca-5	25.1-26.6 km	Dique con revestimiento	3,092,046	2,579,806	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
			SUB TOTAL	15,867,305	13,201,685	26,746	21,199	585,576	496,251	144,050	124,788	505,660	410,553											
Rio Chinchá チンチャ河	Chico-1	2.9-5.0 km	Dique con revestimiento	3,869,704	3,191,494	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Chico-2	14.7-15.3 km	Descolmatación de cause, dique con revestimiento	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Chico-3	24.0-24.4 km	Bocanoma - Dique con revestimiento	9,533,669	7,830,517	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Ma-1	2.5-5.0 km	Dique con revestimiento	5,129,938	4,271,028	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Ma-2	8.0-10.5 km	Descolmatación de cause, dique con revestimiento	6,480,309	5,325,681	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
			SUB TOTAL	26,947,476	21,883,183	76,593	60,456	798,096	676,333	144,050	124,788	487,440	403,113											
Rio Pisco ピスコ河	PI-1	3.0-5.0 km	Dique con revestimiento	5,703,661	4,679,372	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	PI-2	6.5-7.9 km	Descolmatación de cause, dique con revestimiento	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	PI-3	12.4-13.9 km	Dique con revestimiento	5,251,094	4,319,384	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	PI-4	19.5-20.5 km	Dique con revestimiento	1,992,899	1,657,566	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	PI-5	25.8-26.4 km	Descolmatación de cause, dique con revestimiento	1,163,790	970,051	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
			SUB TOTAL	22,178,280	18,283,764	12,133	9,577																	
Rio Majes-Camariá マヘス・カマリア河	MC-1	0.0-4.5 km	Dique con revestimiento	39,047,316	32,190,233	50,051	39,598	77,2915	655,013	144,050	124,788													
	MC-2	7.5-9.5 km	Dique con revestimiento	8,130,313	6,759,640	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	MC-3	11.0-17.0 km	Dique con revestimiento	2,776,927	2,309,566	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	MC-4	48.0-50.5 km	Dique con revestimiento	10,548,430	8,763,887	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	MC-5	52.0-56.0 km	Dique con revestimiento	2,861,288	2,382,930	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	MC-6	59.6-62.8 km	Dique con revestimiento	7,211,419	5,998,561	44,047	35,388																	
	MC-7	65.0-66.7 km	Dique con revestimiento	7,552,881	7,552,881	72,077	57,908																	
			SUB TOTAL	68,662,786	57,116,072	39,042	31,367																	
			TOTAL	128,928,607	106,758,639	421,586	336,654	3,200,002	2,711,866	576,200	499,153	2,162,119	1,780,445											

## 2 Operation and maintenance costs

### 2.1Cañete River Basin

#### Ca-1

##### COSTOS DE MANTENIMIENTO "CON PROYECTO" - ENROCADO

ITEM	DESCRIPCION	UNID.	CANTIDAD	UNITARIO S/.	PARCIAL S/.	SUB TOTAL S/.	PRECIOS SOCIALES
<b>1.00</b>	<b>OBRAS PRELIMINARES</b>					<b>3,150.00</b>	<b>2,677.50</b>
1.01	Moviliz. y Desmoviliz. de Maquinaria Pesada	Unid.	1.00	2,000.00	2,000.00		
1.02	Trazos Replanteo y Control Topografico	ml	1,000.00	1.15	1,150.00		
<b>2.00</b>	<b>MOVIMIENTO DE TIERRAS</b>					<b>22,260.00</b>	<b>18,921.00</b>
2.01	Limpieza Encauzamiento - Corte	m3	6,000.00	3.71	22,260.00		
<b>3.00</b>	<b>CONSERVACION DE ENROCADO</b>					<b>1,816.70</b>	<b>1,544.20</b>
3.01	Podas de formación de plantaciones forestal	Unid.	667.00	2.50	1,667.50		
3.01	Reacomodo de Roca	m3	10.00	14.92	149.20		
COSTO DIRECTO						27,226.70	23,142.70
COSTO INDIRECTO (15%)						4,084.01	3,471.40
<b>COSTO TOTAL DE OPERACIÓN Y MANTENIMIENTO</b>						<b>31,310.71</b>	<b>26,614.10</b>

#### Ca-2

##### COSTOS DE MANTENIMIENTO "CON PROYECTO" - ENROCADO

ITEM	DESCRIPCION	UNID.	CANTIDAD	UNITARIO S/.	PARCIAL S/.	SUB TOTAL S/.	PRECIOS SOCIALES
<b>1.00</b>	<b>OBRAS PRELIMINARES</b>					<b>8,140.00</b>	<b>6,919.00</b>
1.01	Moviliz. y Desmoviliz. de Maquinaria Pesada	Unid.	2.00	2,000.00	4,000.00		
1.02	Trazos Replanteo y Control Topografico	ml	3,600.00	1.15	4,140.00		
<b>2.00</b>	<b>MOVIMIENTO DE TIERRAS</b>					<b>80,136.00</b>	<b>68,115.60</b>
2.01	Limpieza Encauzamiento - Corte	m3	21,600.00	3.71	80,136.00		
<b>3.00</b>	<b>CONSERVACION DE ENROCADO</b>					<b>6,537.12</b>	<b>5,556.55</b>
3.01	Podas de formación de plantaciones forestal	Unid.	2,400.00	2.50	6,000.00		
3.01	Reacomodo de Roca	m3	36.00	14.92	537.12		
COSTO DIRECTO						94,813.12	80,591.15
COSTO INDIRECTO (15%)						14,221.97	12,088.67
<b>COSTO TOTAL DE OPERACIÓN Y MANTENIMIENTO</b>						<b>109,035.09</b>	<b>92,679.82</b>

### Ca-3

#### COSTOS DE MANTENIMIENTO "CON PROYECTO" - ENROCADO

ITEM	DESCRIPCION	UNID.	CANTIDAD	UNITARIO S/.	PARCIAL S/.	SUB TOTAL S/.	PRECIOS SOCIALES
<b>1.00</b>	<b>OBRAS PRELIMINARES</b>					<b>5,610.00</b>	<b>4,768.50</b>
1.01	Moviliz. y Desmoviliz. de Maquinaria Pesada	Unid.	2.00	2,000.00	4,000.00		
1.02	Trazos Replanteo y Control Topografico	ml	1,400.00	1.15	1,610.00		
<b>2.00</b>	<b>MOVIMIENTO DE TIERRAS</b>					<b>31,164.00</b>	<b>26,489.40</b>
2.01	Limpieza Encauzamiento - Corte	m3	8,400.00	3.71	31,164.00		
<b>3.00</b>	<b>CONSERVACION DE ENROCADO</b>					<b>2,541.38</b>	<b>2,160.17</b>
3.01	Podas de formación de plantaciones forestal	Unid.	933.00	2.50	2,332.50		
3.01	Reacomodo de Roca	m3	14.00	14.92	208.88		
COSTO DIRECTO						39,315.38	33,418.07
COSTO INDIRECTO (15%)						5,897.31	5,012.71
<b>COSTO TOTAL DE OPERACIÓN Y MANTENIMIENTO</b>						<b>45,212.69</b>	<b>38,430.78</b>

### Ca-4

#### COSTOS DE MANTENIMIENTO "CON PROYECTO" - ENROCADO

ITEM	DESCRIPCION	UNID.	CANTIDAD	UNITARIO S/.	PARCIAL S/.	SUB TOTAL S/.	PRECIOS SOCIALES
<b>1.00</b>	<b>OBRAS PRELIMINARES</b>					<b>3,120.00</b>	<b>2,652.00</b>
1.01	Moviliz. y Desmoviliz. de Maquinaria Pesada	Unid.	1.00	2,200.00	2,200.00		
1.02	Trazos Replanteo y Control Topografico	ml	800.00	1.15	920.00		
<b>2.00</b>	<b>MOVIMIENTO DE TIERRAS</b>					<b>17,808.00</b>	<b>15,136.80</b>
2.01	Limpieza Encauzamiento - Corte	m3	4,800.00	3.71	17,808.00		
<b>3.00</b>	<b>CONSERVACION DE ENROCADO</b>					<b>1,451.86</b>	<b>1,234.08</b>
3.01	Podas de formación de plantaciones forestal	Unid.	533.00	2.50	1,332.50		
3.01	Reacomodo de Roca	m3	8.00	14.92	119.36		
COSTO DIRECTO						22,379.86	19,022.88
COSTO INDIRECTO (15%)						3,356.98	2,853.43
<b>COSTO TOTAL DE OPERACIÓN Y MANTENIMIENTO</b>						<b>25,736.84</b>	<b>21,876.31</b>

Ca-5

**COSTOS DE MANTENIMIENTO "CON PROYECTO" - ENROCADO**

ITEM	DESCRIPCION	UNID.	CANTIDAD	UNITARIO S/.	PARCIAL S/.	SUB TOTAL S/.	PRECIOS SOCIALES
<b>1.00</b>	<b>OBRAS PRELIMINARES</b>					<b>6,125.00</b>	<b>5,206.25</b>
1.01	Moviliz. y Desmoviliz. de Maquinaria Pesada	Unid.	2.00	2,200.00	4,400.00		
1.02	Trazos Replanteo y Control Topografico	ml	1,500.00	1.15	1,725.00		
<b>2.00</b>	<b>MOVIMIENTO DE TIERRAS</b>					<b>33,390.00</b>	<b>28,381.50</b>
2.01	Limpieza Encauzamiento - Corte	m3	9,000.00	3.71	33,390.00		
<b>3.00</b>	<b>CONSERVACION DE ENROCADO</b>					<b>2,723.80</b>	<b>2,315.23</b>
3.01	Podas de formación de plantaciones forestal	Unid.	1,000.00	2.50	2,500.00		
3.01	Reacomodo de Roca	m3	15.00	14.92	223.80		
COSTO DIRECTO						42,238.80	35,902.98
COSTO INDIRECTO (15%)						6,335.82	5,385.45
<b>COSTO TOTAL DE OPERACIÓN Y MANTENIMIENTO</b>						<b>48,574.62</b>	<b>41,288.43</b>

## 2.2 Chincha River Basin

Chico-1

**COSTOS DE MANTENIMIENTO "CON PROYECTO" - ENROCADO**

ITEM	DESCRIPCION	UNID.	CANTIDAD	UNITARIO S/.	PARCIAL S/.	SUB TOTAL S/.	PRECIOS SOCIALES
<b>1.00</b>	<b>OBRAS PRELIMINARES</b>					<b>7,965.00</b>	<b>6,770.25</b>
1.01	Moviliz. y Desmoviliz. de Maquinaria Pesada	Unid.	2.00	2,200.00	4,400.00		
1.02	Trazos Replanteo y Control Topografico	ml	3,100.00	1.15	3,565.00		
<b>2.00</b>	<b>MOVIMIENTO DE TIERRAS</b>					<b>69,192.00</b>	<b>58,813.20</b>
2.01	Limpieza Encauzamiento - Corte	m3	18,600.00	3.72	69,192.00		
<b>3.00</b>	<b>CONSERVACION DE ENROCADO</b>					<b>5,630.64</b>	<b>4,786.04</b>
3.01	Podas de formación de plantaciones forestales	Unid.	2,067.00	2.50	5,167.50		
3.01	Reacomodo de Roca	m3	31.00	14.94	463.14		
COSTO DIRECTO						82,787.64	70,369.49
COSTO INDIRECTO (15%)						12,418.15	10,555.42
<b>COSTO TOTAL DE OPERACIÓN Y MANTENIMIENTO</b>						<b>95,205.79</b>	<b>80,924.92</b>

## Chico-2

### COSTOS DE MANTENIMIENTO "CON PROYECTO" - ENROCADO

ITEM	DESCRIPCION	UNID.	CANTIDAD	UNITARIO S/.	PARCIAL S/.	SUB TOTAL S/.	PRECIOS SOCIALES
<b>1.00</b>	<b>OBRAS PRELIMINARES</b>					<b>3,120.00</b>	<b>2,652.00</b>
1.01	Movilz. y Desmoviliz. de Maquinaria Pesada	Unid.	1.00	2,200.00	2,200.00		
1.02	Trazos Replanteo y Control Topografico	ml	800.00	1.15	920.00		
<b>2.00</b>	<b>MOVIMIENTO DE TIERRAS</b>					<b>17,856.00</b>	<b>15,177.60</b>
2.01	Limpieza Encauzamiento - Corte	m3	4,800.00	3.72	17,856.00		
<b>3.00</b>	<b>CONSERVACION DE ENROCADO</b>					<b>1,481.90</b>	<b>1,259.62</b>
3.01	Podas de formación de plantaciones forestales	Unid.	533.00	2.50	1,332.50		
3.01	Reacomodo de Roca	m3	10.00	14.94	149.40		
COSTO DIRECTO						22,457.90	19,089.22
COSTO INDIRECTO (15%)						3,368.69	2,863.38
<b>COSTO TOTAL DE OPERACIÓN Y MANTENIMIENTO</b>						<b>25,826.59</b>	<b>21,952.60</b>

## Chico-3

### COSTOS DE OPERACIÓN - PARTIDOR

CONCEPTO		Unidad	Cantidad	Precio Unitario (S/. Unidad)	TOTAL (S/. )	Precios Sociales
1.1	Vigilantes	m/h	12	800.00	9,600.00	8,736.00
1.2	Chofer (1)	m/h	12	1,000.00	12,000.00	10,920.00
<b>TOTAL</b>					<b>21,600.00</b>	<b>19,656.00</b>

### COSTOS DE MANTENIMIENTO - PARTIDOR

CONCEPTO		Unidad	Cantidad	Precio Unitario (S/. Unidad)	TOTAL (S/. )	Precios Sociales
<b>1</b>	<b>MANTENIMIENTO PARTIDOR</b>				<b>17,000.00</b>	<b>14,450.00</b>
1.1	Mantenimiento de Diques de Contorno	und	1	12,000.00	12,000.00	10,200.00
1.2	Mantenimiento de Muro Guia	und	1	5,000.00	5,000.00	4,250.00
<b>2</b>	<b>MUROS ESTABILIZADORES Y DE CONTORNO</b>				<b>10,000.00</b>	<b>8,500.00</b>
2.1	Mantenimiento de Mampostería de Piedra	est.	1	10,000.00	10,000.00	8,500.00
<b>TOTAL</b>					<b>27,000.00</b>	<b>22,950.00</b>

<b>COSTO TOTAL DE OPERACIÓN Y MANTENIMIENTO</b>	<b>48,600.00</b>	<b>42,606.00</b>
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## Ma-1

### COSTOS DE MANTENIMIENTO "CON PROYECTO" - ENROCADO

ITEM	DESCRIPCION	UNID.	CANTIDAD	UNITARIO S/.	PARCIAL S/.	SUB TOTAL S/.	PRECIOS SOCIALES
<b>1.00</b>	<b>OBRAS PRELIMINARES</b>					<b>11,890.00</b>	<b>10,106.50</b>
1.01	Moviliz. y Desmoviliz. de Maquinaria Pesada	Unid.	3.00	2,200.00	6,600.00		
1.02	Trazos Replanteo y Control Topografico	ml	4,600.00	1.15	5,290.00		
<b>2.00</b>	<b>MOVIMIENTO DE TIERRAS</b>					<b>102,672.00</b>	<b>87,271.20</b>
2.01	Limpieza Encauzamiento - Corte	m3	27,600.00	3.72	102,672.00		
<b>3.00</b>	<b>CONSERVACION DE ENROCADO</b>					<b>8,354.74</b>	<b>7,101.53</b>
3.01	Podas de formación de plantaciones forestales	Unid.	3,067.00	2.50	7,667.50		
3.01	Reacomodo de Roca	m3	46.00	14.94	687.24		
COSTO DIRECTO						122,916.74	104,479.23
COSTO INDIRECTO (15%)						18,437.51	15,671.88
<b>COSTO TOTAL DE OPERACIÓN Y MANTENIMIENTO</b>						<b>141,354.25</b>	<b>120,151.11</b>

## Ma-2

### COSTOS DE MANTENIMIENTO "CON PROYECTO" - ENROCADO

ITEM	DESCRIPCION	UNID.	CANTIDAD	UNITARIO S/.	PARCIAL S/.	SUB TOTAL S/.	PRECIOS SOCIALES
<b>1.00</b>	<b>OBRAS PRELIMINARES</b>					<b>11,200.00</b>	<b>9,520.00</b>
1.01	Moviliz. y Desmoviliz. de Maquinaria Pesada	Unid.	3.00	2,200.00	6,600.00		
1.02	Trazos Replanteo y Control Topografico	ml	4,000.00	1.15	4,600.00		
<b>2.00</b>	<b>MOVIMIENTO DE TIERRAS</b>					<b>89,280.00</b>	<b>75,888.00</b>
2.01	Limpieza Encauzamiento - Corte	m3	24,000.00	3.72	89,280.00		
<b>3.00</b>	<b>CONSERVACION DE ENROCADO</b>					<b>7,265.10</b>	<b>6,175.34</b>
3.01	Podas de formación de plantaciones forestales	Unid.	2,667.00	2.50	6,667.50		
3.01	Reacomodo de Roca	m3	40.00	14.94	597.60		
COSTO DIRECTO						107,745.10	91,583.34
COSTO INDIRECTO (15%)						16,161.77	13,737.50
<b>COSTO TOTAL DE OPERACIÓN Y MANTENIMIENTO</b>						<b>123,906.87</b>	<b>105,320.84</b>

## 2.3 Pisco River Basin

### Pi-1

#### COSTOS DE MANTENIMIENTO "CON PROYECTO" - ENROCADO

ITEM	DESCRIPCION	UNID.	CANTIDAD	UNITARIO S/.	PARCIAL S/.	SUB TOTAL S/.	PRECIOS SOCIALES
<b>1.00</b>	<b>OBRAS PRELIMINARES</b>					<b>10,892.00</b>	<b>9,258.20</b>
1.01	Moviliz. y Desmoviliz. de Maquinaria Pesada	Unid.	3.00	2,200.00	6,600.00		
1.02	Trazos Replanteo y Control Topografico	ml	3,700.00	1.16	4,292.00		
<b>2.00</b>	<b>MOVIMIENTO DE TIERRAS</b>					<b>37,200.00</b>	<b>31,620.00</b>
2.01	Limpieza Encauzamiento - Corte	m3	10,000.00	3.72	37,200.00		
<b>3.00</b>	<b>CONSERVACION DE ENROCADO</b>					<b>6,765.10</b>	<b>5,750.34</b>
3.01	Podas de formación de plantaciones forestales	Unid.	2,467.00	2.50	6,167.50		
3.01	Reacomodo de Roca	m3	40.00	14.94	597.60		
COSTO DIRECTO						54,857.10	46,628.54
COSTO INDIRECTO (15%)						8,228.57	6,994.28
<b>COSTO TOTAL DE OPERACIÓN Y MANTENIMIENTO</b>						<b>63,085.67</b>	<b>53,622.82</b>

### Pi-2

#### COSTOS DE MANTENIMIENTO "CON PROYECTO" - ENROCADO

ITEM	DESCRIPCION	UNID.	CANTIDAD	UNITARIO S/.	PARCIAL S/.	SUB TOTAL S/.	PRECIOS SOCIALES
<b>1.00</b>	<b>OBRAS PRELIMINARES</b>					<b>7,532.00</b>	<b>6,402.20</b>
1.01	Moviliz. y Desmoviliz. de Maquinaria Pesada	Unid.	2.00	2,200.00	4,400.00		
1.02	Trazos Replanteo y Control Topografico	ml	2,700.00	1.16	3,132.00		
<b>2.00</b>	<b>MOVIMIENTO DE TIERRAS</b>					<b>26,040.00</b>	<b>22,134.00</b>
2.01	Limpieza Encauzamiento - Corte	m3	7,000.00	3.72	26,040.00		
<b>3.00</b>	<b>CONSERVACION DE ENROCADO</b>					<b>4,903.38</b>	<b>4,167.87</b>
3.01	Podas de formación de plantaciones forestales	Unid.	1,800.00	2.50	4,500.00		
3.01	Reacomodo de Roca	m3	27.00	14.94	403.38		
COSTO DIRECTO						38,475.38	32,704.07
COSTO INDIRECTO (15%)						5,771.31	4,905.61
<b>COSTO TOTAL DE OPERACIÓN Y MANTENIMIENTO</b>						<b>44,246.69</b>	<b>37,609.68</b>



**Pi-3**

**COSTOS DE MANTENIMIENTO "CON PROYECTO" - ENROCADO**

ITEM	DESCRIPCION	UNID.	CANTIDAD	UNITARIO S/.	PARCIAL S/.	SUB TOTAL S/.	PRECIOS SOCIALES
<b>1.00</b>	<b>OBRAS PRELIMINARES</b>					<b>3,940.00</b>	<b>3,349.00</b>
1.01	Moviliz. y Desmoviliz. de Maquinaria Pesada	Unid.	1.00	2,200.00	2,200.00		
1.02	Trazos Replanteo y Control Topografico	ml	1,500.00	1.16	1,740.00		
<b>2.00</b>	<b>MOVIMIENTO DE TIERRAS</b>					<b>55,800.00</b>	<b>47,430.00</b>
2.01	Limpieza Encauzamiento - Corte	m3	15,000.00	3.72	55,800.00		
<b>3.00</b>	<b>CONSERVACION DE ENROCADO</b>					<b>2,724.10</b>	<b>2,315.49</b>
3.01	Podas de formación de plantaciones forestales	Unid.	1,000.00	2.50	2,500.00		
3.01	Reacomodo de Roca	m3	15.00	14.94	224.10		
COSTO DIRECTO						62,464.10	53,094.49
COSTO INDIRECTO (15%)						9,369.62	7,964.17
<b>COSTO TOTAL DE OPERACIÓN Y MANTENIMIENTO</b>						<b>71,833.72</b>	<b>61,058.66</b>

**Pi-4**

**COSTOS DE MANTENIMIENTO "CON PROYECTO" - ENROCADO**

ITEM	DESCRIPCION	UNID.	CANTIDAD	UNITARIO S/.	PARCIAL S/.	SUB TOTAL S/.	PRECIOS SOCIALES
<b>1.00</b>	<b>OBRAS PRELIMINARES</b>					<b>3,660.00</b>	<b>3,111.00</b>
1.01	Moviliz. y Desmoviliz. de Maquinaria Pesada	Unid.	1.00	2,500.00	2,500.00		
1.02	Trazos Replanteo y Control Topografico	ml	1,000.00	1.16	1,160.00		
<b>2.00</b>	<b>MOVIMIENTO DE TIERRAS</b>					<b>18,600.00</b>	<b>15,810.00</b>
2.01	Limpieza Encauzamiento - Corte	m3	5,000.00	3.72	18,600.00		
<b>3.00</b>	<b>CONSERVACION DE ENROCADO</b>					<b>1,846.78</b>	<b>1,569.76</b>
3.01	Podas de formación de plantaciones forestales	Unid.	667.00	2.50	1,667.50		
3.01	Reacomodo de Roca	m3	12.00	14.94	179.28		
COSTO DIRECTO						24,106.78	20,490.76
COSTO INDIRECTO (15%)						3,616.02	3,073.61
<b>COSTO TOTAL DE OPERACIÓN Y MANTENIMIENTO</b>						<b>27,722.80</b>	<b>23,564.38</b>

**Pi-5**

**COSTOS DE MANTENIMIENTO "CON PROYECTO" - ENROCADO**

ITEM	DESCRIPCION	UNID.	CANTIDAD	UNITARIO S/.	PARCIAL S/.	SUB TOTAL S/.	PRECIOS SOCIALES
<b>1.00</b>	<b>OBRAS PRELIMINARES</b>					<b>3,660.00</b>	<b>3,111.00</b>
1.01	Moviliz. y Desmoviliz. de Maquinaria Pesada	Unid.	1.00	2,500.00	2,500.00		
1.02	Trazos Replanteo y Control Topografico	ml	1,000.00	1.16	1,160.00		
<b>2.00</b>	<b>MOVIMIENTO DE TIERRAS</b>					<b>18,600.00</b>	<b>15,810.00</b>
2.01	Limpieza Encauzamiento - Corte	m3	5,000.00	3.72	18,600.00		
<b>3.00</b>	<b>CONSERVACION DE ENROCADO</b>					<b>1,846.78</b>	<b>1,569.76</b>
3.01	Podas de formación de plantaciones forestales	Unid.	667.00	2.50	1,667.50		
3.01	Reacomodo de Roca	m3	12.00	14.94	179.28		
COSTO DIRECTO						24,106.78	20,490.76
COSTO INDIRECTO (15%)						3,616.02	3,073.61
<b>COSTO TOTAL DE OPERACIÓN Y MANTENIMIENTO</b>						<b>27,722.80</b>	<b>23,564.38</b>

**Pi-6**

**CONSTRUCCION DE POZA DE REGULACIÓN DE SEDIMENTOS**

**COSTOS DE MANTENIMIENTO "CON PROYECTO" - ENROCADO**

ITEM	DESCRIPCION	UNID.	CANTIDAD	UNITARIO S/.	PARCIAL S/.	SUB TOTAL S/.	PRECIOS SOCIALES
<b>1.00</b>	<b>OBRAS PRELIMINARES</b>					<b>16,728.00</b>	<b>14,218.80</b>
1.01	Moviliz. y Desmoviliz. de Maquinaria Pesada	Unid.	4.00	2,500.00	10,000.00		
1.02	Trazos Replanteo y Control Topografico	ml	5,800.00	1.16	6,728.00		
<b>2.00</b>	<b>MOVIMIENTO DE TIERRAS</b>					<b>107,880.00</b>	<b>91,698.00</b>
2.01	Limpieza Encauzamiento - Corte	m3	29,000.00	3.72	107,880.00		
<b>3.00</b>	<b>CONSERVACION DE ENROCADO</b>					<b>4,299.78</b>	<b>3,654.81</b>
3.01	Podas de formación de plantaciones forestales	Unid.	1,200.00	2.50	3,000.00		
3.01	Reacomodo de Roca	m3	87.00	14.94	1,299.78		
COSTO DIRECTO						128,907.78	109,571.61
COSTO INDIRECTO (15%)						19,336.17	16,435.74
<b>COSTO TOTAL DE OPERACIÓN Y MANTENIMIENTO</b>						<b>148,243.95</b>	<b>126,007.35</b>

## 2.4 Majes-Camaná River Basin

### MC-1

#### COSTOS DE MANTENIMIENTO "CON PROYECTO" - ENROCADO

ITEM	DESCRIPCION	UNID.	CANTIDAD	UNITARIO S/.	PARCIAL S/.	SUB TOTAL S/.	PRECIOS SOCIALES
<b>1.00</b>	<b>OBRAS PRELIMINARES</b>					<b>13,975.00</b>	<b>11,878.75</b>
1.01	Moviliz. y Desmoviliz. de Maquinaria Pesada	Unid.	4.00	2,200.00	8,800.00		
1.02	Trazos Replanteo y Control Topografico	ml	4,500.00	1.15	5,175.00		
<b>2.00</b>	<b>MOVIMIENTO DE TIERRAS</b>					<b>74,800.00</b>	<b>63,580.00</b>
2.01	Limpieza Encauzamiento - Corte	m3	20,000.00	3.74	74,800.00		
<b>3.00</b>	<b>CONSERVACION DE ENROCADO</b>					<b>8,219.52</b>	<b>6,986.59</b>
3.01	Podas de formación de plantaciones forestales	Unid.	3,000.00	2.50	7,500.00		
3.01	Reacomodo de Roca	m3	48.00	14.99	719.52		
COSTO DIRECTO						96,994.52	82,445.34
COSTO INDIRECTO (15%)						14,549.18	12,366.80
<b>COSTO TOTAL DE OPERACIÓN Y MANTENIMIENTO</b>						<b>111,543.70</b>	<b>94,812.14</b>

### MC-2

#### COSTOS DE MANTENIMIENTO "CON PROYECTO" - ENROCADO

ITEM	DESCRIPCION	UNID.	CANTIDAD	UNITARIO S/.	PARCIAL S/.	SUB TOTAL S/.	PRECIOS SOCIALES
<b>1.00</b>	<b>OBRAS PRELIMINARES</b>					<b>6,700.00</b>	<b>5,695.00</b>
1.01	Moviliz. y Desmoviliz. de Maquinaria Pesada	Unid.	2.00	2,200.00	4,400.00		
1.02	Trazos Replanteo y Control Topografico	ml	2,000.00	1.15	2,300.00		
<b>2.00</b>	<b>MOVIMIENTO DE TIERRAS</b>					<b>37,400.00</b>	<b>31,790.00</b>
2.01	Limpieza Encauzamiento - Corte	m3	10,000.00	3.74	37,400.00		
<b>3.00</b>	<b>CONSERVACION DE ENROCADO</b>					<b>3,662.28</b>	<b>3,112.94</b>
3.01	Podas de formación de plantaciones forestales	Unid.	1,333.00	2.50	3,332.50		
3.01	Reacomodo de Roca	m3	22.00	14.99	329.78		
COSTO DIRECTO						47,762.28	40,597.94
COSTO INDIRECTO (15%)						7,164.34	6,089.69
<b>COSTO TOTAL DE OPERACIÓN Y MANTENIMIENTO</b>						<b>54,926.62</b>	<b>46,687.63</b>

### MC-3

#### COSTOS DE MANTENIMIENTO "CON PROYECTO" - ENROCADO

ITEM	DESCRIPCION	UNID.	CANTIDAD	UNITARIO S/.	PARCIAL S/.	SUB TOTAL S/.	PRECIOS SOCIALES
<b>1.00</b>	<b>OBRAS PRELIMINARES</b>					<b>20,100.00</b>	<b>17,085.00</b>
1.01	Moviliz. y Desmoviliz. de Maquinaria Pesada	Unid.	6.00	2,200.00	13,200.00		
1.02	Trazos Replanteo y Control Topografico	ml	6,000.00	1.15	6,900.00		
<b>2.00</b>	<b>MOVIMIENTO DE TIERRAS</b>					<b>112,200.00</b>	<b>95,370.00</b>
2.01	Limpieza Encauzamiento - Corte	m3	30,000.00	3.74	112,200.00		
<b>3.00</b>	<b>CONSERVACION DE ENROCADO</b>					<b>11,049.30</b>	<b>9,391.91</b>
3.01	Podas de formación de plantaciones forestales	Unid.	4,000.00	2.50	10,000.00		
3.01	Reacomodo de Roca	m3	70.00	14.99	1,049.30		
COSTO DIRECTO						143,349.30	121,846.91
COSTO INDIRECTO (15%)						21,502.40	18,277.04
<b>COSTO TOTAL DE OPERACIÓN Y MANTENIMIENTO</b>						<b>164,851.70</b>	<b>140,123.94</b>

### MC-4

#### COSTOS DE MANTENIMIENTO "CON PROYECTO" - ENROCADO

ITEM	DESCRIPCION	UNID.	CANTIDAD	UNITARIO S/.	PARCIAL S/.	SUB TOTAL S/.	PRECIOS SOCIALES
<b>1.00</b>	<b>OBRAS PRELIMINARES</b>					<b>4,800.00</b>	<b>4,080.00</b>
1.01	Moviliz. y Desmoviliz. de Maquinaria Pesada	Unid.	1.00	2,500.00	2,500.00		
1.02	Trazos Replanteo y Control Topografico	ml	2,000.00	1.15	2,300.00		
<b>2.00</b>	<b>MOVIMIENTO DE TIERRAS</b>					<b>37,400.00</b>	<b>31,790.00</b>
2.01	Limpieza Encauzamiento - Corte	m3	10,000.00	3.74	37,400.00		
<b>3.00</b>	<b>CONSERVACION DE ENROCADO</b>					<b>3,707.25</b>	<b>3,151.16</b>
3.01	Podas de formación de plantaciones forestales	Unid.	1,333.00	2.50	3,332.50		
3.01	Reacomodo de Roca	m3	25.00	14.99	374.75		
COSTO DIRECTO						45,907.25	39,021.16
COSTO INDIRECTO (15%)						6,886.09	5,853.17
<b>COSTO TOTAL DE OPERACIÓN Y MANTENIMIENTO</b>						<b>52,793.34</b>	<b>44,874.34</b>

## MC-5

### COSTOS DE MANTENIMIENTO "CON PROYECTO" - ENROCADO

ITEM	DESCRIPCION	UNID.	CANTIDAD	UNITARIO S/.	PARCIAL S/.	SUB TOTAL S/.	PRECIOS SOCIALES
<b>1.00</b>	<b>OBRAS PRELIMINARES</b>					<b>11,150.00</b>	<b>9,477.50</b>
1.01	Moviliz. y Desmoviliz. de Maquinaria Pesada	Unid.	4.00	2,500.00	10,000.00		
1.02	Trazos Replanteo y Control Topografico	ml	1,000.00	1.15	1,150.00		
<b>2.00</b>	<b>MOVIMIENTO DE TIERRAS</b>					<b>74,800.00</b>	<b>63,580.00</b>
2.01	Limpieza Encauzamiento - Corte	m3	20,000.00	3.74	74,800.00		
<b>3.00</b>	<b>CONSERVACION DE ENROCADO</b>					<b>7,387.02</b>	<b>6,278.97</b>
3.01	Podas de formación de plantaciones forestales	Unid.	2,667.00	2.50	6,667.50		
3.01	Reacomodo de Roca	m3	48.00	14.99	719.52		
COSTO DIRECTO						93,337.02	79,336.47
COSTO INDIRECTO (15%)						14,000.55	11,900.47
<b>COSTO TOTAL DE OPERACIÓN Y MANTENIMIENTO</b>						<b>107,337.57</b>	<b>91,236.94</b>

## MC-6

### COSTOS DE MANTENIMIENTO "CON PROYECTO" - ENROCADO

ITEM	DESCRIPCION	UNID.	CANTIDAD	UNITARIO S/.	PARCIAL S/.	SUB TOTAL S/.	PRECIOS SOCIALES
<b>1.00</b>	<b>OBRAS PRELIMINARES</b>					<b>14,055.00</b>	<b>11,946.75</b>
1.01	Moviliz. y Desmoviliz. de Maquinaria Pesada	Unid.	3.00	2,500.00	7,500.00		
1.02	Trazos Replanteo y Control Topografico	ml	5,700.00	1.15	6,555.00		
<b>2.00</b>	<b>MOVIMIENTO DE TIERRAS</b>					<b>106,590.00</b>	<b>90,601.50</b>
2.01	Limpieza Encauzamiento - Corte	m3	28,500.00	3.74	106,590.00		
<b>3.00</b>	<b>CONSERVACION DE ENROCADO</b>					<b>10,399.40</b>	<b>8,839.49</b>
3.01	Podas de formación de plantaciones forestales	Unid.	3,800.00	2.50	9,500.00		
3.01	Reacomodo de Roca	m3	60.00	14.99	899.40		
COSTO DIRECTO						131,044.40	111,387.74
COSTO INDIRECTO (15%)						19,656.66	16,708.16
<b>COSTO TOTAL DE OPERACIÓN Y MANTENIMIENTO</b>						<b>150,701.06</b>	<b>128,095.90</b>

**MC-7**

**COSTOS DE MANTENIMIENTO "CON PROYECTO" - ENROCADO**

ITEM	DESCRIPCION	UNID.	CANTIDAD	UNITARIO S/.	PARCIAL S/.	SUB TOTAL S/.	PRECIOS SOCIALES
<b>1.00</b>	<b>OBRAS PRELIMINARES</b>					<b>5,490.00</b>	<b>4,666.50</b>
1.01	Moviliz. y Desmoviliz. de Maquinaria Pesada	Unid.	1.00	2,500.00	2,500.00		
1.02	Trazos Replanteo y Control Topografico	ml	2,600.00	1.15	2,990.00		
<b>2.00</b>	<b>MOVIMIENTO DE TIERRAS</b>					<b>48,620.00</b>	<b>41,327.00</b>
2.01	Limpieza Encauzamiento - Corte	m3	13,000.00	3.74	48,620.00		
<b>3.00</b>	<b>CONSERVACION DE ENROCADO</b>					<b>4,782.20</b>	<b>4,064.87</b>
3.01	Podas de formación de plantaciones forestales	Unid.	1,733.00	2.50	4,332.50		
3.01	Reacomodo de Roca	m3	30.00	14.99	449.70		
<b>COSTO DIRECTO</b>						<b>58,892.20</b>	<b>50,058.37</b>
<b>COSTO INDIRECTO (15%)</b>						<b>8,833.83</b>	<b>7,508.76</b>
<b>COSTO TOTAL DE OPERACIÓN Y MANTENIMIENTO</b>						<b>67,726.03</b>	<b>57,567.13</b>

## 2.5 Resumen

		Costo de O&M	
Cuenca	Punto Crítico	Precios Privados	Precios Sociales
Rio Cañete	Ca-1	31,310.71	26,614.10
	Ca-2	109,035.09	92,679.82
	Ca-3	45,212.69	38,430.78
	Ca-4	25,736.84	21,876.31
	Ca-5	48,574.62	41,288.43
	<b>Total</b>	<b>259,869.94</b>	<b>220,889.45</b>
Rio Chincha	Chico-1	95,205.79	80,924.92
	Chico-2	25,826.59	21,952.60
	Chico-3	48,600.00	42,606.00
	Ma-1	141,354.25	120,151.11
	Ma-2	123,906.87	105,320.84
	<b>Total</b>	<b>434,893.49</b>	<b>370,955.46</b>
Rio Pisco	Pi-1	63,085.67	53,622.82
	Pi-2	44,246.69	37,609.68
	Pi-3	71,833.72	61,058.66
	Pi-4	27,722.80	23,564.38
	Pi-5	27,722.80	23,564.38
	Pi-6	148,243.95	126,007.35
	<b>Total</b>	<b>382,855.61</b>	<b>325,427.27</b>
Rio Majes-Camaná	MC-1	111,543.70	94,812.14
	MC-2	54,926.62	46,687.63
	MC-3	164,851.70	140,123.94
	MC-4	52,793.34	44,874.34
	MC-5	107,337.57	91,236.94
	MC-6	150,701.06	128,095.90
	MC-7	67,726.03	57,567.13
	<b>Total</b>	<b>709,880.02</b>	<b>603,398.01</b>
<b>TOTAL</b>		<b>1,787,499.05</b>	<b>1,520,670.19</b>

### 3 Total Project Cost

#### 3.1 Private Prices

##### (a) Total Program Cost

COSTO DIRECTO（直接工事費）							COSTO INDIRECTO（間接工事費）				
NOMBRE DE LA CUENCA 流域名	COMPONENT A			COMPONENT B	COSTO DIRECTO TOTAL  直接工事費計 (5)=(1)+(2)+(3)+(4)	Gastos Generales  諸経費 (6) = 0.15 x (5)	Utilidad  利益 (7) = 0.1 x (5)	Costo de Obras  工事費 (8) = (5)+(6)+(7)	IGV  税金 (9) = 0.18 x (8)	COSTO TOTAL DE OBRAS  建設費 (10) = (8)+(9)	
	COSTOS DE INFRAESTRUCTURA		Forestación y Recuperación Vegetal  植林/ 植生回復 (2)	Mitigación de Impacto Ambiental  環境影響 (3)							Capacitación y prevención de riesgos  防災教育/ 能力開発 (4)
	Infraestructura	Rehabilitación de infraestructuras existentes  補償工事費 (1)-2									
	対策工 (1)-1	(1)-2									
CAÑETE	15,867,305	505,660	26,746	585,576	144,050	2,569,400	1,712,934	21,411,671	3,854,101	25,265,771	
CHINCHA	26,547,476	487,440	76,593	798,096	144,050	4,208,048	2,805,365	35,067,068	6,312,072	41,379,140	
PISCO	39,047,316	4,168	50,051	772,915	144,050	6,002,775	4,001,850	50,023,125	9,004,163	59,027,288	
MAJES-CAMANA	47,466,607	1,164,852	268,196	1,043,414	144,050	7,513,068	5,008,712	62,608,899	11,269,602	73,878,501	
TOTAL	128,928,703	2,162,119	421,586	3,200,002	576,200	20,293,292	13,528,861	169,110,763	30,439,937	199,550,700	

NOMBRE DE LA CUENCA 流域名	COSTOS DE CONSULTORIA（コンサルタント費）			INFRAESTRUCTURA HIDRAULICA COSTO TOTAL  構築物・事業費 (14)=(10)+(13)	COSTOS DE EXPROPIACIÓN DE PREDIOS  用地取得費 (15)	COSTO TOTAL POR PROYECTO  流域別事業費 (17)=(14)+(15)+(16)	GASTOS DE ADMINISTRACION DEL PROGRAMA  実施機関管理費 (18)	COSTO TOTAL DEL PROGRAMA  全体事業費 (19)=(17)+(18)
	Expediente Tecnico  詳細設計 (11)	Supervisión  施工管理費 (12)	COSTOS TOTALES DE CONSULTORIA  コンサルタント 費 (13)=(11)+(12)	28,332,338	1,263,432	29,595,770	(18)	(19)=(17)+(18)
CAÑETE	1,236,604	1,829,962	3,066,566	28,332,338	1,263,432	29,595,770		
CHINCHA	2,025,254	2,997,030	5,022,284	46,401,424	622,981	47,024,405		
PISCO	2,889,022	4,275,259	7,164,281	66,191,569	352,567	66,544,136		
MAJES-CAMANA	3,615,898	5,350,910	8,966,808	82,845,309	4,946,510	87,791,820		
TOTAL	9,766,778	14,453,162	24,219,940	223,770,640	7,185,491	230,956,130	8,518,170	239,474,300



**(b) Costs by components**

	INFRAESTRUCTURA	Gastos Generales	Utilidad	Costo de Obras	IGV	Costo Total de Obras
CAÑETE	16,372,964	2,455,945	1,637,296	20,466,206	3,683,917	24,150,123
CHINCHA	27,034,915	4,055,237	2,703,492	33,793,644	6,082,856	39,876,500
PISCO	39,051,484	5,857,723	3,905,148	48,814,355	8,786,584	57,600,939
MAJES-CAMANA	48,631,459	7,294,719	4,863,146	60,789,324	10,942,078	71,731,402
TOTAL	131,090,822	19,663,623	13,109,082	163,863,528	29,495,435	193,358,963

	FORESTACION	Gastos Generales	Utilidad	Costo de Obras	IGV	Costo Total de Obras
CAÑETE	26,746	4,012	2,675	33,433	6,018	39,450
CHINCHA	76,593	11,489	7,659	95,741	17,233	112,975
PISCO	50,051	7,508	5,005	62,564	11,261	73,825
MAJES-CAMANA	268,196	40,229	26,820	335,245	60,344	395,589
TOTAL	421,586	63,238	42,159	526,983	94,857	621,839

	IMPACTO AMBIENTAL	Gastos Generales	Utilidad	Costo de Obras	IGV	Costo Total de Obras
CAÑETE	585,576	87,836	58,558	731,970	131,755	863,725
CHINCHA	798,096	119,714	79,810	997,620	179,572	1,177,192
PISCO	772,915	115,937	77,292	966,144	173,906	1,140,050
MAJES-CAMANA	1,043,414	156,512	104,341	1,304,268	234,768	1,539,036
TOTAL	3,200,002	480,000	320,000	4,000,002	720,000	4,720,002

	CAPACITACION	Gastos Generales	Utilidad	Costo de Obras	IGV	Costo Total de Obras
CAÑETE	144,050	21,608	14,405	180,063	32,411	212,474
CHINCHA	144,050	21,608	14,405	180,063	32,411	212,474
PISCO	144,050	21,608	14,405	180,063	32,411	212,474
MAJES-CAMANA	144,050	21,608	14,405	180,063	32,411	212,474
TOTAL	576,200	86,430	57,620	720,250	129,645	849,895

### 3.2 Social Prices

#### (a) Total Program Cost

NOMBRE DE LA CUENCA 流域名	COSTO TOTAL DE LOS COMPONENTES (A + B) PRECIOS PRIVADOS 減設費 (民間価格) (10) = (8)+(9)	FACTOR DE CORRECCION (FC) 修正係数	COSTO TOTAL DE LOS COMPONENTES (A + B) PRECIOS SOCIALES 建設費 (社会価格)	COSTOS DE CONSULTORIA (コンサルタント費)			INFRAESTRUCTUR A HIDRAULICA COSTO TOTAL 構造物・事業費 (14) = (10)+(13)	COSTOS DE EXPROPIACIÓN DE PREDIOS 用地取得費 (15)	COSTO TOTAL POR PROYECTO 流域別事業費 (17) = (14)+(15)+(16)	GASTOS DE ADMINISTRACION DEL PROGRAMA 実施機関管理 費 (18)	COSTO TOTAL DEL PROGRAMA 全体事業費 (19) = (17)+(18)
				Expediente Tecnico 詳細設計 (11)	Supervisión 施工管理費 (12)	COSTOS TOTALES DE CONSULTORIA コンサルタント 費 (13)=(11)+(12)					
CAÑETE	25,265,771	0.832	21,025,353	1,108,551	1,652,295	2,760,846	23,786,198	1,077,688	24,863,886		
CHINCHA	41,379,140	0.825	34,143,142	1,800,180	2,683,167	4,483,347	38,626,489	537,590	39,164,079		
PISCO	59,027,288	0.825	48,694,156	2,567,375	3,826,671	6,394,045	55,088,201	341,990	55,430,191		
MAJES-CAMANA	73,878,501	0.832	61,465,314	3,240,727	4,830,303	8,071,030	69,536,344	4,304,833	73,841,176		
TOTAL	199,550,700		165,327,964	8,716,833	12,992,435	21,709,268	187,037,232	6,262,101	193,299,333	7,512,038	200,811,371

4 Calculation of economic variables (private prices)

4.1 Cañete River Basin

EVALUACIÓN ECONOMICA (PRECIOS PRIVADOS)																									経済評価 (民間価格)								
期間 (Etapas)		年層 t (Años)	便益 (B) (BENEFIT)		費用 (COST)																残存価値 ⑩ Valor Residual	費用便益比 (CBR) ⑮ (Costo/Benef.)	純現在価値 (NPV) ⑯ (VAN)	内部収益率 (Internal rate of return) ⑰ (Tasa Interna de Retorno)									
			年平均被害軽減 期待額 (b) Daño Medio Anual ①	便益(B) PV ② Actualización del Daño Medio Anual (\$/.)	建設費 (対策工+構造物) (Costo de Infraestructuras)		設備・観測維持費 (O&M de Estructuras)		植林/植生回復 (Reforestación)		環境影響 (Impacto Ambiental)		防災教育 (Capacitación)		用地取得 (Expropiación de Predios)		施工管理 (Supervisión)		費用計 (c) (Total de Costos)														
					費用 c ③ (Costo)	現在価値(PV) ④ Actualización del Costo	費用 c ③-1 (Costo)	現在価値(PV) ④-1 Actualización del Costo	費用 c ③-2 (Costo)	現在価値(PV) ④-2 Actualización del Costo	費用 c ③-3 (Costo)	現在価値(PV) ④-3 Actualización del Costo	費用 c ③-4 (Costo)	現在価値(PV) ④-4 Actualización del Costo	費用 c ③-5 (Costo)	現在価値(PV) ④-5 Actualización del Costo	費用 c ③-6 (Costo)	現在価値(PV) ④-6 Actualización del Costo	費用計 a (Total Cost) ⑦	現在価値計 (CPV) ⑧ Costo total Actualizado				B/C I ⑮/ I ③-⑧	NPV (⑰-⑩) (VAB-VAC)	B-C (⑰-⑱) (IRR (TIR))							
CAÑETE	整備期間 a	設計期間 (Diseño)	0	2012			1,236,604	1,236,604											1,236,604	1,236,604	0		-1,236,604	-1,236,604									
		施工期間 (Construcción)	1	2013			12,073,061	10,977,328				19,725	17,932	431,862	392,602	106,237	96,579	631,716	574,287	914,981	831,801	14,179,583	12,890,530	0	-12,890,530	-14,179,583							
			2	2014			12,073,061	9,979,389				19,725	16,302	431,862	356,911	106,237	87,799	631,716	522,079	914,981	756,183	14,179,583	11,718,664	0	-11,718,664	-14,179,583							
	施設完成後の評価期間 13年 (Análisis de Proyección en 13 años después de la culminación de las obras)		3	2015	12,273,572	9,221,316		0	0	259,870	195,244										259,870	195,244	0	9,026,072	12,013,702								
			4	2016	12,273,572	8,383,015				259,870	177,495											259,870	177,495	0	8,205,520	12,013,702							
			5	2017	12,273,572	7,620,922				259,870	161,359											259,870	161,359	0	7,459,564	12,013,702							
			6	2018	12,273,572	6,928,111				259,870	146,690											259,870	146,690	0	6,781,421	12,013,702							
			7	2019	12,273,572	6,298,283				259,870	133,354											259,870	133,354	0	6,164,929	12,013,702							
			8	2020	12,273,572	5,725,712				259,870	121,231											259,870	121,231	0	5,604,480	12,013,702							
			9	2021	12,273,572	5,205,192				259,870	110,210											259,870	110,210	0	5,094,982	12,013,702							
			10	2022	12,273,572	4,731,993				259,870	100,191											259,870	100,191	0	4,631,802	12,013,702							
			11	2023	12,273,572	4,301,812				259,870	91,083											259,870	91,083	0	4,210,729	12,013,702							
			12	2024	12,273,572	3,910,738				259,870	82,803											259,870	82,803	0	3,827,936	12,013,702							
			13	2025	12,273,572	3,555,217				259,870	75,275											259,870	75,275	0	3,479,941	12,013,702							
			14	2026	12,273,572	3,232,015				259,870	68,432											259,870	68,432	0	3,163,583	12,013,702							
			15	2027	12,273,572	2,938,195				259,870	62,211											259,870	62,211	0	2,875,985	12,013,702							
	合計 (Total)					159,556,431	72,052,521	25,386,726	22,193,322	3,378,309	1,125,577	39,450	34,234	863,725	746,513	212,474	184,378	1,263,432	1,096,367	1,829,962	1,587,984	32,974,079	27,371,375	0	2,63	44,681,147	33.2%						
																				VAB												VAC	

4.2 Chíncha River Basin

EVALUACIÓN ECONOMICA (PRECIOS PRIVADOS)																									経済評価 (民間価格)									
期間 (Etapas)		年度 t (Años)	便益 (B) (BENEFIT)		費用 (COST)																残存価値 ⑩ Valor Residual	費用便益比 (CBR) ⑮ (Costo/Benef.)	純現在価値 (NPV) ⑯ (VAN)	内部収益率 (Internal rate of return) ⑰ (Tasa Interna de Retorno)										
			年平均被害軽減 期待額 (b) Daño Medio Anual ①	便益(B) PV ② Actualización del Daño Medio Anual (\$/.)	建設費 (対策工+補償費) (Costo de Infraestructuras)		設備・観測 維持費 (O&M de Estructuras)		植林/植生回復 (Reforestación)		環境影響 (Impacto Ambiental)		防災教育 (Capacitación)		用地取得 (Expropiación de Predios)		施工管理 (Supervisión)		費用計 (c) (Total de Costos)															
					費用 c ③ (Costo)	現在価値(PV) ④ Actualización del Costo	費用c ③-1 (Costo)	現在価値(PV) ④-1 Actualización del Costo	費用c ③-2 (Costo)	現在価値(PV) ④-2 Actualización del Costo	費用c ③-3 (Costo)	現在価値(PV) ④-3 Actualización del Costo	費用c ③-4 (Costo)	現在価値(PV) ④-4 Actualización del Costo	費用c ③-5 (Costo)	現在価値(PV) ④-5 Actualización del Costo	費用c ③-6 (Costo)	現在価値(PV) ④-6 Actualización del Costo	費用計 c (Total Cost) ⑦	現在価値計 (CPV) ⑧ Costo total Actualizado				B/C I ⑮/ I (③-④)	NPV (⑰-⑩) (VAB-VAC)	B-C (⑰-⑱) (IRR (TIR))								
CHINCHA	整備期間 a	設計期間 (Diseño)	0	2012			2,025,254	2,025,254											2,025,254	2,025,254	0		-2,025,254	-2,025,254										
			施工期間 (Construcción)	1	2013			19,938,150	18,125,682			56,487	51,352	588,596	535,287	106,237	96,579	111,491	283,173	1,498,515	1,362,286	22,499,576	20,454,160	0	-20,454,160	-22,499,576								
				2	2014			19,938,150	16,477,893			56,487	46,684	588,596	486,443	106,237	87,799	111,491	257,430	1,498,515	1,238,442	22,499,576	18,594,691	0	-18,594,691	-22,499,576								
	施設完成後の評価期間 13年 (Análisis de Proyección en 13 años después de la culminación de las obras)		3	2015	20,531,810	15,423,833	0	0	434,893	32,6742											434,893	326,742	0	15,099,111	20,096,917									
		4	2016	20,531,810	14,023,502			434,893	29,7038													434,893	297,038	0	13,726,484	20,096,917								
		5	2017	20,531,810	12,748,639			434,893	27,0035													434,893	270,035	0	12,478,604	20,096,917								
		6	2018	20,531,810	11,589,671			434,893	24,5486													434,893	245,486	0	11,344,185	20,096,917								
		7	2019	20,531,810	10,536,065			434,893	22,3169													434,893	223,169	0	10,312,196	20,096,917								
		8	2020	20,531,810	9,578,241			434,893	20,2881													434,893	202,881	0	9,375,160	20,096,917								
		9	2021	20,531,810	8,707,492			434,893	18,4337													434,893	184,437	0	8,523,054	20,096,917								
		10	2022	20,531,810	7,913,902			434,893	16,7670													434,893	167,670	0	7,748,131	20,096,917								
		11	2023	20,531,810	7,196,274			434,893	15,2428													434,893	152,428	0	7,043,147	20,096,917								
		12	2024	20,531,810	6,542,067			434,893	13,8570													434,893	138,570	0	6,403,497	20,096,917								
		13	2025	20,531,810	5,947,334			434,893	12,5973													434,893	125,973	0	5,821,161	20,096,917								
		14	2026	20,531,810	5,406,667			434,893	11,4521													434,893	114,521	0	5,292,146	20,096,917								
		15	2027	20,531,810	4,915,152			434,893	10,4110													434,893	104,110	0	4,811,042	20,096,917								
	合計 (Total)					266,913,530	120,532,859	41,901,734	36,628,829	5,653,615	2,353,061	112,973	98,036	1,177,192	1,021,530	212,474	184,378	622,981	540,604	2,997,030	2,600,728	52,678,021	43,627,165	0	2.76	76,905,195	34.8%							
																				VAB													VAC	

4.3 Pisco River Basin

EVALUACIÓN ECONOMICA (PRECIOS PRIVADOS) 経済評価 (民間価格)																									
期間 (Etapas)		年 度 t (Años)	便益 (B) (BENEFIT)		費用 (COST)														残存価値 Salvage Value ③ Valor Residual	費用便益比 (CBR) ⑩ (Costo/Benef.)	純現在価値 (NPV) ⑪ (VAN)	内部収益率 (Internal rate of return) ⑫ (Tasa interna de Retorno)			
			年平均被害軽減 期待値 (b) Daño Medio Anual ①	便益(B) PV ② Actualización del Daño Medio Anual (\$/.)	建設費 (対照工・補償費) (Costo de Infraestructuras)		環境・護岸維持費 (O&M de Estructuras)		植林・植生回復 (Reforestación)		環境影響 (Impacto Ambiental)		防災教育 (Capacitación)		用地取得 (Expropiación de Predios)		施工管理 (Supervisión)					費用計 (c) (Total de Costos)			
					費用 c ③ (Costo)	現在価値(PV) ④ Actualización del Costo	費用 c ⑤-1 (Costo)	現在価値(PV) ⑥-1 Actualización del Costo	費用 c ⑤-2 (Costo)	現在価値(PV) ⑥-2 Actualización del Costo	費用 c ⑤-3 (Costo)	現在価値(PV) ⑥-3 Actualización del Costo	費用 c ⑤-4 (Costo)	現在価値(PV) ⑥-4 Actualización del Costo	費用 c ⑤-5 (Costo)	現在価値(PV) ⑥-5 Actualización del Costo	費用 c ⑤-6 (Costo)	現在価値(PV) ⑥-6 Actualización del Costo				費用計 c (Total Cost) ⑦	現在価値計 (CPV) ⑧ Costo total Actualizado	B/C 1⑩/ 1 (①-③)	NPV (⑫-⑪) (VAB-VAC)
PISCO	整備期間 a	設計期間 (Diseño)	0	2012		2,889,022	2,889,022												2,889,022	2,889,022	0		-2,889,022	-2,889,022	
		施工期間 (Construcción)	1	2013		28,800,469	26,182,245				36,913	33,557	570,025	511,205	106,237	96,579	176,284	160,218	2,137,630	1,943,300	31,817,557	28,934,143	0	-2,893,143	-3,1827,557
	施設完成後の評価期間 13年 (Análisis de Proyección en 13 años después de la culminación de las obras)		2	2014		28,800,469	23,802,041				36,913	30,506	570,025	471,095	106,237	87,799	176,284	145,619	2,137,630	1,766,636	31,817,557	26,303,766	0	-2,6301,766	-3,1827,557
			3	2015	17,843,741	13,406,267	0	0	382,856	187,645											312,856	287,645	0	13,116,622	17,460,885
			4	2016	17,843,741	12,187,515			382,856	161,496											312,856	261,496	0	11,925,020	17,460,885
			5	2017	17,843,741	11,079,559			382,856	137,723											312,856	237,723	0	10,641,836	17,460,885
			6	2018	17,843,741	10,072,327			382,856	116,112											312,856	216,112	0	9,356,215	17,460,885
			7	2019	17,843,741	9,156,661			382,856	196,465											312,856	196,465	0	8,960,195	17,460,885
			8	2020	17,843,741	8,324,237			382,856	178,605											312,856	178,605	0	8,141,632	17,460,885
			9	2021	17,843,741	7,567,488			382,856	162,368											312,856	162,368	0	7,405,120	17,460,885
			10	2022	17,843,741	6,879,535			382,856	147,607											312,856	147,607	0	6,731,827	17,460,885
			11	2023	17,843,741	6,254,122			382,856	134,189											312,856	134,189	0	6,113,934	17,460,885
			12	2024	17,843,741	5,685,566			382,856	121,990											312,856	121,990	0	5,561,576	17,460,885
			13	2025	17,843,741	5,168,696			382,856	110,900											312,856	110,900	0	5,057,797	17,460,885
			14	2026	17,843,741	4,698,815			382,856	100,818											312,856	100,818	0	4,597,997	17,460,885
	15		2027	17,843,741	4,271,650			382,856	91,653											312,856	91,653	0	4,179,997	17,460,885	
	合計 (Total)				231,968,634	104,752,437	60,489,961	52,873,308	4,977,123	2,147,570	73,825	64,063	1,140,050	981,300	212,474	184,378	352,567	305,947	4,275,259	3,709,936	71,511,259	60,374,501	0	1.74	44,377,936
							VAB														VAC				

4.4 Majes-Camaná River Basin

EVALUACIÓN ECONOMICA (PRECIOS PRIVADOS) 経済評価 (民間価格)																										
期間 (Etapas)		年度 t (Años)	便益 (B) (BENEFIT)		費用 (COST)														残存価値 Salvage Value ③ Valor Residual	費用便益比 (CBR) ⑩ (Costo/Benef.)	純現在価値 (NPV) ⑪ (VAN)	内部収益率 (Internal rate of return) ⑫ (Tasa interna de Retorno)				
			年平均被害軽減 減期待値 (b) Daño Medio Anual ①	便益(B) PV ② Actualización del Daño Medio Anual (\$/.)	建設費 (対照工・補償費) (Costo de Infraestructuras)		環境・護岸 維持費 (O&M de Estructuras)		植林・植生回復 (Reforestación)		環境影響 (Impacto Ambiental)		防災教育 (Capacitación)		用地取得 (Expropiación de Predios)		施工管理 (Supervisión)					費用計 (c) (Total de Costos)				
					費用 c ③ (Costo)	現在価値(PV) ④ Actualización del Costo	費用 c ⑤-1 (Costo)	現在価値(PV) ⑥-1 Actualización del Costo	費用 c ⑤-2 (Costo)	現在価値(PV) ⑥-2 Actualización del Costo	費用 c ⑤-3 (Costo)	現在価値(PV) ⑥-3 Actualización del Costo	費用 c ⑤-4 (Costo)	現在価値(PV) ⑥-4 Actualización del Costo	費用 c ⑤-5 (Costo)	現在価値(PV) ⑥-5 Actualización del Costo	費用 c ⑤-6 (Costo)	現在価値(PV) ⑥-6 Actualización del Costo				費用計 c (Total Cost) ⑦	現在価値計 (CPV) ⑧ Costo total Actualizado	B/C 1⑩/ 1 (①-③)	NPV (⑫-⑪) (VAB-VAC)	B-C (①-⑦) (IRR (TIR)
MAJES-CAMANA	整備期間 a	設計期間 (Diseño)	0	2012			3,615,898	3,615,898											3,615,898	3,615,898	0		-3,615,898	-3,615,898		
		施工期間 (Construcción)	1	2013			35,865,701	32,605,183				197,795	179,813	769,518	691,962	106,237	96,579	2,473,255	2,248,414	2,675,455	2,432,232	42,087,961	38,261,783	0	-3,826,178	-42,087,961
			2	2014			35,865,701	29,641,075				197,795	163,467	769,518	631,965	106,237	87,799	2,473,255	2,044,013	2,675,455	2,211,120	42,087,961	34,783,439	0	-34,783,439	-42,087,961
	施設完成後の評価期間 13年 (Análisis de Proyección en 13 años después de la culminación de las obras)		3	2015	17,592,180	13,217,265	0	0	709,880	133,343											709,880	533,343	0	12,683,922	16,882,300	
			4	2016	17,592,180	12,015,696			709,880	118,858											709,880	484,858	0	11,530,838	16,882,300	
			5	2017	17,592,180	10,923,360			709,880	104,780											709,880	440,780	0	10,481,580	16,882,300	
			6	2018	17,592,180	9,930,327			709,880	90,709											709,880	400,709	0	9,526,618	16,882,300	
			7	2019	17,592,180	9,027,570			709,880	76,281											709,880	364,281	0	8,661,289	16,882,300	
			8	2020	17,592,180	8,206,882			709,880	63,164											709,880	331,164	0	7,871,718	16,882,300	
			9	2021	17,592,180	7,460,802			709,880	50,108											709,880	301,058	0	7,156,743	16,882,300	
			10	2022	17,592,180	6,782,547			709,880	37,689											709,880	273,689	0	6,501,857	16,882,300	
			11	2023	17,592,180	6,165,952			709,880	24,809											709,880	248,809	0	5,917,143	16,882,300	
			12	2024	17,592,180	5,605,411			709,880	12,619											709,880	226,190	0	5,376,221	16,882,300	
			13	2025	17,592,180	5,095,828			709,880	10,627											709,880	205,627	0	4,890,201	16,882,300	
			14	2026	17,592,180	4,632,571			709,880	8,694											709,880	186,934	0	4,441,637	16,882,300	
			15	2027	17,592,180	4,212,428			709,880	6,940											709,880	169,940	0	4,041,488	16,882,300	
	合計 (Total)				228,698,340	103,275,637	75,347,300	65,862,156	9,228,440	4,167,381	395,589	343,280	1,539,036	1,331,527	212,474	184,378	4,946,510	4,292,418	5,350,910	4,643,352	97,022,260	80,828,500	0	1.28	22,441,137	14.8 %
							VAB														VAC					

4.5 Total 4 Basins

EVALUACIÓN ECONOMICA (PRECIOS PRIVADOS) 経済評価 (民間価格)																										
期間 (Etapas)		年度 t (Años)	便益 (B) (BENEFIT)		費用 (COST)																残存価値 (Salvage Value) ⑤ Valor Residual	費用便益比 (CER) ⑩ (Costo/Benef.)	純現在価値 (NPV) ⑪ (VAN)	内部収益率 (Internal rate of return) ⑫ (Tasa interna de Retorno)		
			年平均被害軽減 期待値 (b) Daño Medio Anual ①	便益(B) PV ② Actualización del Daño Medio Anual (\$/.)	建設費 (対照工+補償費) (Costo de Infraestructuras)		環境・護岸維持費 (O&M de Estructuras)		植林/植生回復 (Reforestación)		環境影響 (Impacto Ambiental)		防災教育 (Capacitación)		用地取得 (Expropiación de Predios)		施工管理 (Supervisión)		費用計 (c) (Total de Costos)							
					費用 c ③ (Costo)	現在価値(PV) ④ Actualización del Costo	費用c ⑤-1 (Costo)	現在価値(PV) ⑥-1 Actualización del Costo	費用c ⑤-2 (Costo)	現在価値(PV) ⑥-2 Actualización del Costo	費用c ⑤-3 (Costo)	現在価値(PV) ⑥-3 Actualización del Costo	費用c ⑤-4 (Costo)	現在価値(PV) ⑥-4 Actualización del Costo	費用c ⑤-5 (Costo)	現在価値(PV) ⑥-5 Actualización del Costo	費用c ⑤-6 (Costo)	現在価値(PV) ⑥-6 Actualización del Costo	費用計c (Total Cost) ⑦	現在価値計 (CPV) ⑧ Costo total Actualizado				B/C ⑩ ①-③	NPV (⑪-⑧) (VAN-VAC)	B-C (⑫-⑦) (IRR (TIR))
整備期間 a (Construction)	設計期間 (Diseño)	0	2012			9,766,778	9,766,778	85,1817											10,618,595	9,766,778	0		-9,766,778	-10,618,595		
	施工期間 (Construction)	1	2013			96,679,482	87,890,438	3,833,176		310,920	282,654	2,360,001	2,141,456	424,948	386,316	3,592,745	3,266,132	7,226,581	6,569,619	114,427,852	100,540,615	0		-100,540,615	-114,427,852	
		2	2014			96,679,482	79,900,398	3,833,176		310,920	256,958	2,360,001	1,950,414	424,948	351,196	3,592,745	2,969,211	7,226,581	5,972,381	114,427,852	91,400,559	0		-91,400,559	-114,427,852	
	施設完成後の評価期間 13年 (Análisis de Proyección en 13 años después de la culminación de las obras)	3	2015	68,241,303	11,270,701	0	0	1,787,499	1,142,974										1,787,499	1,342,974	0		49,827,726	66,453,804		
		4	2016	68,241,303	16,809,728			1,787,499	1,120,886										1,787,499	1,320,886	0		45,388,842	66,453,804		
		5	2017	68,241,303	42,372,480			1,787,499	1,109,896										1,787,499	1,109,896	0		41,261,584	66,453,804		
		6	2018	68,241,303	18,520,436			1,787,499	1,008,997										1,787,499	1,008,997	0		37,511,440	66,453,804		
		7	2019	68,241,303	15,018,578			1,787,499	917,270										1,787,499	917,270	0		34,101,309	66,453,804		
		8	2020	68,241,303	11,835,071			1,787,499	833,881										1,787,499	833,881	0		31,001,190	66,453,804		
		9	2021	68,241,303	18,940,974			1,787,499	758,074										1,787,499	758,074	0		28,181,900	66,453,804		
		10	2022	68,241,303	16,309,876			1,787,499	689,158										1,787,499	689,158	0		25,620,818	66,453,804		
		11	2023	68,241,303	13,918,160			1,787,499	626,508										1,787,499	626,508	0		23,291,633	66,453,804		
		12	2024	68,241,303	11,743,782			1,787,499	569,552										1,787,499	569,552	0		21,174,230	66,453,804		
		13	2025	68,241,303	19,767,075			1,787,499	517,775										1,787,499	517,775	0		19,246,300	66,453,804		
		14	2026	68,241,303	17,970,068			1,787,499	470,704										1,787,499	470,704	0		17,496,363	66,453,804		
		15	2027	68,241,303	16,336,425			1,787,499	427,913										1,787,499	427,913	0		15,901,512	66,453,804		
	合計 (Total)				887,136,935	400,613,455	203,125,741	177,557,614	31,755,657	10,493,589	62,1839	539,613	4,720,002	4,091,870	849,895	737,512	7,185,491	6,235,343	14,453,162	12,542,000	0	1.89	188,411,915		22.8%	
						VAB														VAC						

5 Calculation of economic variables (social prices)

5.1Cañete River Basin

EVALUACIÓN ECONOMICA (PRECIOS SOCIALES)																									経済評価 (社会価格)			
期間 (Etapas)		年度 t (Años)	便益 (B) (BENEFIT)		費用 (COST)																残存価値 ⑨ Salvage value Valor Residual	費用便益比 (CER) ⑩ (Costo/Benef.)	純現在価値 (NPV) ⑪ (VAN)	内部収益率 (Internal rate of return) ⑫ (Tasa interna de Retorno)				
			年平均被害軽減 期待時間 (b) Daño Medio Anual ①	便益(B) PV ② Actualización del Daño Medio Anual (\$/.)	建設費 (Costo de Construcción)		環境・護岸維持費 (O&M de Estructuras)		植林/植生回復 (Reforestación)		環境影響 (Impacto Ambiental)		防災教育 (Capacitación)		用地取得費 (Expropiación de Predios)		施工管理 (Supervisión)		費用計 (c) (Total de Costos)									
					費用 c ③ (Costo)	現在価値(PV) ④ Actualización del Costo	費用c ⑤-1 (Costo)	現在価値(PV) ⑥-1 Actualización del Costo	費用c ⑤-2 (Costo)	現在価値(PV) ⑥-2 Actualización del Costo	費用c ⑤-3 (Costo)	現在価値(PV) ⑥-3 Actualización del Costo	費用c ⑤-4 (Costo)	現在価値(PV) ⑥-4 Actualización del Costo	費用c ⑤-5 (Costo)	現在価値(PV) ⑥-5 Actualización del Costo	費用c ⑤-6 (Costo)	現在価値(PV) ⑥-6 Actualización del Costo	費用計c (Total Cost) ⑦	現在価値計 (CPV) ⑧ Costo total Actualizado				B/C ⑩ ①-③	NPV (⑪-⑧) (VAN-VAC)	B-C (⑫-⑦) (IRR (TIR))		
CARI TI	整備期間 a	設計期間 (Diseño)	0	2012			1,108,551	1,108,551											1,108,551	1,108,551	0		-1,108,551	-1,108,551				
	施工期間 (Construction)	1	2013			10,039,026	9,126,387			15,634	14,213	365,985	331,714	92,031	83,665	538,844	489,838	82,6147	751,043	11,877,667	10,797,880	0		-10,797,880	-11,877,667			
		2	2014			10,039,026	8,296,715			15,634	12,921	365,985	301,467	92,031	76,059	538,844	445,316	82,6147	682,766	11,877,667	9,816,254	0		-9,816,254	-11,877,667			
	施設完成後の評価期間 13年 (Análisis de Proyección en 13 años después de la culminación de las obras)	3	2015	18,533,194	13,924,263			220,889	165,958										220,889	165,958	0		13,721,305	18,312,305				
		4	2016	18,533,194	12,658,421			220,889	150,870										220,889	150,870	0		12,507,550	18,312,305				
		5	2017	18,533,194	11,507,655			220,889	137,155										220,889	137,155	0		11,370,500	18,312,305				
		6	2018	18,533,194	10,461,505			220,889	124,686										220,889	124,686	0		10,334,819	18,312,305				
		7	2019	18,533,194	9,510,459			220,889	113,351										220,889	113,351	0		9,397,108	18,312,305				
		8	2020	18,533,194	8,645,872			220,889	103,047										220,889	103,047	0		8,541,825	18,312,305				
		9	2021	18,533,194	7,859,883			220,889	93,679										220,889	93,679	0		7,764,205	18,312,305				
		10	2022	18,533,194	7,145,349			220,889	85,162										220,889	85,162	0		7,060,186	18,312,305				
		11	2023	18,533,194	6,495,771			220,889	77,420										220,889	77,420	0		6,418,351	18,312,305				
		12	2024	18,533,194	5,905,247			220,889	70,382										220,889	70,382	0		5,834,865	18,312,305				
		13	2025	18,533,194	5,368,406			220,889	63,984										220,889	63,984	0		5,304,422	18,312,305				
		14	2026	18,533,194	4,880,369			220,889	58,167										220,889	58,167	0		4,821,202	18,312,305				
		15	2027	18,533,194	4,436,699			220,889	52,879										220,889	52,879	0		4,381,820	18,312,305				
	合計 (Total)					240,931,523	208,799,900	21,186,602	18,311,654	2,871,563	1,296,741	31,269	27,134	731,970	631,181	184,063	159,724	1,077,688	935,114	1,652,285	1,433,809	27,735,448	23,019,426	0	4.73	85,780,474		33.3%
							VAB													VAC								

5.2Chincha River Basin

EVALUACIÓN ECONOMICA (PRECIOS SOCIALES) 経済評価 (社会価格)																														
期間 (Etapas)		年原 t (Años)	便益 (B) (BENEFIT)		費用 (COST)																残存価値 Salvage Value ⑤ Valor Residual	費用便益比 (CBR) ⑩ (Costo/Benefit)	純現在価値 (NPV) ⑪ (VAN)	内部収益率 (Internal rate of return) ⑫ (Tasa Interna de Retorno)						
			年平均被害軽減 減期時間 (b) Daño Medio Anual ①	便益(B) PV ② Actualización del Daño Medio Anual (\$/.)	建設費 (Costo de Construcción)		設備・構架維持費 (O&M de Estructuras)		植林/植生回復 (Reforestación)		環境影響 (Impacto Ambiental)		防災教育 (Capacitación)		用地取得費 (Expropiación de Predios)		施工管理 (Supervisión)		費用計 (c) (Total de Costos)											
					費用 c ③ (Costo)	現在価値(PV) ④ Actualización del Costo	費用c ⑤-1 (Costo)	現在価値(PV) ⑥-1 Actualización del Costo	費用c ⑤-2 (Costo)	現在価値(PV) ⑥-2 Actualización del Costo	費用c ⑤-3 (Costo)	現在価値(PV) ⑥-3 Actualización del Costo	費用c ⑤-4 (Costo)	現在価値(PV) ⑥-4 Actualización del Costo	費用c ⑤-5 (Costo)	現在価値(PV) ⑥-5 Actualización del Costo	費用c ⑤-6 (Costo)	現在価値(PV) ⑥-6 Actualización del Costo	費用計c (Total Cost) ⑦	現在価値計 (CPV) ⑧ Costo total Actualizado				B/C I ⑩ / II (①-⑤)	NPV (②-⑥) (VAB-VAC)	b-c (①-⑦) (IRR (TIR)				
CHINCHA	整備期間 a	設計期間 (Diseño)	0	2012				1,800,180	1,800,180											1,800,180	1,800,180	0		-1,800,180	-1,800,180					
		施工期間 (Construcción)	1	2013				16,436,143	14,941,948					44,586	40,333	498,810	451,464	92,031	83,665	2,68,795	244,359	1,341,584	1,219,621	18,681,950	16,983,591	0		-16,983,591	-16,983,590	
			2	2014				16,436,143	13,583,589					44,586	36,848	498,810	411,240	92,031	76,059	2,68,795	222,145	1,341,584	1,108,747	18,681,950	15,439,628	0		-15,439,628	-15,439,628	
	施設完成後の評価期間 13年 (Análisis de Proyección en 13 años después de la culminación de las obras)		3	2015	24,092,190	18,100,819	0	0	370,955	278,704											370,955	278,704	0		17,821,115	23,721,235				
			4	2016	24,092,190	16,455,290			370,955	259,368												370,955	259,368	0		16,201,923	23,721,235			
			5	2017	24,092,190	14,959,355			370,955	230,334												370,955	230,334	0		14,729,021	23,721,235			
			6	2018	24,092,190	13,599,413			370,955	209,395												370,955	209,395	0		13,380,019	23,721,235			
			7	2019	24,092,190	12,363,103			370,955	180,359												370,955	180,359	0		12,171,744	23,721,235			
			8	2020	24,092,190	11,239,185			370,955	173,053												370,955	173,053	0		11,064,131	23,721,235			
			9	2021	24,092,190	10,217,441			370,955	157,321												370,955	157,321	0		10,060,119	23,721,235			
			10	2022	24,092,190	9,288,582			370,955	143,019												370,955	143,019	0		9,142,563	23,721,235			
			11	2023	24,092,190	8,444,166			370,955	130,018												370,955	130,018	0		8,314,148	23,721,235			
			12	2024	24,092,190	7,676,514			370,955	118,198												370,955	118,198	0		7,559,316	23,721,235			
			13	2025	24,092,190	6,978,649			370,955	107,453												370,955	107,453	0		6,871,197	23,721,235			
			14	2026	24,092,190	6,344,227			370,955	97,684												370,955	97,684	0		6,246,543	23,721,235			
			15	2027	24,092,190	5,757,479			370,955	88,804												370,955	88,804	0		5,671,675	23,721,235			
	合計 (Total)					313,198,474	341,434,223	34,671,466	30,325,718	4,822,421	2,177,710	89,173	77,381	997,620	861,703	184,063	159,724	537,590	466,504	2,683,167	2,328,368	0	3.89	105,031,115		47.1%				
						VAB															VAC									

5.3 Pisco River Basin

EVALUACIÓN ECONOMICA (PRECIOS SOCIALES) 経済評価 (社会価格)																													
期間 (Etapas)		年 度 t (Años)	便益 (B) (BENEFIT)		費用 (COST)																残存価値 Salvage value ⑤ Valor Residual	費用便益比 (CER) ⑩ (Costo/Benef.)	純現在価値 (NPV) ⑪ (VAN)	内部収益率 (Internal rate of return) ⑫ (Tasa interna de Retorno)					
			年平均被害軽減 減期時間 (b) Daño Medio Anual ①	便益(B) PV ② Actualización del Daño Medio Anual (\$/.)	建設費 (Costo de Construcción)		設備・構架維持費 (O&M de Estructuras)		植林/植生回復 (Reforestación)		環境影響 (Impacto Ambiental)		防災教育 (Capacitación)		用地取得費 (Expropiación de Predios)		施工管理 (Supervisión)		費用計 (C) (Total de Costos)										
					費用 c ③ (Costo)	現在価値(PV) ④ Actualización del Costo	費用c ⑤-1 (Costo)	現在価値(PV) ⑥-1 Actualización del Costo	費用c ⑤-2 (Costo)	現在価値(PV) ⑥-2 Actualización del Costo	費用c ⑤-3 (Costo)	現在価値(PV) ⑥-3 Actualización del Costo	費用c ⑤-4 (Costo)	現在価値(PV) ⑥-4 Actualización del Costo	費用c ⑤-5 (Costo)	現在価値(PV) ⑥-5 Actualización del Costo	費用c ⑤-6 (Costo)	現在価値(PV) ⑥-6 Actualización del Costo	費用計c (Total Cost) ⑦	現在価値計 (CPV) ⑧ Costo total Actualizado				B/C I ⑩ / II (①-⑤)	NPV (②-⑥) (VAB-VAC)	b-c (①-⑦) (IRR (TIR)			
PISCO	整備期間 a	設計期間 (Diseño)	0	2012			2,567,375	2,567,375											2,567,375	2,567,375	0		-2,567,375	-2,567,375					
		施工期間 (Construcción)	1	2013			23,742,839	21,584,399					29,136	26,487	483,072	431,236	92,031	83,665	170,995	155,450	1,913,335	1,739,396	26,431,408	24,028,553	0		-24,028,553	-26,431,408	
			2	2014			23,742,839	19,622,181					29,136	24,079	483,072	391,233	92,031	76,059	170,995	141,318	1,913,335	1,581,269	26,431,408	21,844,139	0		-21,844,139	-26,431,408	
	施設完成後の評価期間 13年 (Análisis de Proyección en 13 años después de la culminación de las obras)		3	2015	18,299,831	13,748,934	0	0	325,427	244,498									325,427	244,498	0		19,504,436	17,974,404					
			4	2016	18,299,831	12,499,031			325,427	222,271									325,427	222,271	0		12,274,760	17,974,404					
			5	2017	18,299,831	11,362,756			325,427	202,065									325,427	202,065	0		11,160,691	17,974,404					
			6	2018	18,299,831	10,329,778			325,427	183,695									325,427	183,695	0		10,146,083	17,974,404					
			7	2019	18,299,831	9,390,707			325,427	166,996									325,427	166,996	0		9,221,711	17,974,404					
			8	2020	18,299,831	8,537,006			325,427	151,814									325,427	151,814	0		8,385,192	17,974,404					
			9	2021	18,299,831	7,760,915			325,427	138,013									325,427	138,013	0		7,621,902	17,974,404					
			10	2022	18,299,831	7,055,377			325,427	125,466									325,427	125,466	0		6,929,911	17,974,404					
			11	2023	18,299,831	6,413,979			325,427	114,060									325,427	114,060	0		6,299,919	17,974,404					
			12	2024	18,299,831	5,830,890			325,427	103,691									325,427	103,691	0		5,727,199	17,974,404					
			13	2025	18,299,831	5,300,809			325,427	94,265									325,427	94,265	0		5,204,545	17,974,404					
			14	2026	18,299,831	4,818,918			325,427	85,695									325,427	85,695	0		4,731,222	17,974,404					
			15	2027	18,299,831	4,380,834			325,427	77,905									325,427	77,905	0		4,301,929	17,974,404					
	合計 (Total)					237,897,809	207,429,935	50,051,052	43,773,954	4,230,554	1,910,435	58,272	50,566	966,144	831,339	184,063	159,724	341,990	296,718	3,826,671	3,320,665	0	2.13	57,075,434				26.8%	
							VAB													VAC									



5.4 Majes-Camaná River Basin

EVALUACIÓN ECONOMICA (PRECIOS SOCIALES)																								経済評価 (社会価格)									
期間 (Etapas)		年度 t (Años)	便益 (B) (BENEFIT)		費用 (COST)																残存価値 salvage value ⑤ Valor Residual	費用便益比 (CBR) ⑤ (Costo/Benef.)	純現在価値 (NPV) ⑪ (VAN)	内部収益率 (Internal rate of return) ⑫ (Tasa Interna de Retorno)									
			年平均被害軽減 減期待額 (b) Daño Medio Anual ①	便益(B) PV ② Actualización del Daño Medio Anual (\$/.)	建設費 (Costo de Construcción)		設備・護岸維持費 (O&M de Estructuras)		植林/植生回復 (Reforestación)		環境影響 (Impacto Ambiental)		防災教育 (Capacitación)		用地取得費 (Expropiación de Predios)		施工管理 (Supervisión)		費用計 (C) (Total de Costos)														
					費用 C ③ (Costo)	現在価値(PV) ④ Actualización del Costo	費用C ⑤-1 (Costo)	現在価値(PV) ⑥-1 Actualización del Costo	費用C ⑤-2 (Costo)	現在価値(PV) ⑥-2 Actualización del Costo	費用C ⑤-3 (Costo)	現在価値(PV) ⑥-3 Actualización del Costo	費用C ⑤-4 (Costo)	現在価値(PV) ⑥-4 Actualización del Costo	費用C ⑤-5 (Costo)	現在価値(PV) ⑥-5 Actualización del Costo	費用C ⑤-6 (Costo)	現在価値(PV) ⑥-6 Actualización del Costo	費用計 c (Total Cost) ⑦	現在価値計 (CPV) ⑧ Costo total Actualizado				B/C I ② / I (③-⑤)	NPV (②-⑤) (VAB-VAC)	B-C (②-⑤) (①-⑦)	IRR (TIR)						
整備期間 a	設計期間 (Diseño)	0	2012			3,240,727	3,240,727													3,240,727	3,240,727	0		-3,240,727	-3,240,727								
	施工期間 (Construcción)	1	2013			29,829,566	27,117,787			158,925	144,478	652,134	592,819	92,031	83,665	2,152,416	1,826,742	2,415,151	2,185,592	35,300,225	32,091,113	0		-32,091,113	-35,300,225								
施設完成後の評価期間 13年 (Análisis de Proyección en 13 años después de la culminación de las obras)		2	2014			29,829,566	24,652,534			158,925	131,343	652,134	538,954	92,031	76,059	2,152,416	1,778,856	2,415,151	1,995,993	35,300,225	29,173,739	0		-29,173,739	-35,300,225								
		3	2015	17,734,597	13,324,265	0	0	603,398	451,342											603,398	453,342	0		12,870,923	17,131,199								
		4	2016	17,734,597	12,112,968			603,398	411,129											603,398	412,129	0		11,700,839	17,131,199								
		5	2017	17,734,597	11,011,789			603,398	374,663											603,398	374,663	0		10,637,126	17,131,199								
		6	2018	17,734,597	10,010,717			603,398	340,602											603,398	340,602	0		9,670,115	17,131,199								
		7	2019	17,734,597	9,100,632			603,398	309,639											603,398	309,639	0		8,791,014	17,131,199								
		8	2020	17,734,597	8,273,320			603,398	281,490											603,398	281,490	0		7,991,831	17,131,199								
		9	2021	17,734,597	7,521,200			603,398	251,900											603,398	255,900	0		7,265,501	17,131,199								
		10	2022	17,734,597	6,837,455			603,398	231,636											603,398	232,636	0		6,604,819	17,131,199								
		11	2023	17,734,597	6,215,868			603,398	211,487											603,398	211,487	0		6,004,381	17,131,199								
		12	2024	17,734,597	5,650,789			603,398	191,261											603,398	192,261	0		5,458,528	17,131,199								
		13	2025	17,734,597	5,137,081			603,398	171,783											603,398	174,783	0		4,962,288	17,131,199								
		14	2026	17,734,597	4,670,074			603,398	151,894											603,398	158,894	0		4,511,180	17,131,199								
		15	2027	17,734,597	4,245,521			603,398	144,449											603,398	144,449	0		4,101,073	17,131,199								
合計 (Total)				230,549,756	104,111,700 VAB	62,899,860	55,011,049	7,844,174	3,541,274	317,851	275,821	1,304,268	1,131,853	184,063	159,724	4,304,833	3,735,599	4,830,303	4,191,585	81,685,551	68,047,853 VAC	0	1.53	36,063,646		18.7%							

5.5 Total 4 Basins

EVALUACIÓN ECONOMICA (PRECIOS SOCIALES) 経済評価 (社会価格)																											
期間 (Etapas)		年度 t (Años)	便益 (B) (BENEFIT)		費用 (COST)																残存価値 ⑤ Valor Residual	費用便益比 (CBR) ⑤ (Costo/Benet)	純現在価値 (NPV) ⑪ (VAN)	内部収益率 (Internal rate of return) ⑫ (Tasa Interna de Retorno)			
			年平均被害軽減 減期待額 (b) Daño Medio Anual ①	便益(B) PV ② Actualización del Daño Medio Anual (\$/.)	建設費 (Costo de Construcción)		設備・護岸維持費 (O&M de Estructuras)		植林/植生回復 (Reforestación)		環境影響 (Impacto Ambiental)		防災教育 (Capacitación)		用地取得費 (Expropiación de Predios)		施工管理 (Supervisión)		費用計 (C) (Total de Costos)					B/C I ② / I (③-⑤)	NPV (②-⑤) (VAB-VAC)	B-C (②-⑤)	IRR (TIR)
					費用 C ③ (Costo)	現在価値(PV) ④ Actualización del Costo	費用C ⑤-1 (Costo)	現在価値(PV) ⑥-1 Actualización del Costo	費用C ⑤-2 (Costo)	現在価値(PV) ⑥-2 Actualización del Costo	費用C ⑤-3 (Costo)	現在価値(PV) ⑥-3 Actualización del Costo	費用C ⑤-4 (Costo)	現在価値(PV) ⑥-4 Actualización del Costo	費用C ⑤-5 (Costo)	現在価値(PV) ⑥-5 Actualización del Costo	費用C ⑤-6 (Costo)	現在価値(PV) ⑥-6 Actualización del Costo	費用計 c (Total Cost) ⑦	現在価値計 (CPV) ⑧ Costo total Actualizado							
整備期間 a	設計期間 (Diseño)	0	2011			8,716,833	8,716,833	751,204												9,468,037	8,716,833	0		-8,716,833	-9,468,037		
		1	2013			80,047,574	72,770,522	3,380,417			248,282	225,711	2,000,001	1,818,183	368,125	334,659	3,131,050	2,846,409	6,496,218	5,905,652	95,671,667	83,901,136	0		-83,901,136	-95,671,667	
	施設完成後の評価期間 13年 (Análisis de Proyección en 13 años después de la culminación de las obras)	2	2014			80,047,574	66,155,020	3,380,417			248,282	205,192	2,000,001	1,612,893	368,125	304,236	3,131,050	2,587,645	6,496,218	5,368,775	95,671,667	76,273,760	0		-76,273,760	-95,671,667	
		3	2015	78,659,812	59,098,281	0	0	1,520,670	1,142,902												1,120,670	1,142,902	0		37,555,779	77,139,141	
		4	2016	78,659,812	53,725,710			1,520,670	1,038,638												1,120,670	1,038,638	0		32,687,072	77,139,141	
		5	2017	78,659,812	48,841,535			1,520,670	944,217												1,120,670	944,217	0		27,897,338	77,139,141	
		6	2018	78,659,812	44,401,413			1,520,670	858,379												1,120,670	858,379	0		23,543,035	77,139,141	
		7	2019	78,659,812	40,364,921			1,520,670	780,344												1,120,670	780,344	0		19,584,577	77,139,141	
		8	2020	78,659,812	36,655,383			1,520,670	709,404												1,120,670	709,404	0		15,895,979	77,139,141	
		9	2021	78,659,812	33,359,439			1,520,670	644,913												1,120,670	644,913	0		12,714,527	77,139,141	
		10	2022	78,659,812	30,326,763			1,520,670	586,284												1,120,670	586,284	0		9,760,479	77,139,141	
		11	2023	78,659,812	27,569,784			1,520,670	532,986												1,120,670	532,986	0		7,036,799	77,139,141	
		12	2024	78,659,812	25,063,440			1,520,670	484,532												1,120,670	484,532	0		4,578,908	77,139,141	
		13	2025	78,659,812	22,784,946			1,520,670	440,484												1,120,670	440,484	0		2,344,462	77,139,141	
		14	2026	78,659,812	20,713,587			1,520,670	400,440												1,120,670	400,440	0		20,313,147	77,139,141	
		15	2027	78,659,812	18,830,334			1,520,670	364,036												1,120,670	364,036	0		18,486,497	77,139,141	
		合計 (Total)				1,022,577,561	461,775,757 VAB	168,811,981	147,642,374	27,280,751	1,927,159	496,364	430,903	4,000,002	3,471,076	736,250	638,895	6,262,101	5,434,054	12,992,435	11,274,427	220,180,084	177,818,888 VAC	0	2.80	283,956,869	





## 6 Social evaluation results

	流域 Cuencas	年平均被害軽減額 Beneficio Anual Promedio Acumulado	評価期間被害 軽減額 (15年) Beneficio Anual Promedio Acumulado (en 15 años)	事業費 Costo del Proyecto	維持管理費 Costo de O&M	B/C Relación Beneficio/Costo	Net Present Value (NPV) Valor Actual Neto (VAN)	Internal Rate of Return (IRR) Tasa Interna de Retorno (TIR)
Precios Privados 民間価格	Basin Level	Cañete	159,556,431	29,595,770	3,378,309	2.63	44,681,147	33%
		Chincha	266,913,530	47,024,405	5,653,615	2.76	76,905,695	35%
		Pisco	231,968,634	66,544,136	4,977,123	1.74	44,377,936	21%
		Majes-Camana	228,698,340	87,791,820	9,228,440	1.28	22,447,137	15%
	All Basin		887,136,935	239,474,300	23,237,488	1.89	188,411,915	23%
Precios Sociales 社会価格		Cañete	240,931,523	24,863,886	2,871,563	4.73	85,780,474	55%
		Chincha	313,198,474	39,164,079	4,822,421	3.89	105,033,115	47%
		Pisco	237,897,809	55,430,191	4,230,554	2.13	57,079,434	27%
		Majes-Camana	230,549,756	73,841,176	7,844,174	1.53	36,063,846	19%
	All Basin		1,022,577,561	200,811,371	19,768,712	2.60	283,956,869	32%



**Ministry of Agriculture  
Republic of Peru**

**THE PREPARATORY STUDY  
ON  
PROJECT OF THE PROTECTION OF  
FLOOD PLAIN AND VULNERABLE  
RURAL POPULATION AGAINST FLOOD  
IN THE REPUBLIC OF PERU**

**FINAL REPORT  
I-6 SUPPORTING REPORT  
ANNEX-11 ENVIRONMENTAL AND  
SOCIAL CONSIDERATIONS/GENDER**

**March 2013**

**JAPAN INTERNATIONAL COOPERATION AGENCY  
(JICA)**

**YACHIYO ENGINEERING CO., LTD.  
NIPPON KOEI CO., LTD.  
NIPPON KOEI LATIN AMERICA –  
CARIBBEAN Co., LTD.**





Figure Study Area



## ABBREVIATION

Abbreviation	Official Form or Meaning
ANA	Autoridad Nacional del Agua/National Water Authority
ALA	Autoridad Local del Agua/Local Water Authority
B/C	Costo Benefit Ratio/Benefit Cost Ratio
GDP	Gross Domestic Product/Gross Domestic Product
GIS	Geographic Information System/Geographic Information System
DGAA	Dirección General de Asuntos Ambientales/General Directorate of Environmental Affairs
DGFFS	Dirección General de Forestal y de Fauna Silvestre/Directorate General of Forest and Wildlife
DGIH	Dirección General de Infraestructura Hidráulica/Directorate General for Water Infrastructure
DGPI (Paleo-DGPM)	Dirección General de Política de Inversiones/Directorate General of Investment Policy
DNEP	Dirección Nacional de Endeudamiento Público/National Directorate of Public Debt
DRA	Dirección Regional de Agricultura/Regional Directorate Agriculture
EIA	Evaluación de Impacto Ambiental/Environmental Impact Assessment
FAO	Agricultura y la Alimentación Organización de las Naciones Unidas/ Food and Agriculture Organization of the United Nations
F/S	Estudio de Factibilidad/ Feasibility Study
GORE	Gobierno Regional/Regional Government
HEC-HMS	Centros de Ingeniería Hidrológica Sistema de Modelación Hidrológica Método /Hydrologic Engineering Centers Hydrologic Modeling System Method
HEC-RAS	Centros de Ingeniería Hidrológica del Río de Análisis del Sistema Méto de /Hydrologic Engineering Centers River Analysis System Method
IGN	Instituto Geográfico Nacional/National Geographic Institute
IGV	Impuesto General a Ventas/General Sales Tax
INDECI	Instituto Nacional de Defensa Civil/National Institute of Civil Defense
INEI	Instituto Nacional de Estadística/National Institute of Statistics
INGEMMET	Instituto Nacional Geológico Minero Metalúrgico/National Geological and Mining Metallurgical Institute
INRENA	Instituto Nacional de Recursos Naturales/Natural Resources Institute
IRR	Tasa Interna de Retorno (TIR)/Internal Rate of Return
JICA	Japonés de Cooperación Internacional /Japan International Cooperation Agency
JNUDRP	Junta Nacional de Usuarios de Distritos del Perú/National Board of Peru

	Districts Users
L/A	Convenio de Préstamo/Loan Agreement
MEF	Ministerio de Economía y Finanzas/Ministry of Economy and Finance
MINAG	Ministerio de Agricultura/Ministry of Agriculture
M/M	Acta de la reunion/Minutes of Meeting
NPV	Valor Actual Neto (VAN)/NET PRESENT VALUE
O&M	Operación y Mantenimiento /Operation and maintenance
OGA	Oficina General de Administración/General Office of Administration
ONERRN	Oficina Nacional de Evaluación de Recursos Naturales/National Bureau of Natural Resource Evaluation
OPI (OPP)	Oficina de Programación e Inversiones/Programming and Investment Office (Oficina de Planificación e Presupuesto/Office of Planning and Budget)
PBI	Producto Bruto Interno/Gross Domestic Product
PE	Exp. Proyecto Especial (PE) Chira-Piura/ Exp. Special Project Chira-Piura
PES	Pago por Servicios Ambientales (PSA)/Payment for Environmental Services
PERFIL	PERFIL/PROFILE (Preparatory survey of project before investment)
Pre F/S	Estudio de Prefactibilidad /Pre-Feasibility Study
PERPEC	Programa de Encauzamiento de Ríos y protección de Estructura de Captación
PRONAMACHIS	Programa Nacional de Manejo de Cuencas Hidrográficas y Conservación de Suelos/National Program of River Basin and Soil Conservation Management
PSI	Programa de Sub Sectorial de Irrigaciones/Program of Sub Irrigation Sector
SCF	Factor de conversión estándar/Standard conversion factor
SENAMHI	Servicio Nacional de Meteorología y Hidrología/ National Service of Meteorology and Hydrology
SNIP	Sistema Nacional de Inversión Pública/National Public Investment System
UF	Unidad formuladora/Formulator unit
VALLE	Valle/Valley
VAT	Impuesto al valor agregado/Value-added tax



**THE PREPARATORY STUDY ON PROJECT OF THE PROTECTION  
OF  
FLOOD PLAIN AND VULNERABLE RURAL POPULATION AGAINST FLOOD  
IN THE REPUBLIC OF PERU  
FEASIBILITY STUDY REPORT  
SUPPORTING REPORT**

**Annex-11  
Environmental and Social Consideration/Gender**

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## **CHAPTER 1 ENVIRONMENTAL ASSESSMENT AND SOCIAL CONSIDERATIONS IN PERU**

### **1.1 The Need to Carry out a Socio Environmental Impact Assessment**

In Peru, the National System for Environmental Impact Assessment Law (SEIA, in Spanish) was issued in 2001. This law establishes that it is mandatory for all public and private projects to get the “Environmental Certification”, an authorization that is granted after the approval of a relevant Environmental Impact Assessment that matches the probable negative impacts resulting from a project execution. According to the EIA Law, it is the Ministry of the Environment’s (MINAM) competence to issue such Environmental Certification; however, it currently lacks the power to do it, as this ministry was just established in 2008. For the time being, relevant environmental affairs entities are in charge of issuing the Environmental Certificate.

The General Environmental Affairs Directorate (DGAA, in Spanish) is the entity that evaluates and approves the Environmental Impact Assessment (EIA), and issues the Environmental Certification, as well. The National Public Investment System (SNIP, in Spanish) Law establishes that an Environmental Impact Assessment is necessary for all public investments.

### **1.2 Legal Framework**

#### **1) Legal Framework related to Environmental Impact Assessments**

For the Environmental Certification to be granted, SEIA previously defines the request processes, the EIA instrument revisions and approvals, the project categorizations, based on the extent of negative impacts generated by project executions, the terms of reference for the EIA-semi detailed (EIA-sd) and EIA-detailed (EIA-d) developments, the EIA-sd and EIA-d report revisions, the Civil Participation, and the follow-up to, and control of any negative impacts. In addition, it is MINAM’s competence to apply the SEIA. In 2008, SEIA was modified after the establishment of the Ministry of the Environment (MINAM).

The following Table lists the legal documents that are related to the Environmental Impact Assessment.

**Table 1.1 Legal Framework Related to the Environmental Impact Assessment**

Document Name	Year Issued	Description
National Public Investment System Law (Law No. 27293)	2000	This law creates the National Public Investment System that aims at optimizing the use of public resources devoted to investment.
National System for Environmental Impact Assessment Law (Law No. 27446)	2001	This law creates the National System for Environmental Impact Assessment, as a unique and coordinated system that identifies, prevents, supervises, controls, and corrects in advance any negative environmental impacts derived from human actions carried out during the investment project execution.
Rules of the SNIP Law and SNIP Attachments (S.D. No. 221-2006-EF, Policy No. 002-2007-EF/68.01)	2006 / 2007	These are the SNIP law rules.
Changes to SEIA Law statements: Articles 2, 3, 4, 5, 6, 10, 11, 12, 15, 16, 17, 18 (D.L. 1078)	2008	They change statements in SEIA Law Articles 2, 3, 4, 5, 6, 10, 11, 12, 15, 16, 17, 18. The Strategic Environmental Assessment (SEA) has been added. In addition, MINAM is entrusted to assess environmental impact studies.
SEIA Law Rules (S.D. No. 018-2009-MINAM)	2009	These are rules to the SEIA Law, and the following was noted: Article 11 specifies the existing environmental assessment (EIA) levels. Article 51 describes Civil Participation and Environmental Management Plan as requirements in these studies. In addition, Articles 74 and 75 state that a project holder is to be held accountable for all negative impacts that might be brought about by his project.
National Environmental Assessment and Supervision System Law (Law No. 29325).	2009	This law was to create the National Environmental Assessment and Supervision System that is in charge of the Environmental Assessment and Supervision Organism (OEFA, in Spanish) as the ruling entity. This system aims at ensuring the enforcement of the environmental legislation by all individuals or legal entities, as well as supervising and ensuring assessment and supervision, control and sanctioning activities with regard to environmental issues to be carried out in an independent, impartial, swift and efficient way by the various public entities.

Source: JICA Study Team

In 1995, MINAG published its “Guide for Terms of Reference Formulation in Environmental Impact Studies in the Agricultural Sector.” In 2001, the SEIA Law was issued, and in 2009, the SEIA Rules were issued, as a foundational legal framework for environmental impact assessments in all sectors. In this sector, the 1995 MINAG Guide is mostly applied, but in case of any disagreements between the “MINAG Guide” and the “SEIA Law and Rules”, the latter will prevail as the correct interpretation. It must be pointed out that at present (October 2011), the “1995 MINAG Guide” and the “SEIA Law and Rules” updating is in progress by this sector’s DGAA.



**Presentation Workshops for Environmental Impact Study Terms of Reference  
Formulation Guides in the Agricultural Sector**

On November 19<sup>th</sup>, 2010, an Introduction Workshop for Environmental Impact Study Terms of Reference Formulation Guides in the Agricultural Sector was carried out by DGAA. The two DGAA Environmental Impact and Social Considerations Officials participated along with the JICA Study Team consultants.

- **Workshop Objective:** To present the “Environmental Impact Study Terms of Reference Formulation Guides in the Agricultural Sector”, and consult the public audience. To determine the guide by including opinions and remarks generated in the workshop.
- **Participants:** MINAG officials and officials from other ministries, environmental impact specialist consultants, NGOs, professors, etc. Around 50 people total.
- **Program (10:00 – 14:00)**
  1. Workshop opening by Ms. Antonieta Noli Hinostrroza, Engineer, General Director of Environmental Affairs.
  2. Guide presentation by Mr. Ricardo Gutiérrez Quiros, Biologist, Director of Agriculture Environmental Management
  3. Making up of teams and appointing team representatives
- < **Coffee Break** >
  4. Team work (120 minutes)
  5. Presentations by Work Team Representatives (Input and Suggestions) (60 minutes)
  6. Conclusions and Recommendations
  7. Workshop Closing
- **Comments, Remarks, and Major Suggestions**
  - Terms of Reference are still to be developed. The Guide must be specifically prepared for the Agriculture sector projects.
  - Environmental standards for reference are still to be included.
  - An environmental impact assessment methodology is still to be justified. Assessment needs to be carried out both quantitatively and qualitatively.
  - A specification of the assessment and approval process for the environmental instruments in the Agriculture sector is desirable.

## 2) Legal Framework Related to Natural Area and Species Conservation.

Natural protected areas, conservation of natural resources, wild fauna and flora were MINAG’s competence, until the establishment of the Ministry of the Environment in 2009. At present, natural protected areas and natural resource conservation are MINAM’s competence, whereas wild fauna and flora conservation are still to be under the jurisdiction of MINAG’s General Forest and Wild Fauna Directorate.

The table below shows the list of legal documents that are relevant to biological conservation.

**Table 1.2 Legal Framework Related to Biological Conservation**

Document Name	Year issued	Description
Framework Law for Private Investment Growth (D.L. 757, November 13 <sup>th</sup> , 1991)	1991	It substantially changes several articles in the Environment and Natural Resource Code, in order to harmonically combine private investment, socioeconomic development, environmental conservation, and natural resource sustainable uses.
1993 Political Constitution of Peru	1993	Article 68 defines the concept of “Natural Protected Areas”
Environmental Impact Assessment for Works and Activities Law (Law No. 26786)	1997	It modifies some articles in D.L. 757, including, for example, Article 1 that points out that the Ministry of the Environment should be given notice by the competent sectoral authorities of any activities to be developed in its sector that might exceed standard or bearable contamination levels, and should be supported by EIAs.
Natural Protected Area Law (Law No. 26834)	1997	On the whole, natural protected areas make up the National System of Natural State - Protected Areas (SINANPE, in Spanish.) This system is managed by public Central Government institutions, decentralized Governments at regional level, and municipalities.

Document Name	Year issued	Description
Law to establish the National Environmental Fund (FONAM, in Spanish) (Law No. 26793)	1997	This law established the National Environmental Fund (FONAM, in Spanish), as an intangible trust that aims at funding plans, programs, projects, and activities leading to environmental protection, environmental management strengthening, and the sustainable use of natural resources and environmental heritage, by means of institutional financial mechanisms.
Organic Law for Natural Resource Sustainable Exploitation (Law No. 26821)	1997	Its major objective is to promote and regulate sustainable exploitation of natural, renewable, and non – renewable resources, by establishing a suitable framework for investment to be encouraged, and a dynamic balance to be kept between economic growth, natural resource and environmental conservation, and people's development.
Law for Biological Diversity Conservation and Sustainable Exploitation Law No. 26839)	1997	This law points out that the State is sovereign, and can adopt measures for biological diversity conservation and sustainable use. This implies preserving the diversity of ecosystems, species and genus, as well as keeping those essential ecological processes the species survival rely on.
Forest and Wild Fauna Law (Law No. 27308)	2000	It establishes conservation of forest and fauna resources, by specifying their rational use regime, by means of transforming and commercializing any resources derived from them.
Rules of the Natural Protected Area Law (S.D. No. 038-2001-AG)	2001	It consolidates the conceptual and legal framework for the development of protected natural areas to contribute to the provision of social, economic, environmental, educational, and cultural benefits to the local population within these areas' scope.
Rules of the Forest and Wild Fauna Law (S.D. No. 014-2001-AG)	2001	This Supreme Decree regulates the Forest and Wild fauna Law. It holds the general principles, definitions, competent organisms relevant t to these resources, as well as all management plans and ways of exploitation that are relevant to them.
National Environmental Management System Framework Law (Law No. 28245)	2004	This law defines the environmental control mechanisms and the role played by CONAM (MINAM) and the regional and local governments with regard to environmental conservation.
General Environmental Law (Law No. 28611)	2005	It defines the use and management of natural resources and environment. Article 25 defines EIA contents.
Categorization of wild fauna endangered species is approved (S.D. No. 034-2004-AG)	2004	Categorization of endangered species is defined by priority order, as follows: Critically endangered (CR), Endangered (EN), In vulnerable situation (VU), and Almost Endangered (NT) species.
Categorization of wild flora endangered species is approved (DC 043-2006-AG)	2006	Categorization of endangered species is defined by priority order, as follows: Critically endangered (CR), Endangered (EN), In vulnerable situation (VU), and Almost Endangered (NT) species.
D.L. that establishes the Ministry of the Environment (D.L. No. 1013, May 14 <sup>th</sup> , 2008)	2008	MINAM's general function is to design, set up, execute, and supervise the environmental national and sectoral policy, by ruling it. Its competences involve the environmental sector, namely, the National Environmental Management System, the National Environmental Assessment System, the National Environmental Information System, and the National System of Natural State – Protected Areas. It also involves management of i) natural resources within its competence scope, ii) biodiversity, iii) climate change, iv) soil, and v) other thematic scopes established by law.  The Environmental Assessment and Supervision Organism (OEFA, in Spanish) is established in the Ministry. This organism is in charge of supervision, control, and sanctions to environmental issues.

Source: JICA Study Team

### 3) Environmental Standards

In Peru, the following environmental standards are in place: The Environmental Quality Standards (EQS) that apply to all sectors, and the Maximum Permissible Limits (MPL) that are defined for each sector.

The EQS are environmental quality indicators: They measure concentration levels of elements, substances, physical, chemical, and biological parameters that are present in the air, water, or soil. At present (February 2011), only EQS for water have been approved. EQS for air, noise, and soil, are still under revision or waiting for their final approval.

The MPL measures concentration levels of elements, substances, physical, chemical, and biological parameters that are present in emissions, effluents, or discharges, as they are generated by a productive activity (mining, hydrocarbons, electricity, etc.). When set levels are exceeded, damages to health, human wellbeing, and environment might occur. Sectors with their own MPL include: The Ministry of Energy and Mines, the Ministry of Transportation and Communications; the Ministry of Housing, Construction and Sanitation; the Ministry of Health; the Ministry of Production (Industry and Fishery), and the Ministry of Agriculture (MINAG.) Ministries still lacking MPL or having MPL approvals in progress make use of the Ministry of Energy and Mines' MPL, as these are most strict.

**Table 1.3 Legal Framework Related to Environmental Standards**

Document Name	Year Issued
The Maximum Permissible Limits (MPL) for liquid effluents (D.R. No. 08-97-EM/DGAA) is approved	1997
Rules for National Environmental Noise Quality Standards (S.D. No. 085-2003-PCM)	2003
National Environmental Water Quality Standards (S.D. No. 002-2008-MINAM)	2008
Environmental Air Quality Standards are approved (S.D. No. 003-2008-MINAM)	2008

Source: JICA Study Team

### 4) Legal Framework Related to Social Considerations

The following table shows laws and rules related to security for workers, private land expropriations, archaeological remain conservation, and support to women and other vulnerable people. Item 2.1 especially details laws related to expropriations and archaeological remain conservations.

**Table 1.4 Legal Framework Related to Social Considerations**

Document Name	Year issued	Description
Industrial Safety, Security, and Health Rules (S.D. No. 009-2005-TR), Title IV, Chapter I: Employer Rights and Obligations	2005	This chapter explains that the contractor should develop a risk prevention plan for work risk management purposes during works. Both external and internal risks should be taken into account.
Law that regulates land transportation of materials and hazardous wastes (Law No. 28256)	2004	This law aims at regulating activities, processes, and operations for land transportation of materials and hazardous wastes, subject to prevention and people, environment, and property protection principles.
General Expropriation Law (Law No. 27117)	1999	Expropriation consists in forced transference of private property rights that is solely authorized by a specific law on behalf of the State, as issued by the Congress and upon initiative of the Executive, the Regions or Local Governments, and after a payment in cash of the property appraised value, as a compensation for probable damages. The State is the only beneficiary of any expropriations.

Document Name	Year issued	Description
General National Cultural Heritage (Law No. 28296)	2008	This law establishes national policies to defend, protect, promote, hold property of, and the legal regime and destination of those assets that make up the Nation's cultural Heritage.
Archaeological Research Rules (S.R. No. 004 – 2000 – ED)	2000	These Rules set the standards for archaeological research, in all its modalities, of those tangible assets that make up the National Cultural Heritage under the various established categories, as detailed under Article 1 of these Rules. They also point out that for archaeological site or cultural heritage conservation purposes, all investment projects should get the “Non – Existence of Archaeological Remains Certificate (CIRA, in Spanish), as granted by the National Technical Archaeology Commission.
Law 27558 – (Oct. 31 <sup>st</sup> , 2001), Rural Child and Teenager Education Promotion Law	2001	Articles 8, 12, 25, and 27 foresees objectives and implementation actions for gender equality in rural education
Organic Law No. 27779 – Organic Law that changes Ministry organization structures and functions.	2002	This law changed the Executive's ministry structure, and as a result, the MINISTRY OF WOMEN'S AFFAIRS AND SOCIAL DEVELOPMENT – MIMDES – was established. MIMDES objectives include promoting equality between women and men and equal opportunities for women.
Law No. 27867, Organic Regional Government Law (Nov. 18 <sup>th</sup> , 2002), as modified by Law 27902 (Jan. 1 <sup>st</sup> , 2003)	2002	It establishes that Regional Governments should develop policies towards vulnerable population rights promotion.
Law No. 29597 – Ministry of Women's Affairs and Social Development Organization Structure and Functions Law	2010	This law states that MIMDES designs, proposes, and executes social and human development policies, by promoting gender equality and equal opportunities for women, children, senior citizens, and populations living in poverty and extreme poverty, discrimination, and exclusion conditions.

Source: JICA Study Team

## 5) Sectoral Legal Framework

The table below shows the sectoral legal framework:

**Table 1.5 Sectoral Legal Framework**

Document Name	Year Issued	Description
Law Promoting Investments in the Agricultural Sector (Decree Law No. 653)	1991	This law aims at creating the necessary conditions for private investment development in the agricultural sector. Articles 55, 56, and 57 establish alignments for the appointment of Hydrographic Basin Autonomous Authorities and the need for Master Plans to be prepared. Article 55 authorizes the establishment of Hydrographic Basin Autonomous Authorities for a better use and reclamation of the hydric resources in those basins having a regulated irrigation and/or an intensive and multisectoral water use.
Rules to the Law Promoting Investments in the Agricultural Sector (S.D. No. 048-91-AG)	1991	These rules set out the establishment, functions, powers, and funding of the Hydrographic Basin Autonomous Authorities. Activities of the Hydrographic Basin Autonomous Authorities will be regulated and supervised by the Ministry of Agriculture's General Water and Soil Directorate. Rules also establish functions to be performed by the Irrigation District Technical Administrator and the User Associations.
Ministry of Agriculture Organic Law (Decree Law No. 25902)	1992	This law establishes that it is the Ministry of Agriculture's responsibility to formulate, supervise, and assess the enforcement of nationwide policies, plans, and programs in the Agricultural Sector.
Guide to the formulation of Terms of Reference for Environmental Impact	1995	It aims at guiding the technicians, who are in charge of preparing the TOR, towards the expectations from these studies.

Document Name	Year Issued	Description
Studies in the Agricultural Sector (J.R. No. 021-95-INRENA)		It is convenient to take into account that the EIS is one component within a specific program or project; therefore, it must develop its own TOR. In addition, properly formulated TOR will ensure efficient EIS that will become supporting decision making instruments in the hands of relevant and competent environmental authorities in the sector.
D.L. that establishes the National Hydric Resource System (D.L. No. 1081)	2008	The law aims at articulating the State's actions towards an integrated and multisectoral hydric resource management, including the evaluation, appraisal, arrangement, allotment of the multisectoral, efficient, and sustainable use and reclamation of water as a resource; in this sense, the National Hydric Resource System was established.
D.L. promoting Hydric Resource Efficient Reclamation and Conservation (D.L. No. 1083)	2008	This law establishes a public need and a national interest in hydric resource conservation and efficient reclamation. It aims at establishing the legal framework to promote an efficient reclamation and conservation of hydric resources, by encouraging the development of a culture of efficient resource use among all the public or private hydraulic infrastructure users and operators.
D.L. creating the National Water Authority (D.L. No. 997)	2008	This law is about the establishment of the National Water Authority (ANA, in Spanish) and its objectives, and it also defines the role played by the Administrative Water Authority (AAA, in Spanish), and the Local Water Authority (ALA, in Spanish.)
Hydric Resource Law (Law No. 29338)	2009	The enactment of the Hydric Resource Law strengthens the National Water Authority (ANA, in Spanish), and enhances an efficient use of this resource. This law refers to the Basin Council terms, water rates, and User Associations

Source: JICA Study Team

### 1.3 Project Categorization by Socio Environmental Impact

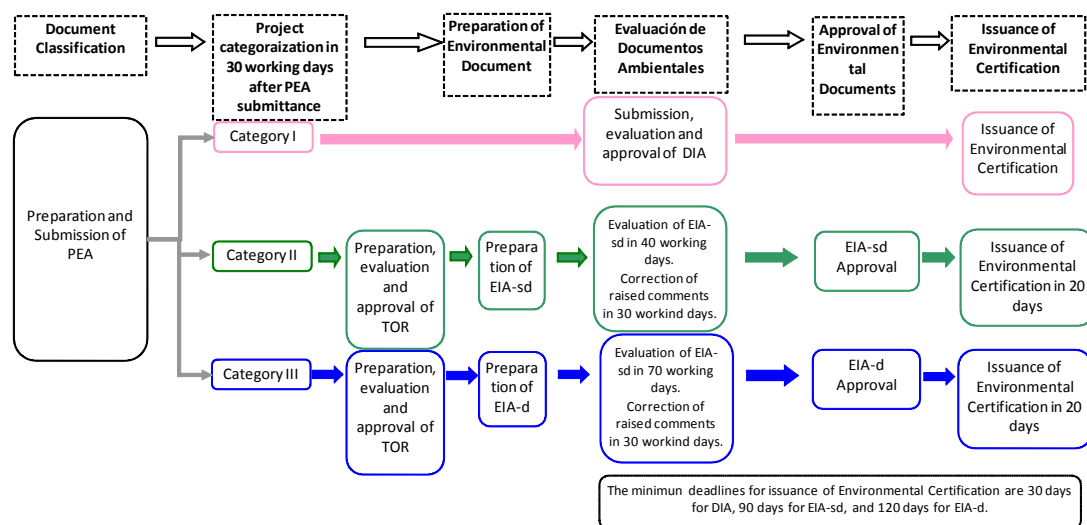
Projects are categorized in three scales, based on the significance level of the negative and positive impacts, and each sector has an independent competence on this categorization. The following table shows the environmental management instruments that are required for each category. The Project holder should submit the Environmental Impact Statement (DIA, in Spanish) for all Projects under Category I. The project holder should prepare an EIA-sd or an EIA-d if the Project is categorized under Category II or III, respectively, to be granted the Environmental Certification from the relevant Ministry Directorate.

**Table 1.6 Project Categorization and Environmental Management Instruments**

	Description	Required Environmental Management Instrument
Category I	It includes those Projects that when carried out, they cause no significant negative environmental impacts whatsoever.	PEA that is considered a DIA after the assessment for this category
Category II	It includes those Projects that when carried out, they can cause moderate environmental impacts, and their negative effects can be removed or minimized through the adoption of easily applicable measures.	Semi-Detailed Environmental Impact Assessment (EIA-sd)
Category III	It includes those Projects than can cause significant quantitative or qualitative negative environmental impacts because of their characteristics, magnitude and/or location. Therefore, a deep analysis is required to revise those impacts and set out a relevant environmental management strategy.	Detailed Environmental Impact Assessment (EIA-d)

Source: Prepared by the JICA Study Team based on the SEIA Law (2001)

The next graph shows the Environmental Document's Classification, the Environmental Document's Assessment, and the Environmental Certification.



Source: Prepared by the JICA Study Team based on the SEIA Regulations (2009)

**Figure 1.1 The Process to Obtain the Environmental Certification**

First, the Project holder applies for the Project classification, by submitting the Preliminary Environmental Assessment (PEA). The relevant sector assesses and categorizes the Project within the next 30 working days after the document's submission. The Project's PEA that is categorized under Category I becomes an EID, and those Projects categorized under Category II or III should prepare an EIA-sd or EIA-d, as applicable. There are cases in which the relevant sector prepares the Terms of Reference for these two studies, and submits them to the holder. There are other cases in which the holder prepares the Terms of Reference and these are approved by the relevant sector, based on the interview with DGAA. Number of working days required for EIA-sd revision and approval is 90, and number of working days required for EIS-d is 120; however, these maximum deadlines may be extended.

## 1.4 Environmental Impact Assessment

The minimum contents for Environmental Impact Assessment and the methodology based on the SEIA Law and its rules are explained below. It is the holder's responsibility to submit both the Preliminary Environmental Assessments (PEA) and the environmental impact studies to the relevant authority, but only the consulting firms or registered consultants that are registered in the relevant sector, are authorized to prepare these documents.

### (1) Preliminary Environmental Assessments (PEA)

The contents of the PEA are detailed in the Table below. The study can be prepared mainly with secondary information (books, previous studies, journals, etc.), carrying out a field study is useful, though not mandatory.

**Table 1.7 PEA Minimum Contents**

I.	General Data
II.	Project Description
	2.1 Project General Data 2.2 Project Characteristics Service Infrastructures, Access Roads, Raw Materials and Inputs, Processes, Prepared Outputs, Effluents and/or Liquid Wastes, Solid Wastes, Hazardous Substance Managements, Atmospheric Emissions, Noise Generation, Radiation Generations, Other Type of Wastes
III.	Aspects in the Physical, Biotic, Social, Cultural, and Economic Environments
IV.	Citizen Participation Plan
V.	Description of the Probable Environmental Impacts
VI.	Prevention, Mitigation, or Correction Measures for Environmental Impacts
VII.	Follow – Up and Control Plan
VIII.	Closure or Abandonment Plan
IX.	Contingency Plans
X.	Execution Schedule
XI.	Implementation Budget

Source: Prepared by the JICA Study Team based on the SEIA Rules (2009)

## **(2) Semi-Detailed Environmental Impact Assessment (EIA-sd)**

With regard to EIA-sd, a field study is mandatory in addition to office work. At the same time, further detailed data on the works plan are required, and an Environmental Management Plan should be taken into account to prevent, avoid, and mitigate any probable negative impacts in the case of programs.

**Table 1.8 EIA-sd Minimum Contents**

<b>1. Executive Summary</b>
<b>2. Project Description</b> a) Project General Background b) Legal and Administrative Reference Framework c) Project Objective and Justification d) Project Geographical and Political Location in UTM Coordinates e) Project Description by Stages f) Project Magnitude. Area of Influence g) Life Time and Estimated Investment Amounts h) Description of Information Gathering Stage i) Description of Construction Stage j) Description of Operation and Maintenance Stage k) Description of Abandonment and Closure / Phasing Out Stage
<b>3. Environmental Baseline</b> a) Project Location, Extension, and Site. Direct and Indirect Areas of Influence. Description of the Physical Component / Meteorology, Climate, and Life Zones / Geology and Geomorphology / Hydrography, Hydrology b) Hydrogeology and Hydric Balance / Soil, Capacity of Land Major Use and current Soil Use / Air, Soil, and Water Quality / Other Existing Activities in the Project Area / Other Aspects to be defined by the Relevant Authority, Description of the Biological Component /the Biological Diversity and its Components / Flora and Fauna / Fragile Ecosystems c) Natural Protected Areas or Buffering Zones / landscape units in the Project area / Aspects or factors that are a threat to the habitat or ecosystem /preservations / Other Aspects to be Defined by the Relevant Authority. d) Description of the Social, Economic, Cultural, and Anthropological Component Demographic, Social, Economic, Labor – related and other similar Indices Basic Services and Infrastructure, Quality of Life, and Traditions in communities around the Project area Description and Analysis of the Territory's Current Use Other Aspects to be defined by the Relevant Authority e) Presence of Archaeological, Historical, and Cultural Remains f) Identification of the Vulnerability Aspects g) Preparation of the General Cartography (Location Maps, Theme Maps, etc.)
<b>4. Citizenship Participation Plan</b>
<b>5. Environmental Impact Characterization</b> Identification, Appraisal, Appraisal, and Classification by Order of importance of both Positive and Negative

<p>Environmental Impacts</p> <ul style="list-style-type: none"> <li>a) Impacts will be identified, by analyzing the baseline's environmental situation, as it is compared to the Project's description.</li> <li>b) Impacts are appraised, as direct, indirect, cumulative, and synergic impacts are prevented; and any induced risks that might generate on the baseline's environmental components are appraised.</li> <li>c) Use of representative variables for both positive and negative impact identifications</li> <li>d) Effective EQS and MPL, as well as international standards, as approved by MINAM, are taken into account.</li> </ul> <p>The following will be taken into account for both positive and negative environmental impact identifications and appraisals: The physical environment, the biological environment, social, economic, and cultural aspects (especially those related to quality of life for the affected populations), the inclusion of any arrangement plans for lands or areas that are under official protection, the characterization of the area of influence, with regard to the existing infrastructure; the land potentialities and the soil current use; the landscape and any other tourist aspects, any other aspects with regard to the baseline, to be defined by the relevant authority.</p>
<p><b>6. Environmental Management Strategy</b></p> <ul style="list-style-type: none"> <li>a) Environmental Management Plan (EMP)</li> <li>b) Environmental Vigilance Plan</li> <li>c) Contingency Plan</li> <li>d) Abandonment and Closure / Phasing Out Plan</li> <li>e) Schedule and Budget</li> <li>f) Summary Table Showing Environmental Commitments</li> </ul>
<p><b>7. Introduction of Consulting Firm</b> Names and companies of the practitioners and technicians involved in the sd – EIA preparation</p>
<p><b>8. Other Technical Considerations to be Defined by the Relevant Authority</b></p>
<p><b>Attachments</b></p>

Source: Prepared by the JICA Study Team, based on the SEIA Rules (2009)

### (3) Detailed Environmental Impact Assessment (EIA-d)

Both office work and field work are required to develop an EIA-d, and the minimum terms for revision and approval are longer than those for the EIA-sd, as the report contents includes further detailed information. Required information for this type of study is primary information. For example, data obtained for the environmental baseline preparation should be gathered in the field work, as this study is being prepared.

**Table 1.9 EIA-d Minimum Contents**

<b>1. Executive Summary</b>
<p><b>2. Project Description</b></p> <ul style="list-style-type: none"> <li>a) Background</li> <li>b) Legal and Administrative Reference Framework</li> <li>c) Project Objective and Justification</li> <li>d) Project Geographical and Political Location in UTM Coordinates</li> <li>e) Project Description by Stages</li> <li>f) Area Required by the Project, in terms of Design</li> <li>g) Definition of both Direct and Indirect Area of Influence, Magnitude, Productive Characteristics, and any Potential Environmental Impacts</li> <li>h) Evaluation of the Project Alternatives from an Environmental, Economic, and Socio Cultural Point of View</li> <li>i) Project Life Time and Estimated Investment Amounts</li> <li>j) Description of Information Gathering Stage</li> <li>k) Description of Construction Stage</li> <li>l) Description of Operation and Maintenance Stage</li> <li>m) Description of Abandonment and Closure / Phasing Out Stage</li> </ul>
<p><b>3. Environmental Baseline</b></p> <ul style="list-style-type: none"> <li>a) Project Location, Extension, and Site. Direct and Indirect Areas of Influence. Macro - and Micro - Location Study.</li> <li>b) Description of the Physical Component <ul style="list-style-type: none"> <li>Meteorology, Climate, and Life Zones</li> <li>Geology and Geomorphology, Stratigraphy, and Geochemistry</li> <li>Hydrography, Hydrology, Hydrogeology and Hydric Balance</li> <li>Soil, Capacity of Land Major Use and current Soil Use</li> <li>Air, Soil, and Water Quality</li> </ul> </li> </ul>



<p>Other Existing Activities in the Project Area</p> <p>Other Aspects to be defined by the Relevant Authority</p> <p>c) Description of the Biological Component the Biological Diversity and its Components Flora and Fauna Fragile Ecosystems Natural Protected Areas or Buffering Zones Landscape units in the Project area Aspects or factors that are a threat to the habitat or ecosystem   preservations</p> <p>d) Description of the Social, Economic, Cultural, and Anthropological Component Territorial Distribution and Spatial Structure of Territorial Relations Demographic, Social, Economic, Labor – related and other similar   Indices Basic Services and Infrastructure, Quality of Life, and Traditions in communities around the Project area Description and Analysis of the Territory’s Current Use Presence of Productive Activities Other Aspects to be defined by the Relevant Authority</p> <p>e) Presence of Archaeological, Historical, and Cultural Remains</p> <p>f) Vulnerability Aspects and Hazards of a Natural or Anthropogenic Nature</p> <p>g) Preparation of the General Cartography (Location Maps, Theme Maps, etc.)</p>
<b>4. Citizenship Participation Plan</b>
<p><b>5. Environmental Impact Characterization</b> Identification, Appraisal, and Classification by Order of importance of both Positive and Negative Environmental Impacts. Appraisal should be carried out by using applicable quantitative methods.</p> <p>a) Impacts will be identified, by analyzing the baseline’s environmental situation, as it is compared to the Project’s description.</p> <p>b) Impacts are appraised, as direct, indirect, cumulative, and synergic impacts are prevented; and any induced risks that might generate on the baseline’s environmental components are appraised. An emphasis is put on the relevance of methodologies used in terms of i) the nature of the action taken, ii) the affected environmental variables, and iii) the environmental characteristics in the area of influence.</p> <p>c) The use of representative variables for both positive and negative impact identifications.</p> <p>d) Effective EQS and MPL, as well as international standards, as approved by MINAM, are taken into account. The following will be taken into account for both positive and negative environmental impact identifications and appraisals: The physical environment, the biological environment, social, economic, and cultural aspects (especially those related to quality of life for the affected populations), the inclusion of any arrangement plans for lands or areas   that are under official protection, the characterization of the area of influence, with regard to the existing infrastructure; the land potentialities and the soil current use; the landscape and any other tourist aspects, any other aspects with regard   to the baseline, to be defined by the relevant authority. In addition, the following will be taken into account for the appraisal: The positive, negative, or neutral character of the impacts. Their extent of disturbance to environment. Their environmental significance, their occurrence risk, their extension, their duration, their reversibility, the chances for biological diversity enhancement.</p>
<p><b>6. Environmental Management Strategy</b></p> <p>a) Environmental Management Plan (EMP)</p> <p>b) Environmental Vigilance Plan</p> <p>c) Compensation Plan</p> <p>d) Community Relations Plan</p> <p>e) Contingency Plan</p> <p>f) Abandonment and Closure / Phasing Out Plan</p> <p>g) Schedule and Budget</p> <p>h) Summary Table Showing Environmental Commitments</p>
<b>7. Environmental Impact Economic Appraisal</b>
<p><b>8. Introduction of Consulting Firm</b> Names and companies of the practitioners and technicians involved in the d – EIA preparation</p>
<b>9. Other Technical Considerations to be Defined by the Relevant Authority</b>
<b>Attachments</b>

Source: Prepared by the JICA Study Team, based on the SEIA Rules (2009)

## 1.5 Public Consultation

During the EIA-sd and EIA-d preparation processes, Public Consultations are necessary to be developed and carried out for Projects in the Agricultural Sector. It is the Project holder’s responsibility to undertake them. The objective of preparing and carrying out Public Consultation is

to establish suitable communication channels between the Project holder and the community in the area of influence. The minimum requirement for Public Consultation to be carried out is that the attendance of at least one (1) person from the Project's area of influence is ensured, according to the interview with DGAA. The Project holder is to take on all costs generated from the preparation of the Public Consultation. In addition, the Project holder is to strictly follow the preparation procedure for Public Consultation.

**Table 1.10 Procedure to carry out Public Hearings**

No.	Description of the Procedure Prior to a Public Hearing
1	MINAG's DGAA will propose the day, time, and place for the Project holder to support the environmental management instrument (EIA-sd, EIA-d, or EMP) in Public Consultation.
2	The Project holder will make the Consultation publicly known, via a publication in the Official Newspaper, " <i>El Peruano</i> ", and another newspaper in the Project region, no less than 10 days before the scheduled date for the Public Consultation.
3	The holder should communicate in writing about the public hearing to SENASA, DIGESA, ALA, SERNANP, the Technical Forest and Wild Fauna Administration (ATFFS, in Spanish), the local Municipality, the INC Authorities (Ministry of Cultural Affairs), and the civil organized society.
4	The holder will prepare at least 30 copies of the Environmental Management Instrument's Executive Summary for their handing out during the Public Consultation.
5	People interested in attending the Public Consultation will register at the premises, as defined by the holder, MINAG's DGAA office, and the Institutional email of the DGAA official, who is in charge of the Public Consultation.

Source: Prepared by the JICA Study Team, based on the Terms of Reference for the Public Hearing of the Agricultural Sector's Management Instruments

The Public Consultation starts with a Project's explanation, in terms of the environmental impact it generates, then there are two rounds of questions and answers, and finally, the Public Consultation's Minutes is prepared and subscribed. The Table below shows the Public Consultation Program and an estimated duration of each of its activities. Experts in charge will have to submit the Public Consultation Report, plus all related documents, to MINAG's DGAA within the next 15 working days. MINAG's DGAA will submit a copy of the Public Consultation Report to the Project holder, informing about inputs, suggestions, and remarks made at the Public Consultation. In case there are any remarks, the holder of the environmental management instrument's appraisal will have to submit the relevant Remarks Solution within the next 15 calendar days after acknowledgement of receipt of the Public Consultation Report.

**Table 1.11 Public Consultation Programs**

	Program Description
1	Introduction of the Public Consultation, by MINAG's DGAA Board Chair
2	Project introduction, by the Project holder
3	Project description, by the Consulting Firm that is in charge of the Environmental Management Instrument's preparation
4	Questions and Answers – 1 <sup>st</sup> Round
5	Questions and Answers – 2 <sup>nd</sup> Round
6	Introduction of supplementary documents
7	Preparing and reading the Public Consultation Minutes
8	Subscription of the Public Consultation Minutes

Source: Prepared by the JICA Study Team, based on the Terms of Reference for the Public Hearing of the Agricultural Sector's Management Instruments

## 1.6 National Public Investment System and EIAs

Under the National Public Investment System (SNIP, in Spanish), the Project is categorized based on its investment amount; therefore, the required information varies. As previously mentioned in this report, an Environmental Certification is necessary for all public investment Projects (The SEIA law). Relevant environmental instruments for each type of SNIP study are explained below.

A study at “Perfil” level is required for all investment Projects amounting less than PEN 10 million. At this stage, the project holder (DGIH in this Program) prepare the PEA (Preliminary Environmental Assessment) based on the SEIA law, and this report approved by the DGAA (in this case) should be attached to the Perfil report. In the case of that the Project is categorized as II or III, the project holder should do EIA-sd or EIA-d and obtain the Environmental Certification until the start of the construction.

A study at “Perfil” level is also required for all investment Projects amounting more than PEN 10 million. Having approved the Perfil report, the F/S study is required to obtain the feasibility of the project. The F/S report should contain the results of the DIA, EIA-sd or EIA-d approved by the corresponding entity.

**Table 1.12 SNIP Study Level and Environmental Assessment**

		PROJECT PIP <10 M	PROJECT PIP >10 M	ENVIRONMENTAL IMPACT
Legal Framework		SNIP	SNIP	SEIA
Step 1	Nivel of Study	PERFIL	PERFIL	EAP
	Result	FEASIBILITY	Approval of Perfil for F/S Study	ENVIRONMENTAL CATEGORIZATION
Step 2	Nivel of Study		F/S	DIA / EIA-sd / EIA-d
	Result		FEASIBILITY	ENVIRONMENTAL CERTIFICATION

Source: JICA Study Team



## **CHAPTER 2 ENVIRONMENTAL AND SOCIAL CONSIDERATIONS FOR PROJECTS IN 6 BASINS**

### **2.1 Additional Aspects of the Base-line in all 6 Basins in the Program**

Significant points on environmental impacts and social considerations to the general aspects, as detailed in Chapter 2 of the Program Perfil are summarized here.

#### **2.1.1 Natural Protected Areas**

Natural Protected Area categories under National Administration, according to their management objectives, include: National Parks, National Sanctuaries, Historical Sanctuaries, National Reserves, Landscape Reserves, Wildlife Sanctuaries, Community Reserves, Protected Forests, Hunting Reserves, and Reserved Zones (RZ). These natural protected areas are under National Administration, and make up the National System of Natural State - Protected Areas (SINANPE, in Spanish.) There are 69 Natural Protected Areas in Peru (as of October, 2010), and their total area is 185,949.91km<sup>2</sup>. It must be highlighted that investment points under this Program are not included in these Natural Protected Areas.

#### **2.1.2 Species in the Red List**

Endangered species are classified in order of priority and based on the UICN categorization, as follows: Categorization of endangered species is defined by priority order, as follows: Critically endangered (CR), Endangered (EN), In vulnerable situation (VU), and Almost Endangered (NT) species.

The *Acacia Macramantha* is found in the area of influence along the Chira River. This species is registered in the Red List under the NT categorization. In addition, birds, such as the Andean flamingos / parihuanas (*Phoenicopterus Chiensis*) migrate from the Chira and Piura River basins, from November to March, and are also registered under the NT category. No further flora or fauna appearing in the Red List have been found along the remaining basins in the Program.



Andean flamingos / parihuanas

Source: JICA Study Team (February, 2011. Close to River Chira's km. 97 point)

### **2.1.3 Indigenous Peoples**

In Peru, the National Institute for Andean, Amazon, and African Peruvian Peoples (INDEPA, in Spanish) promotes socioeconomic development for Andean, Amazon, and African Peruvian people. No indigenous communities are found within the area of influence of all 6 basins in the Program.

### **2.1.4 Land Acquisition**

In Peru, the State is the only entitled to acquire private land property for public project executions, according to the General Expropriations Law that defines the process to be followed for land expropriations. Once the Project's need is known, an expropriation law is issued within a 60-day term. Once the term is due, a Resolution is issued for the expropriation's execution. Within the next 5 days, the Project holder sends the National Letter with an offer amounting the land's commercial value plus 5% as a compensation. The land owner may either accept or reject the proposal within the next 15 days. In the event the owner does not accept the proposal, arbitration takes place. If the proposal is accepted, the State should execute payment of the proposed cost within the next 45 days. After the State has paid the total amount, possession takes place. If the State refuses to pay for the compensation, the case goes to Arbitration.

In the event the land is owned by a community, the Project holder must come to an agreement with the community that holds the land, with regard to compensation from an agricultural / farming point of view.

The following two points should be taken into account in the Project:

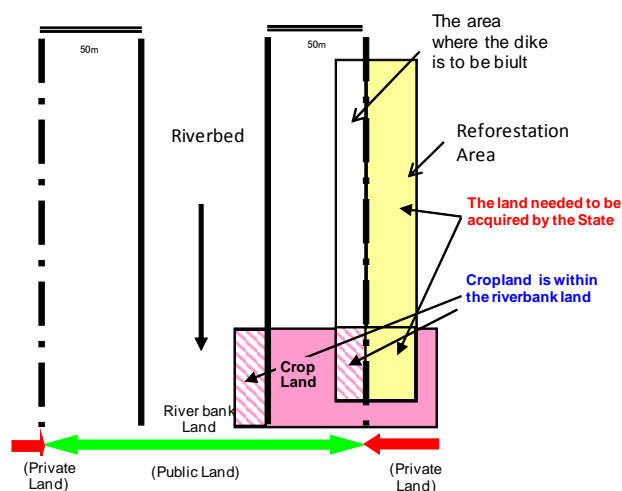
First, the Project site is located in areas where boundaries between riverbank areas and private land are not defined. According to the Rules in the Maritime, River, and Lake Activity Control and Vigilance Law, seashore land on the coast - up to 50 meters measured from the highest sea tide -, and riverbank and lake shore areas along navigable rivers and lakes - up to the highest ordinary measured flood -, all belong to the State. However some Project areas along the 6 basins are located within land used as farming land, and are not within riverbank land boundaries. Riverbank land boundaries that are owned by the State and private land are clearly defined along the Cañete and Chincha River basins. However, there are a few investment points along the Chira and Pisco Rivers in the area with no boundary definitions. There are no available data on the Yauca River basin boundaries. The table below shows the areas with defined riverbank and private land boundaries, as well as those points that fail to be defined either as State or private.

**Table 2.1 Areas with and without Clear Riverbank and Private Land Boundaries**

<b>Basins</b>	<b>Areas with Clear Riverbank and Private and Boundaries</b>	<b>Investment Points Located beyond those Areas with Defined Boundaries.</b>
Chira River	Area from 64.0km to 98.5km	Chira1, Chira2, Chira3
Cañete River	Area from 0.0km to 27.40km	-
Chincha River	Area from 0.0km to 25.00km	-
Pisco River	Area from 0.0km to 34.50km	Pi5, Pi6
Yauca River	No available information.	Ya1, Ya2, Ya3, Ya4, Ya5, Ya6
Majes-Camaná River	No available information.	MC1, MC2, MC3, MC4, MC5, MC6, MC7

Source: JICA Study Team

Second, there are riverbank areas that have been invaded and used up as farming land.



Source: Prepared by the JICA Study Team

**Figure 2.1 An Example of Cropland Located in Riverbank Land**

For example, at the “Mochica” intake point on the Yauca River, between km. 25 and km. 25.7 approximately, a landowner has crossed the land boundary, and has invaded the riverbed with a subsequent illegal progressive river channeling. The River Users’ Association has already filed claims, by submitting their meeting minutes at the Mochica Irrigators’ Commission, and these documents have already been submitted to the relevant authorities, namely, ALA and ANA. However, no measure for this problem has been taken by ALA and ANA (March, 2012).



Source: JICA Study Team (November 26<sup>th</sup>, 2010)

### **2.1.5 Crop Year in the Project Area**

The projects sites of this program are located in agricultural area generally. The main crop of each basin and the crop year will be shown in following section, based on the interview with the irrigation associations of each basin and Agricultural Information Office of each regional government. The crop with bold letter is the main crop in each basin. The busy farming seasons in each basin is also shown based according to the information from the irrigation associations. The cultivate type is categorized as permanent, temporary and semi permanent.

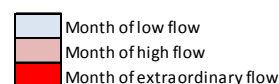
## (1) The Chira River Basin

The main crop in the Chira river basin is cotton. The busy farming season in this basin is from March to June.

**Table 2.2 Crop year of the Chira River Basin**

	Crop		Vegetative period (month)	Activity	Crop year											
	Item	Type			Jul	Aug	Sep	Oct	Nov	Dic	Jan	Feb	Mar	Apr	May	Jun
Chira Basin	Yellow corn	Temporary	5	Sowing												
				Harvest												
	Cotton	Temporary	7	Sowing												
				Harvest												
	Chala corn	Temporary	5	Sowing												
				Harvest												
	Camote	Temporary	5	Sowing												
				Harvest												
	Apple	Permanent	12	Sowing												
				Harvest												
	Vine	Permanent	12	Sowing												
				Harvest												

Source: Agricultural Information Office - Piura



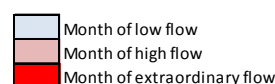
## (2) The Cañete River Basin

The main crops in the Cañete river basin are yellow corn and cotton. Camote (sweet potato), vine and apple follows them. The busy farming season in this basin is from March to June.

**Table 2.3 Crop year of the Cañete River Basin**

	Crop		Vegetative period (month)	Activity	Crop year											
	Item	Type			Jul	Aug	Sep	Oct	Nov	Dic	Jan	Feb	Mar	Apr	May	Jun
CAÑETE Basin	Yellow corn	Temporary	5	Sowing												
				Harvest												
	Cotton	Temporary	7	Sowing												
				Harvest												
	Chala corn	Temporary	5	Sowing												
				Harvest												
	Camote	Temporary	5	Sowing												
				Harvest												
	Apple	Permanent	12	Sowing												
				Harvest												
	Vine	Permanent	12	Sowing												
				Harvest												

Source: Agricultural Information Office - Lima





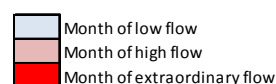
### (3) The Chincha river basin

The main crop in the Chincha river basin is cotton. Corn, alfalfa and artichoke are other important crop in the basin. The busy farming season is from April to July.

**Table 2.4 Crop year of the Chincha River Basin**

	Crop		Vegetative period (month)	Activity	Crop year											
	Item	Type			Jul	Aug	Sep	Oct	Nov	Dic	Jan	Feb	Mar	Apr	May	Jun
CHINCHA Basin	Cotton	Temporary	8	Sowing												
				Harvest												
	Yellow corn	Temporary	5	Sowing												
				Harvest												
	Vine	Permanent	12	Sowing												
				Harvest												
	Artichoke	Semi-Permanent	12	Sowing												
				Harvest												
	Asparagus	Semi-Permanent	12	Sowing												
				Harvest												
	Alfalfa	Permanent	12	Sowing												
				Harvest												

Source: Agricultural Information Office - Ica and Pisco



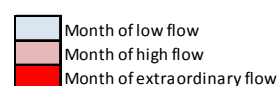
### (4) The Pisco River Basin

The main crop in the Pisco river basin is cotton and the second one is alfalfa. The busy farming season in this basin is from March to July.

**Table 2.5 Crop year of the Pisco river Basin**

	Crop		Vegetative period (month)	Activity	Crop year											
	Item	Type			Jul	Aug	Sep	Oct	Nov	Dic	Jan	Feb	Mar	Apr	May	Jun
PISCO Basin	Cotton	Temporary	8	Sowing												
				Harvest												
	Alfalfa	Semi-Permanent	12	Sowing												
				Harvest												
	Yellow corn	Temporary	5	Sowing												
				Harvest												
	Choclo corn	Temporary	4	Sowing												
				Harvest												
	Asparagus	Semi-Permanent	12	Sowing												
				Harvest												
	Tangelo	Permanent	12	Sowing												
				Harvest												

Source: Agricultural Information Office - Ica and Pisco



## (5) The Yauca River Basin

The main crop in the Yauca river basin is Olive. Alfalfa and other crops are cultivated in the partial agriculture land. The busy farming season in this basin is from April to August.

**Table 2.6 Crop year of the Yauca River Basin**

	Crop		Vegetative period (month)	Activity	Crop year											
	Item	Type			Jul	Aug	Sep	Oct	Nov	Dic	Jan	Feb	Mar	Apr	May	Jun
YAUCA Basin	Olive	Permanent	12	Sowing												
				Harvest												
	Alfalfa	Semi-Permanent	12	Sowing												
				Harvest												
	Cotton	Temporary	9	Sowing												
				Harvest												
	Yellow corn	Temporary	5	Sowing												
				Harvest												
	Camote	Temporary	5	Sowing												
				Harvest												

Source: Regional Government of Arequipa - Agricultural Information Office

	Month of low flow
	Month of high flow
	Month of extraordinary flow

## (6) The Majes – Camaná river basin

The Majes – Camaná river basin is the rice producing region. Beans and other crops are cultivated also. The busy farming season in this basin is from January to May.

**Table 2.7 Crop year of the Majes river Basin**

	Crop		Vegetative period (month)	Activity	Crop year											
	Item	Type			Jul	Aug	Sep	Oct	Nov	Dic	Jan	Feb	Mar	Apr	May	Jun
CAMANA Basin	Rice	Temporary	5	Sowing												
				Harvest												
	Bean	Temporary	5	Sowing												
				Harvest												
	Onion	Temporary	4	Sowing												
				Harvest												
	Wheat	Temporary	5	Sowing												
				Harvest												
	Pumpkin	Temporary	4	Sowing												
				Harvest												
	Chala corn	Temporary	4	Sowing												
				Harvest												
	Choclo corn	Temporary	5	Sowing												
				Harvest												
	Potato	Temporary	5	Sowing												
				Harvest												
	Tomate	Temporary	4	Sowing												
				Harvest												
	Watermelon	Temporary	5	Sowing												
				Harvest												

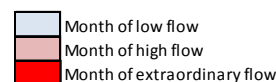
Source: Regional Government of Arequipa - Agricultural Information Office

	Month of low flow
	Month of high flow
	Month of extraordinary flow

**Table 2.8 Crop year of the Camaná River Basin**

	Crop		Vegetative period (month)	Activity	Crop year												
	Item	Type			Jul	Aug	Sep	Oct	Nov	Dic	Jan	Feb	Mar	Apr	May	Jun	
MAJES Basin	Rice	Temporary	5	Sowing													
				Harvest													
	Wheat	Temporary	5	Sowing													
				Harvest													
	Potato	Temporary	4.5	Sowing													
				Harvest													
	Alfalfa	Semi-Permanent	12	Sowing													
				Harvest													
	Bean	Temporary	5	Sowing													
				Harvest													
	Choclo corn	Temporary	5	Sowing													
				Harvest													
	Chala corn	Temporary	4	Sowing													
				Harvest													
	Purple corn	Temporary	5	Sowing													
				Harvest													
	Onion	Temporary	4	Sowing													
				Harvest													
Artichoke	Temporary	7	Sowing														
			Harvest														

Source: Regional Government of Arequipa - Agricultural Information Office



### 2.1.6 Archaeological Conservations Areas

In Peru, all public and private Projects must get the “Non-Existence of Archaeological Remains Certificate (CIRA, in Spanish) for cultural asset / heritage conservation purposes. It is the Ministry of Cultural Affairs’ National Technical Archaeology Commission that grants the CIRA. After the Project sites have been defined, the Project holder should submit the following documents to the Ministry of Cultural Affairs, for the application process for a CIRA grant to get started: 1) Application form, 2) Copies of the location drawings and outline drawings, 3) voucher, 4) Archaeological Assessment Certificate.

### 2.1.7 Women in all 6 Basins of the Project Area

Under this item, information about women’s conditions in all 6 basins will be provided, as well as their participation in the User Associations and Irrigator Commissions and their accessibility to training workshops, as organized by ANA, ALA, and the Regional Governments.

#### 1) The Chira River Basin

Women participate at the Commission meetings on a regular basis. Some women participate at the training workshops; this means they are not excluded from social involvement. However, most women cannot participate at the workshops, as they are immersed in everyday life chores. There are some women (social aid – focused) organizations along the Chira River basin, namely: *Vaso de Leche* (Glass of Milk), Mothers’ Committee

#### 2) The Cañete River Basin

Women along the Cañete River basin participate at the commission meetings, but very few participate at the training workshops, as they are not called to them. There are some women (social aid – focused) organizations along the Cañete River basin, namely: *Vaso de Leche*, Mothers’

Committee, etc.

### **3) The Chincha River Basin**

Women along this basin are devoted to farming activities, and participate at the Commission meetings on a regular basis. However, due to a lack of information and because of their everyday chores, very few women have participated at the training workshops. There are some women (social aid – focused) organizations along the Chincha River basin, such as Mother’s Clubs, The Chincha Women’s Association, *Vaso de Leche*, and the Mothers’ Committee.

### **4) The Pisco River Basin**

The women along the Pisco River basin participate at the Commission meetings. However, one of the attendants expressed that little priority is currently being given to women’s participation in the workshops, in comparison to how women’s participation was viewed in the past. There are some women (social aid – focused) organizations along the Pisco River basin, such as *Vaso de Leche*, Women’s Clubs, Sports Clubs, Vigilance Committees, and a Soup kitchen.



Source: JICA Study Team (February 11<sup>th</sup>, 2010)

### **5) The Yauca River Basin**

Some women participate at the Commission meetings on a regular basis, and other women do not attend at all. Reasons for absence usually include: not being called, and meetings being held during working hours, between 7:00-11:00 and / or 13:00-17:00. There are some women (social aid – focused) organizations along the Yauca River basin, such as a soup kitchen, *Vaso de Leche*, and some church-related (faith-based) organizations.

### **6) Majes-Camaná River Basin**

The men participate the Commission Regular Meeting than the women. That is because the most of land owners are men. However there are women who participate the meeting regularly. In the Mejes-Camaná basin, there are women organizations such as Soup Kitchen, *Vaso de Leche*, Mothers’ Club.

## **2.2 Draft Environmental Assessment for all 6 Basins**

The JICA Study Team subcontracted a local Consultant (CIDE Ingenieros S.A.), and a Preliminary Environmental Assessment (PEA) was carried out, from December 2010 to January 2011 and from September to October 2011. The PEA Reports for Chira Basin, Cañete Basin, Chíncha Basin, and Pisco Basin. The PEA Report of Majes-Camaná Basin ins under the DGAA revision on [May](#) 2012.

This item details the DEA results, based on the following reports:

- Preliminary Environmental Assessment to the “Riverbank Protection Construction for Overflowing and Flooding Controls along the Chira River; Sullana-Paita Province, Piura Region” Project;
- Preliminary Environmental Assessment to the “Riverbank Protection Construction for Overflowing and Flooding Controls along the Cañete River; Cañete Province, Lima Region” Project;
- Preliminary Environmental Assessment to the “Riverbank Protection Construction for Overflowing and Flooding Controls along the Chico and Matagente Rivers; Chíncha Province, Ica Region” Project;
- Preliminary Environmental Assessment to the “Riverbank Protection Construction for Overflowing and Flooding Controls along the Pisco River; Pisco Province, Ica Region” Project;
- Preliminary Environmental Assessment to the “Riverbank Protection Construction for Overflowing and Flooding Controls along the Yauca River; Caraveli Province, Arequipa Region” Project; and
- Preliminary Environmental Assessment to the “Riverbank Protection Construction for Overflowing and Flooding Controls along the Majes-Camaná River; Castilla y Camaná Province, Arequipa Region” Project.

### **2.2.1 Works Description**

Planned works include: Existing levee improvements, dike setup, riverbed unclogging (silt removal), undermining protection, intake and carrier improvement / repair, and riverbed extension. The table below describes the “Specific Works” (“*Puntos de Obras*”) to be taken into account in the Preliminary Environmental Assessment for Environmental Impact on all 6 basins under study.

**Table 2.9 Works Description**

		Work point		Objectives	Measure	Dimensions			Size of constructions
Río Chira	Chira 1	0.0k-4.0k	Erosión ribereña	Cultivos Depósito del Gas Natural	Mejoramiento de dique	Altura; 2.0m    Gradiente; 1:2    Longitud; 4,000m			0.0km~4.0km (Margen.I.)
	Chira 2	11.75k-12.75k	Erosión ribereña	Carretera		Altura; 2.0m    Gradiente; 1:2    Longitud; 1,000m			11.75km~12.75km (M.D.)
	Chira 3	24.5k-27.0k	Erosión ribereña	Cultivos		Altura; 2.0m    Gradiente; 1:2    Longitud; 2,500m			24.5km~27.0km (M.D.)
	Chira 4	64.0k-68.0k	Bocatoma	Cultivos	Descolmatación del cauce	Ancho de la excavación; 100m    Profundidad de la excavación; 1.0m Longitud; 1,000m			64.0km~68.0km (totalidad)
Río Caliente	Ca 1	4.3km	Punto angosto	Puente vial	Descolmatación del cauce	Ancho de la excavación; 100m    Profundidad de la excavación; 1.0m Longitud; 1,000m			4.0km~5.0km (totalidad)
	Ca 2	6.8k~8.0k	Punto de inundación	Cultivos(Manzana, uva, algodón, etc)	Conformación de dique	Altura; 2.0m    Gradiente; 1:2    Longitud; 1,200m			6.5km~8.1km (M.D.)
	Ca 3	10.25k	Punto angosto		Descolmatación del cauce	Ancho de la excavación; 100m    Profundidad de la excavación; 1.0m Longitud; 1,000m			10.0km~11.0km (totalidad)
	Ca 4	24.5k	Bocatoma		Mejoramiento de la bocatoma	Ancho de la presa; 150m    Altura de la presa; 3.0m    Grosor de la presa; 2.0m			24.25km~24.75km (totalidad)
	Ca 5	25.0k, 26.25k	Erosión ribereña	carretera	Defensa contra la socavación	Altura; 2.0m    Gradiente; 1:2    Longitud; 750m			24.75km~26.5km (M.D.)
Ríos Chico y Matagente (Chichia)	Chico 1	C-3.5~5.0k	Punto de inundación	Cultivos (algodón, uva) Zonas urbanas	Conformación de dique	Ancho de la parte superior; 4.0m    Altura; 2.0m    Gradiente; 1:2 Longitud; 3,000m (1,500+1,500)			3.0km~5.1km (totalidad)
	Chico 2	C-15k	Bocatoma		Mejoramiento de la bocatoma Ampliación del cauce	Ancho de la presa; 100m    Altura de la presa; 3.0m    Grosor de la presa; 2.0m			14.8km~15.5km (totalidad)
	Chico 3	C-24k	Estructurarepartidora		Mejoramiento de partidor (reparación de la estructura existente, obras de encausamiento de río, extensión de muro guía)	Ancho de la presa; 70m    Altura de la presa; 3.0m    Grosor de la presa; 2.0m			24.2km~24.5km (totalidad)
	Ma 1	M-3.0k~4.5k	Punto de inundación		Conformación de dique	Ancho de la parte superior; 4.0m    Altura; 2.0m    Gradiente; 1:2 Longitud; 3,000m (1,500+1,500)			2.5km~5.0km (totalidad)
	Ma 2	M-8.9k	Punto angosto		Descolmatación del cauce	Ancho de la excavación; 100m    Profundidad de la excavación; 1.0m Longitud; 1,200m			8.0km~10.5km (totalidad)
Río Pisco	PI 1	5.5k	Punto de inundación	Cultivos	Conformación de dique Mejoramiento de dique	Ancho de la parte superior; 4.0m    Altura; 2.0m    Gradiente; 1:2 Longitud; 2,000m			3.0km~5.0km (hacia M.I.)
	PI 2	7.0k	Punto angosto		Descolmatación del cauce	Ancho de la excavación; 100m    Profundidad de la excavación; 1.0m Longitud; 1,500m			6.5km~8.0km (totalidad)
	PI 3	13.5k	Punto de inundación		Conformación de dique Mejoramiento de dique	Ancho de la parte superior; 4.0m    Altura; 2.0m    Gradiente; 1:2 Longitud; 1,500m			12.5km~14.0km (hacia M.I.)
	PI 4	20.5k	Punto de inundación	Cultivos	Conformación de dique	Ancho de la parte superior; 4.0m    Altura; 2.0m    Gradiente; 1:2 Longitud; 2,000m			19.5km~20.5km (M.I.)
	PI 5	26.5k	Punto angosto		Ampliación del cauce	Ancho de la excavación; 100m    Profundidad de la excavación; 1.0m Longitud; 1,000m			26.0km~27.0km (totalidad)
	PI 6	34.5k	Bocatoma		Pozo de regulación	Pozo; 1,800mx700m			34.5km~36.5km (totalidad)
Río Yauca	Ya 1	4.5k	Punto de inundación	Cultivos (Olivo)	Reparación de diques existentes	Ancho de la parte superior; 4.0m    Altura; 2.0m    Gradiente; 1:2 Longitud; 1,000m			3.5km~7.5km (totalidad)
	Ya 2	4.1k	Punto angosto		Descolmatación del cauce	Ancho de la excavación; 100m    Profundidad de la excavación; 1.0m Longitud; 500m			
	Ya 3	4.5-7.0k	Punto de inundación Bocatoma		Reparación de diques existentes	Ancho de la parte superior; 4.0m    Altura; 2.0m    Gradiente; 1:2 Longitud; 2,500m			
	Ya 4	25.0k	Bocatoma	Cultivos (Olivo) carretera	Reparación de bocatoma	Ancho de la presa; 100m    Altura de la presa; 3.0m    Grosor de la presa; 2.0m			25.0km~25.7km (totalidad)
	Ya 5	25.0k	Bocatoma		Defensa contra la socavación	Altura; 2.0m    Gradiente; 1:2    Longitud; 500m			
	Ya 6	41.1k	Bocatoma		Defensa contra la socavación	Altura; 2.0m    Gradiente; 1:2    Longitud; 400m			
Río Majes-Cañará	MC 1	0.0k-4.5k (M.I.)	Punto de inundación	Cultivos	Conformación/Mejoramiento de dique	Ancho de la parte superior; 4.0m    Altura : entre 2.0m y 3.0m    Gradiente : 1:3 Longitud : 4,500m			0.0km-4.5km (hacia M.I.)
	MC 2	7.5k-9.5k (M.I.)	Punto de inundación		Conformación/Mejoramiento de dique	Ancho de la parte superior; 4.0m    Altura : entre 2.0m y 3.0m    Gradiente : 1:3 Longitud : 2,000m			7.5km-9.5km (hacia M.I.)
	MC 3	11.0k-17.0k (M.I.)	Punto de inundación		Conformación/Mejoramiento de dique	Ancho de la parte superior; 4.0m    Altura : entre 2.0m y 3.0m    Gradiente : 1:3 Longitud : 6,000m			11.0km-17.0km (hacia M.I.)
	MC 4	48.0k-50.5k (M.I.)	Punto de inundación		Conformación/Mejoramiento de dique	Ancho de la parte superior; 4.0m    Altura : entre 2.0m y 3.0m    Gradiente : 1:3 Longitud : 2,500m			48.0km-50.5km (hacia M.I.)
	MC 5	52.0k-56.0k (M.I.)	Punto de inundación		Conformación/Mejoramiento de dique	Ancho de la parte superior : 4.0m    Altura : entre 2.0m y 3.0m    Gradiente : 1:3 Longitud : 4,000m			52.0km-56.0 km. (hacia M.I.)
	MC 6	59.0k-62.5k (M.I.) 59.5k-62.5 (M.D.)	Punto de inundación/Erosión ribereña		Conformación/Mejoramiento de dique	Ancho de la parte superior; 4.0m    Altura : entre 2.0m y 3.0m    Gradiente : 1:3 Longitud : 6,500m			59.0km-62.5km. (hacia M.I.) 59.5km-62.5km. (hacia M.D.)
	MC 7	65.0k-66.5k (M.D.) 64.5k-66.5k (M.I.)	Punto de Inundación (M.I.)		Conformación/Mejoramiento de dique	Ancho de la parte superior; 4.0m    Altura : entre 2.0m y 3.0m    Gradiente : 1:3 Longitud : 3,500m			65.0 km. - 66.5 km. (hacia M.D.) 64.5km-66.5km (hacia M.I.)

Source: JICA Study Team

## 2.2.2 Identification of Environmental and Social Impacts

Based on the DEAs for all 6 basins, the following descriptions show the identification of matrices (construction stage and operation stage) for each basin.

## 1) The Chira River Basin

**Table 2.10 Impact Identification Matrix (Construction and Operation Stage) –Chira River Basin**

Construction Stage			Work	1-4	1-4	1-4	4	1,4	1, 4	1-4	1-4	1-4	1-4	1-4	Total Negative	Total Positive
Environment	Component	Environmental Factors	Activity	Labor Recruitment	Site preparation work (Clearing, land grading, Levelled)	Diversion of riverbed (Cofferdams)	Digging and refilling in riverside	Digging and refilling in riverbed	Civil Work (Concreting)	I&O of stone pits and material production plants	DME I&O	Camps work I&O	Carriage Staff	Transportation of machinery , equipment, materials and supplies		
Physique	Air	PM-10 (Particulate matter)		N	N	N	N			N	N		N	N	8	0
		Gas emissions		N	N	N	N	N	N	N	N		N	N	9	0
	Noise	Noise		N	N	N	N	N	N	N	N	N	N	N	10	0
		Soil fertility		N						N	N				3	0
	Soil	Land Use		N						N	N				3	0
		Calidad del agua superficial			N	N	N			N					4	0
	Water	Cantidad de agua superficial							N			N			2	0
		Morfología fluvial			N	N	N			N					4	0
Physiography	Morfología terrestre		N							N				2	0	
	Terrestrial flora		N							N				2	0	
Biotic	Flora	Aquatic flora		N	N	N	N		N					4	0	
		Terrestrial fauna		N						N				2	0	
	Fauna	Aquatic fauna			N	N	N		N					4	0	
		Visual landscape								N	N				2	0
Socio-economic	Esthetic	Quality of life	P									N	N	N	3	1
		Vulnerability - Security													0	0
	Social	PEA	P												0	1
		Current land use													0	0
Total			2	8	7	7	7	3		10	9	3	4	4	62	2
Percentage of positive and negative															97 %	3 %

Operation Stage			Works	Dike Point 1,2,3	Riverbed without Siting Point 4	Total Negatives	Total Positives
Environment	Component	Environmental Factors					
Physique	Air	PM-10 (Particulate matter)				0	0
		Gas emissions				0	0
	Noise	Noise				0	0
		Soil fertility				0	0
	Soil	Land Use				0	0
		Calidad del agua superficial				0	0
	Water	Cantidad de agua superficial	P	P		0	2
		Morfología fluvial	N	N		2	0
Biotic	Physiography	Morfología terrestre				0	0
		Terrestrial flora				0	0
	Flora	Aquatic flora				0	0
		Terrestrial fauna				0	0
Socio-economic	Fauna	Aquatic fauna	N	N		2	0
		Visual landscape	P	P		0	2
	Social	Quality of life	P	P		0	2
		Vulnerability - Security	P	P		0	2
	Economic	PEA				0	0
Total				7	7	4	10
Percentage of positive and negative						29 %	71 %

N: Negative, P: Positive

Source: Prepared by the JICA Study Team

On the Chira River basin, based on the impact identification results for the construction stage, a total number of 64 interactions have been found. 62 of these interactions (97 %) correspond to impacts that will be perceived as negative, and 2 (3 %) correspond to impacts that will be perceived as positive. In addition, 14 interactions have been found for the operation stage; 4 of these interactions (29 %) correspond to impacts that will be perceived as negative, and 10 (71 %) correspond to impacts

that will be perceived as positive.

## 2) The Cañete River Basin

**Table 2.11 Impact Identification Matrix (Construction and Operation Stage) – The Cañete River Basin**

Construction Stage			Work	1-5	1-5	1-5	4,5	1,2,3	2,4,5	1-5	1-5	1-5	1-5	1-5	Total Negative	Total Positive
Environment	Component	Environmental Factors	Activity	Labor Recruitment	Site preparation work (Clearing, land grading, Levelled)	Diversion of riverbed (Cofferdams)	Digging and refilling in riverside	Digging and refilling in riverbed	Civil Work (Concreting)	I&O of stone pits and material production plants	DME I&O	Camps work I&O	Carriage Staff	Transportation of machinery, equipment, materials and supplies		
Physique	Air	PM-10 (Particulate matter)			N	N	N	N		N	N		N	N	8	0
		Gas emissions			N	N	N	N	N	N	N		N	N	9	0
	Noise	Noise			N	N	N	N	N	N	N	N	N	N	10	0
		Soil	Soil fertility			N					N	N				3
	Land Use			N					N	N				3	0	
	Water	Calidad del agua superficial				N	N	N		N		N			5	0
		Cantidad de agua superficial							N						1	0
	Physiography	Morfología fluvial				N	N	N		N					4	0
		Morfología terrestre			N							N			2	0
	Biotic	Flora	Terrestrial flora			N						N				2
Aquatic flora					N	N	N		N					4	0	
Fauna		Terrestrial fauna			N						N				2	0
		Aquatic fauna				N	N	N		N					4	0
Socio-economic	Esthetic	Visual landscape								N	N				2	0
		Social	Quality of life		P								N	N	N	3
	Vulnerability - Security														0	0
	Economic	PEA		P												0
Current land use														0	0	
Total				2	8	7	7	7	3	10	9	3	4	4	62	2
Percentage of positive and negative															97 %	3 %

N: Negative, P:Positive

Source: Prepared by the JICA Study Team

Operation Stage			Works	Riverbed without Silt Point 1	Dike-Right Side Point 2	Riverbed without Silt Point 3	Intake Point 4	Protection - Right Side Point 5	Total Negative	Total Positive
Environment	Component	Environmental Factors								
Physique	Air	PM-10 (Particulate matter)							0	0
		Gas emissions							0	0
	Noise	Noise							0	0
		Soil	Soil fertility					P	0	1
	Land Use							0	0	
	Water	Calidad del agua superficial				P	P	0	2	
		Cantidad de agua superficial	P	P	P	P		0	3	
	Physiography	Morfología fluvial	N	N	N			3	0	
Morfología terrestre							0	0		
Biotic	Flora	Terrestrial flora						0	0	
		Aquatic flora						0	0	
	Fauna	Terrestrial fauna						0	0	
		Aquatic fauna	N	N	N			3	2	
Socio-economic	Esthetic	Visual landscape	P	P	P		P	0	4	
		Quality of life	P	P	P	P	P	0	5	
	Social	Vulnerability - Security	P	P	P	P	P	0	5	
		PEA						0	0	
	Economic	Current land use	P	P	P	P	P	0	4	
Total			7	7	7	5	6	6	26	
Percentage of positive and negative								19 %	81 %	

N: Negative, P:Positive

Source: Prepared by the JICA Study Team

On the Cañete River basin, based on the impact identification results for the construction stage, a total number of 64 interactions have been found. 62 of these interactions (97 %) correspond to



impacts that will be perceived as negative, and 2 (3 %) correspond to impacts that will be perceived as positive. In addition, 32 interactions have been found for the operation stage; 6 of these interactions (19 %) correspond to impacts that will be perceived as negative, and 26 (81 %) correspond to impacts that will be perceived as positive.

### 3) The Chincha River Basin

**Table 2.12 Impact Identification Matrix (Construction and Operation Stage) – The Chincha River Basin**

Construction Stage			Work	1-5	1-5	1-5	2,3	1,4,5	1-4	1-5	1-5	1-5	1-5	1-5		
Environment	Component	Environmental Factors	Activity	Labor Recruitment	Site preparation work (Clearing, land grading, Levelled)	Diversion of riverbed (Cofferdams)	Digging and refilling in riverside	Digging and refilling in riverbed	Civil Work (Concreting)	I&O of stone pits and material production plants	DME I&O	Camps work I&O	Carriage Staff	Transportation of machinery, equipment, materials and supplies	Total Negative	Total Positive
Physique	Air	PM-10 (Particulate matter)			N	N	N	N		N	N		N	N	8	0
		Gas emissions			N	N	N	N	N	N	N		N	N	9	0
	Noise	Noise			N	N	N	N	N	N	N	N	N	N	10	0
		Soil	Soil fertility			N					N	N				3
	Land Use				N						N	N			3	0
	Water	Calidad del agua superficial				N	N	N		N					4	0
		Cantidad de agua superficial							N			N			2	0
	Physiography	Morfología fluvial				N	N	N		N					4	0
		Morfología terrestre			N						N				2	0
	Biotic	Flora	Terrestrial flora			N						N				2
Aquatic flora						N	N	N		N					4	0
Fauna		Terrestrial fauna			N						N				2	0
		Aquatic fauna				N	N	N			N				4	0
Socio-economic	Esthetic	Visual landscape								N	N				2	0
		Quality of life	P										N	N	3	1
	Social	Vulnerability - Security													0	0
		PEA	P												0	1
	Economic	Current land use													0	0
Total				2	8	7	7	7	3	10	9	3	4	4	62	2
Percentage of positive and negative															97 %	3 %

Operation Stage			Works	Dike Chico 1	Intake Chico 2	Partidor Chico 3	Dike Ma 4	Riverbed without Siltting Ma2	Total Negative	Total Positive
Environment	Component	Environmental Factors								
Physique	Air	PM-10 (Particulate matter)							0	0
		Gas emissions							0	0
	Noise	Noise							0	0
		Soil	Soil fertility							0
	Water	Land Use							0	0
		Calidad del agua superficial		P					0	1
	Physiography	Cantidad de agua superficial	P	P	P	P	P	0	5	
		Morfología fluvial	N		P	N	N	3	1	
		Morfología terrestre						0	0	
Biotic	Flora	Terrestrial flora							0	0
		Aquatic flora							0	0
	Fauna	Terrestrial fauna							0	0
		Aquatic fauna	N		N	N	N	4	0	
Socio-economic	Esthetic	Visual landscape	P	P	P	P	P	0	4	
		Quality of life	P	P	P	P	P	0	5	
	Social	Vulnerability - Security	P	P	P	P	P	0	5	
		PEA						0	0	
	Economic	Current land use	P	P	P	P	P	0	5	
Total				7	5	7	7	7	7	26
Percentage of positive and negative									21 %	79 %

N: Negative, P:Positive

Source: Prepared by the JICA Study Team

On the Chinchu River basin, based on the impact identification results for the construction stage, a total number of 64 interactions have been found. 62 of these interactions (97 %) correspond to impacts that will be perceived as negative, and 2 (3 %) correspond to impacts that will be perceived as positive. In addition, 33 interactions have been found for the operation stage; 7 of these interactions (21 %) correspond to impacts that will be perceived as negative, and 26 (79 %) correspond to impacts that will be perceived as positive.

#### 4) The Pisco River Basin

**Table 2.13 Impact Identification Matrix (Construction and Operation Stage) – The Pisco River Basin**

Construction Stage			Work	1-6	1-6	1,3,4	1-6	5	1-5	1,3,4,6	1,3,4,6	1-6	1-5	1-6	1-6	Total Negative	Total Positive		
Environment	Component	Environmental Factors	Activity	Labor Recruitment	Site preparation work (Clearing, land grading, Levelled)	Diversion of riverbed (Cofferdams)	Digging and movement of Land	Digging and refilling in riverside	Digging and refilling in riverbed	Civil Work (Concreting)	I&O of stone pits and material production plants	DME I&O	Camps work I&O	Carriage Staff	Transportation of machinery, equipment, materials and supplies				
Physique	Air	PM-10 (Particulate matter)			N	N	N	N	N		N	N		N	N	9	0		
		Gas emissions			N	N	N	N	N	N	N	N		N	N	10	0		
	Noise	Noise			N	N	N	N	N	N	N	N	N	N	N	11	0		
		Soil fertility			N							N					2	0	
	Soil	Land Use			N						N	N					3	0	
		Calidad del agua superficial				N			N	N		N		N			5	0	
	Water	Cantidad de agua superficial									N						1	0	
		Morfología fluvial				N			N	N		N					4	0	
Physiography	Morfología terrestre				N		N					N				3	0		
	Terrestrial flora				N							N				2	0		
Biotic	Flora	Aquatic flora				N			N	N		N					4	0	
		Terrestrial fauna				N							N				2	0	
	Fauna	Aquatic fauna				N		N	N		N						5	0	
		Visual landscape				N						N	N					3	0
Socio-economic	Social	Quality of life		P										N	N	N	3	1	
		Vulnerability - Security																0	0
	Economic	PEA		P														0	1
		Current land use																	0
Total					2	9	7	5	7	7	3	9	9	3	4	4	67	2	
Percentage of positive and negative																	97 %	3 %	

Operation Stage			Works											Total Negative	Total Positive
Environment	Component	Environmental Factors		Dike-Left Side Point 1	Riverbed without Silling Point 2	Dike-Left Side Point 3	Dike-Right Side Point 4	extended Riverbed Punto 5	Well of Control Point 6						
Physique	Air	PM-10 (Particulate matter)									0	0			
		Gas emissions									0	0			
	Noise	Noise									0	0			
		Soil fertility									0	0			
	Soil	Land Use									0	0			
		Calidad del agua superficial									0	0			
	Water	Cantidad de agua superficial	P	P	P	P					0	4			
		Morfología fluvial	N	N	N	N					4	0			
Physiography	Morfología terrestre									0	0				
	Terrestrial flora									0	0				
Biotic	Flora	Aquatic flora								0	0				
		Terrestrial fauna									0	0			
	Fauna	Aquatic fauna	N	N	N	N					4	0			
		Visual landscape	P	P	P	P					0	4			
Socio-economic	Social	Quality of life	P	P	P	P	P	P	P	0	6				
		Vulnerability - Security	P	P	P	P	P	P	P	0	6				
	Economic	PEA									0	0			
		Current land use	P	P	P	P	P	P	P	0	6				
Total					7	7	7	7	3	3	8	26			
Percentage of positive and negative											24 %	76 %			

N: Negative, P:Positive

Source: Prepared by the JICA Study Team

On the Pisco River basin, based on the impact identification results for the construction stage, a total number of 69 interactions have been found. 67 of these interactions (97 %) correspond to impacts that will be perceived as negative, and 2 (3 %) correspond to impacts that will be perceived as positive. In addition, 34 interactions have been found for the operation stage; 8 of these interactions (24 %) correspond to impacts that will be perceived as negative, and 26 (76 %) correspond to impacts that will be perceived as positive.

## 5) The Yauca River Basin

**Table 2.14 Impact Identification Matrix (Construction and Operation Stage) – The Yauca River Basin**

Construction Stage			Work	1-6	1-6	1-6	1-6	4-6	1,2,3	1,3,4,5,6	1-6	1-6	1-6	1-6	1-6	Total Negative	Total Positive	
Environment	Component	Environmental Factors	Activity	Labor Recruitment	Site preparation work (Clearing, land grading, Levelled)	Dversion of riverbed (Cofferdams)	Digging and movement of Land	Digging and refilling in riverside	Digging and refilling in riverbed	Cvivil Work (Concreting)	I&O of stone pits and material production plants	DME I&O	Camps work I&O	Carriage Staff	Transportation of machinery, equipment, materials and supplies			
Physique	Air	PM-10 (Particulate matter)			N	N	N	N	N		N	N		N	N	9	0	
		Gas emissions			N	N	N	N	N	N	N	N		N	N	10	0	
	Noise	Noise			N	N	N	N	N	N	N	N	N	N	N	11	0	
		Soil	Soil fertility			N						N	N				3	0
		Land Use			N						N	N				3	0	
		Water	Calidad del agua superficial				N		N	N	N	N					5	0
			Cantidad de agua superficial								N			N			2	0
	Physiography	Morfología fluvial							N	N		N					4	0
		Morfología terrestre			N			N					N				3	0
	Biotic	Flora	Terrestrial flora			N							N				2	0
Aquatic flora									N		N					2	0	
Fauna		Terrestrial fauna			N							N				2	0	
		Aquatic fauna				N			N	N		N					4	0
Socio-economic	Esthetic	Visual landscape									N	N				2	0	
		Quality of life	P										N	N	N	3	1	
	Social	Vulnerability - Security															0	0
		PEA	P														0	1
	Economic	Current land use														0	0	
Total				2	8	6	4	6	7	4	10	9	3	4	4	65	2	
Percentage of positive and negative																97 %	3 %	

Operation Stage			Works	Repaired Dike Point 1	Riverbed without Siltting Point 2	Repaired Dike Point 3	Intake Point 4	Protection Point 5	Protection - Left Side Point 6	Total Negative	Total Positive
Environment	Component	Environmental Factors									
Physique	Air	PM-10 (Particulate matter)								0	0
		Gas emissions								0	0
	Noise	Noise								0	0
		Soil	Soil fertility					P	P	0	2
		Land Use								0	0
		Calidad del agua superficial				P	P	P	0	3	
	Water	Cantidad de agua superficial	P	P	P		P			0	4
		Morfología fluvial	N	N	N					3	0
	Physiography	Morfología terrestre								0	0
		Terrestrial flora								0	0
Biotic	Flora	Aquatic flora								0	0
		Terrestrial fauna								0	0
	Fauna	Aquatic fauna	N	N	N					3	0
		Visual landscape	P	P	P		P	P	P	0	5
Socio-economic	Social	Quality of life	P	P	P	P	P	P	P	0	6
		Vulnerability - Security	P	P	P	P	P	P	P	0	6
	Economic	PEA								0	0
		Current land use	P	P	P	P	P	P	P	0	6
Total			7	7	7	5	6	6	6	6	32
Percentage of positive and negative										16 %	84 %

N: Negative, P:Positive

Source: Prepared by the JICA Study Team

On the Yauca River basin, based on the impact identification results for the construction stage, a total number of 67 interactions have been found. 65 of these interactions (97 %) correspond to impacts that will be perceived as negative, and 2 (3 %) correspond to impacts that will be perceived as positive. In addition, 38 interactions have been found for the operation stage; 6 of these interactions (16 %) correspond to impacts that will be perceived as negative, and 32 (84 %) correspond to impacts

that will be perceived as positive.

## 6) The Majes-Camaná Basin

**Table 2.15 Impact Identification Matrix (Construction and Operation Stage) – The Majes-Camaná River Basin**

Construction Stage			Work	1-7	1-7	1-7	1-7	1-7	1-7	1-7	1-7	1-7	Total Negative	Total Positive
Environment	Component	Environmental Factors	Activity	Labor Recruitment	Site preparation work (Clearing, land grading, Levelled)	Digging and movement of Land	Civil Work (Concreting)	I&O of stone pits and material production plants	DME I&O	Camps work I&O	Carriage Staff	Transportation of machinery, equipment, materials and supplies		
Physique	Air	PM-10 (Particulate matter)			N	N		N	N		N	N	6	0
		Gas emissions			N	N	N	N	N		N	N	7	0
	Noise	Noise			N	N	N	N	N	N	N	N	8	0
		Soil	Soil fertility			N				N				2
	Land Use				N			N	N				3	0
	Water	Calidad del agua superficial					N	N		N			3	0
		Cantidad de agua superficial											0	0
	Physiography	Morfología fluvial							N					1
Morfología terrestre				N	N				N				3	0
Biotic	Flora	Terrestrial flora			N				N				2	0
		Aquatic flora						N					1	0
	Fauna	Terrestrial fauna			N				N				2	0
		Aquatic fauna				N			N				2	0
Socio-economic	Esthetic	Visual landscape						N	N				2	0
		Quality of life	P							N	N	N	3	1
	Social	Vulnerability - Security											0	0
		PEA	P										0	1
	Economic	Current land use											0	0
Total				2	8	5	3	9	9	3	4	4	45	2
Percentage of positive and negative													96 %	4 %

N: Negative, P:Positive

Source: Prepared by the JICA Study Team

Operation Stage			Works	Dike Point 1	Dike Point 2	Dike Point 3	Dike Point 4	Dike Point 5	Dike Point 6	Dike Point 7	Total Negative	Total Positive
Environment	Component	Environmental Factors										
Physique	Air	PM-10 (Particulate matter)									0	0
		Gas emissions									0	0
	Noise	Noise									0	0
		Soil fertility									0	0
	Soil	Land Use									0	0
		Calidad del agua superficial									0	0
	Water	Cantidad de agua superficial	P	P	P	P	P	P	P	P	0	7
		Morfología fluvial	N	N	N	N	N	N	N	N	7	0
Physiography	Morfología terrestre	N	N	N	N	N	N	N	N	7	0	
	Biotic	Flora	Terrestrial flora									0
Aquatic flora											0	0
Fauna		Terrestrial fauna									0	0
		Aquatic fauna	N	N	N	N	N	N	N	N	7	0
Socio-economic	Esthetic	Visual landscape	P	P	P	P	P	P	P	P	0	7
		Quality of life	P	P	P	P	P	P	P	P	0	7
	Social	Vulnerability - Security	P	P	P	P	P	P	P	P	0	7
		PEA									0	0
	Economic	Current land use	P	P	P	P	P	P	P	P	0	7
Total			8	8	8	8	8	8	8	8	21	35
Percentage of positive and negative											38 %	63 %

N: Negative, P:Positive

Source: Prepared by the JICA Study Team

On the Majes-Camana River basin, based on the impact identification results for the construction stage, a total number of 47 interactions have been found. 45 of these interactions (97 %) correspond to impacts that will be perceived as negative, and 2 (3 %) correspond to impacts that will be perceived as positive. In addition, 56 interactions have been found for the operation stage; 21 of these interactions (37.5%) correspond to impacts that will be perceived as negative, and 35 (62.5 %) correspond to impacts that will be perceived as positive.

### 2.2.3 Methodology

In Peru, environmental impacts are assessed, by using the Leopold – type matrix, and the steps for such assessment are described, as follows:

- Step 1: Impacts are categorized by the several components, namely: Physical (water quality, soil, air, and land morphology), Biological (fauna and flora), and Socioeconomic (quality of life, ways and traditions, scenery, employment, and economic activities.)
- Step 2: Impacts are categorized during the construction, operation, maintenance, and closure / phasing out stages.
- Step 3: Magnitude is estimated as a linear function of intensity, extension, duration, and reversibility. These are detailed below:

**Table 2.16 Evaluation Criterion - Leopold Matrix**

Index		Description	Valuation
“Na” nature		It defines whether change in each action on the means is positive or negative	Positive (+) : beneficial
			Negative (-): harmful
Probability of Occurrence “P.O.”		It includes the probability of occurrence of the impact on the component	High (>50 %) = 1.0
			Medium (10 – 50 %) = 0.5
			Low (1 – 10 %) = 0.2
Magnitude	Intensity (In)	It indicates the magnitude of change in the environmental factor. It reflects the degree of disturbance	Negligible (2)
			Moderate intensity (5)
			Extreme Disturbance (10)
	Extension “Ex”	It indicates the affected surface by the project actions or the global scope on the environmental factor.	Area of indirect influence: 10
			Area of direct influence: 5
			Area used up by the works: 2
	Duration “Du”	It refers to the period of time when environmental changes prevail	➤ 10 years: 10
			5 – 10 years : 5
			1 – 5 years: 2
	Reversibility “Rev”	It refers to the system’s capacity to return to a similar, or an equivalent to the initial balance.	Irreversible: 10
			Partial return: 5
			Reversible: 2

Source: Prepared based on PEAs of 6 Basins

- Step 4: Total value of impact is obtained from the integration of the pointed out criteria, as follows:

**Table 2.17 Impact Significance Degrees**

SIA	Extent of Significance
≤ 15	Of little significance
15.1 - 28	Significant
≥ 28	Very significant

Source: Prepared based on PEAs of 6 Basins

- Step 5: Prevention and mitigation measures of the impacts that were identified and evaluated in the prior steps should be set out.

## 2.2.4 Environmental and Social Impact Assessments

Environmental and social impacts, as identified in **2.2.2 Identification of Environmental and Social Impacts**, are assessed with the methodology that was explained in **2.2.3 Methodology**. The following tables show the environmental and social assessment results for each basin, during the construction and operation stages.

**Table 2.18 Environmental Impact Assessment Matrix – The Chira River Basin**

			The Chira River Basin											
Medio	Componente	Acciones del proyecto	Construction Stage											Operation Stage
			Labor Recruitment	Site preparation work (Clearing, land grading, Levelled)	Division of riverbed (Cofferdams)	Digging and refilling in riverside	Digging and refilling in riverbed	Civil Work (Concreting)	I&O of stone pits and material production plants	DIME I&O	Camps work I&O	Cariage Staff	Transportation of machinery, equipment, materials and supplies	
		Puntos de Obras: Factores Ambientales	Chi 1 - 4	Chi 1 - 4	Chi 1 - 4	Chi 1 - 4	Chi 1, 2, 3, 4	Chi 1, 2, 3	Chi 1 - 4	Chi 1 - 4	Chi 1 - 4	Chi 1 - 4	Chi 1 - 4	Chi 1, 2 and 3
Physique	Air	PM-10 (Particulate matter)	0.0	-12.0	-12.0	-12.0	-12.0	0.0	-18.0	-18.0	0.0	-12.0	-12.0	0.0
		Gas emissions	0.0	-11.5	-11.5	-11.5	-11.5	-11.5	-11.5	-11.5	0.0	-11.5	-11.5	0.0
	Noise	Noise	0.0	-15.0	-15.0	-15.0	-15.0	-15.0	-15.0	-15.0	-15.0	-15.0	-15.0	0.0
		Soil fertility	0.0	-11.5	0.0	0.0	0.0	0.0	-14.2	-14.2	0.0	0.0	0.0	0.0
	Soil	Land Use	0.0	-14.2	0.0	0.0	0.0	0.0	-15.0	-15.0	0.0	0.0	0.0	0.0
		Calidad del agua superficial	0.0	0.0	-17.5	-12.0	-23.0	0.0	-15.0	0.0	0.0	0.0	0.0	0.0
	Water	Cantidad de agua superficial	0.0	0.0	0.0	0.0	0.0	-9.0	0.0	0.0	-15.0	0.0	0.0	31.0
		Morfología fluvial	0.0	0.0	-12.0	-20.0	-31.0	0.0	-23.0	0.0	0.0	0.0	0.0	-25.5
	Physiography	Morfología terrestre	0.0	-33.0	0.0	0.0	0.0	0.0	0.0	-28.0	0.0	0.0	0.0	0.0
		Terrestrial flora	0.0	-28.0	0.0	0.0	0.0	0.0	0.0	-22.5	0.0	0.0	0.0	0.0
Biotic	Flora	Aquatic flora	0.0	0.0	-12.0	-14.5	-14.5	0.0	-14.5	0.0	0.0	0.0	0.0	0.0
		Terrestrial fauna	0.0	-24.2	0.0	0.0	0.0	0.0	0.0	-22.5	0.0	0.0	0.0	0.0
	Fauna	Aquatic fauna	0.0	0.0	-12.0	-14.5	-22.5	0.0	-15.0	0.0	0.0	0.0	0.0	-25.5
		Visual landscape	0.0	0.0	0.0	0.0	0.0	0.0	-12.0	0.0	0.0	0.0	0.0	36.0
Socio-economic	Social	Quality of life	17.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-17.5	-17.5	36.0	36.0
		Vulnerability - Security	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.0
	Economic	PEA	17.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Current land use	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.0

Grade of Positive Impacts		Grade of Negative Impacts	
0-15.0	Little significant	0-15.0	Little significant
15.1-28.0	Significant	15.1-28.0	Significant
28.1-	Very significant	28.1-	Very significant

Source: Prepared based on PEAs from 6 Basins

It must be pointed out that in the Chira River basin 15 out of a total of 62 negative impacts have been quantified as significant, and 2 have been quantified as very significant, during the construction stage. Meanwhile, out of a total of 4 negative impacts, 2 have been quantified as significant, and 2 have been quantified as very significant, during the operation stage.

During the construction stage, the works site preparation component will significantly affect the land morphology. During the operation stage, river morphology and aquatic fauna will be significantly affected at point “Chi4”, where the dike will be set up and the river basin will be unclogged.

The Environmental Management Plan will be detailed in 3 Environmental Management Plans for Probable Impacts.

**Table 2.19 Environmental Impact Assessment Matrix – The Cañete River Basin**

			The Cañete River Basin															
			Construction Stage										Operation Stage					
Medio	Componente	Acciones del proyecto	Labor Recruitment	Site preparation work (Clearing, land grading, Levelled)	Diversion of riverbed (Cofferdams)	Digging and refilling in riverside	Digging and refilling in riverbed	Civil Work (Concreting)	I&O of stone pits and material production plants	DME I&O	Camps work I&O	Carriage Staff	Transportation of machinery, equipment, materials and supplies	Ca1	Ca2	Ca3	Ca4	Ca5
		Puntos de Obras: Factores Ambientales	Ca 1-5	Ca 1-5	Ca 1-5	Ca 4 y 5	Ca 1, 2 y 3	Ca 4 y 5	Ca 1-5	Ca 1-5	Ca 1-5	Ca 1-5	Ca 1-5					
Physique	Air	PM-10 (Particulate matter)	0.0	-12.0	-12.0	-12.0	-12.0	0.0	-18.0	-18.0	0.0	-12.0	-12.0	0.0	0.0	0.0	0.0	0.0
		Gas emissions	0.0	-11.5	-11.5	-11.5	-11.5	-11.5	-11.5	-11.5	0.0	-11.5	-11.5	0.0	0.0	0.0	0.0	0.0
	Noise	Noise	0.0	-15.0	-15.0	-15.0	-15.0	-15.0	-15.0	-15.0	-15.0	-15.0	-15.0	0.0	0.0	0.0	0.0	0.0
		Soil	Soil fertility	0.0	-11.5	0.0	0.0	0.0	0.0	-14.2	-14.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Land Use		0.0	-14.2	0.0	0.0	0.0	0.0	-15.0	-15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Water	Calidad del agua superficial	0.0	0.0	-17.5	-12.0	-23.0	0.0	-15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.0	31.0
		Cantidad de agua superficial	0.0	0.0	0.0	0.0	0.0	-9.0	0.0	0.0	-15.0	0.0	0.0	0.0	31.0	26.0	31.0	26.0
	Physiography	Morfología fluvial	0.0	0.0	-12.0	-20.0	-31.0	0.0	-23.0	0.0	0.0	0.0	0.0	0.0	-30.5	-25.5	-30.5	0.0
Morfología terrestre		0.0	-33.0	0.0	0.0	0.0	0.0	0.0	-28.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Biotic	Flora	Terrestrial flora	0.0	-28.0	0.0	0.0	0.0	0.0	0.0	-22.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Aquatic flora	0.0	0.0	-12.0	-14.5	-14.5	0.0	-14.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fauna	Terrestrial fauna	0.0	-24.2	0.0	0.0	0.0	0.0	0.0	-22.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Aquatic fauna	0.0	0.0	-12.0	-14.5	-22.5	0.0	-15.0	0.0	0.0	0.0	0.0	0.0	-30.5	-25.5	-30.5	0.0
Socio-economic	Esthetic	Visual landscape	0.0	0.0	0.0	0.0	0.0	0.0	-12.0	-12.0	0.0	0.0	0.0	36.0	36.0	36.0	0.0	36.0
		Quality of life	17.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-17.5	-17.5	-17.5	36.0	36.0	36.0	31.0	36.0
	Social	Vulnerability - Security	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.0	36.0	36.0	31.0	36.0
		PEA	17.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Economic	Current land use	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.0	36.0	36.0	36.0	36.0

0–15.0

15.1–28.0

28.1–

Little significant

Significant

Very significant

0–15.0

15.1–28.0

28.1–

Little significant

Significant

Very significant

Grade of Positive Impacts		Grade of Negative Impacts	
0–15.0	Little significant	0–15.0	Little significant
15.1–28.0	Significant	15.1–28.0	Significant
28.1–	Very significant	28.1–	Very significant

Source: Prepared based on PEAs from 6 Basins

It must be pointed out that in the Cañete River basin only 15 out of a total of 62 negative impacts have been quantified as significant, and 2 have been quantified as very significant, during the construction stage. Meanwhile, out of a total of 6 negative impacts, only 2 have been quantified as significant, and 4 have been quantified as very significant, during the operation stage.

During the construction stage, the works site preparation component and the DME installation and operation will significantly affect the land morphology. During the operation stage, river morphology and aquatic fauna will be significantly affected at “Ca1” and “Ca3” points, where the river basin will be unclogged.

The Environmental Management Plan will be detailed in 3 Environmental Management Plans for Probable Impacts.

**Table 2.20 Environmental Impact Assessment Matrix – The Chinchu River Basin**

			The Chincha River Basin																
			Construction Stage										Operation Stage						
Medio	Componente	Acciones del proyecto	Labor Recruitment	Site preparation work (Clearing, land grading, Levelled)	Diversion of riverbed (Cofferdams)	Digging and refilling in riverside	Digging and refilling in riverbed	Civil Work (Concreting)	I&O of stone pits and material production plants	DME I&O	Camps work I&O	Carriage Staff	Transportation of machinery, equipment, materials and supplies	Chico1	Chico2	Chico3	Ma1	Ma2	
			Todos	Todos	Todos	Chico 2 y 3	Chico 1, Ma 1 y 2	Chico 1, 2, 3, Ma1	Todos	Todos	Todos	Todos	Todos	Todos	Todos				
		Puntos de Obras: Factores Ambientales	Todos	Todos	Todos	Chico 2 y 3	Chico 1, Ma 1 y 2	Chico 1, 2, 3, Ma1	Todos	Todos	Todos	Todos	Todos	Todos					
Physique	Air	PM-10 (Particulate matter)	0.0	-12.0	-12.0	-12.0	-12.0	0.0	-18.0	-18.0	0.0	-12.0	-12.0	0.0	0.0	0.0	0.0	0.0	0.0
		Gas emissions	0.0	-11.5	-11.5	-11.5	-11.5	-11.5	-11.5	-11.5	0.0	-11.5	-11.5	0.0	0.0	0.0	0.0	0.0	0.0
	Noise	Noise	0.0	-15.0	-15.0	-15.0	-15.0	-15.0	-15.0	-15.0	-15.0	-15.0	-15.0	0.0	0.0	0.0	0.0	0.0	0.0
		Soil	Soil fertility	0.0	-11.5	0.0	0.0	0.0	0.0	-14.2	-14.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Water	Land Use	0.0	-14.2	0.0	0.0	0.0	0.0	-15.0	-15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Calidad del agua superficial	0.0	0.0	-17.5	-12.0	-23.0	0.0	-15.0	0.0	0.0	0.0	0.0	0.0	28.0	0.0	0.0	0.0	0.0
		Cantidad de agua superficial	0.0	0.0	0.0	0.0	0.0	-9.0	0.0	0.0	-15.0	0.0	0.0	26.0	31.0	26.0	26.0	31.0	
Physiography	Morfología fluvial	0.0	0.0	-12.0	-20.0	-31.0	0.0	-23.0	0.0	0.0	0.0	0.0	-25.5	0.0	26.0	-25.5	-30.5		
	Morfología terrestre	0.0	-33.0	0.0	0.0	0.0	0.0	0.0	-28.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Biotic	Flora	Terrestrial flora	0.0	-28.0	0.0	0.0	0.0	0.0	0.0	-22.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Aquatic flora	0.0	0.0	-12.0	-14.5	-14.5	0.0	-14.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fauna	Terrestrial fauna	0.0	-24.2	0.0	0.0	0.0	0.0	0.0	-22.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Aquatic fauna	0.0	0.0	-12.0	-14.5	-22.5	0.0	-15.0	0.0	0.0	0.0	0.0	-25.5	0.0	-25.5	-25.5	-30.5	
Socio-economic	Esthetic	Visual landscape	0.0	0.0	0.0	0.0	0.0	0.0	-12.0	-12.0	0.0	0.0	0.0	36.0	0.0	36.0	36.0	36.0	36.0
		Quality of life	17.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-17.5	-17.5	-17.5	36.0	31.0	36.0	36.0	36.0	36.0
	Social	Vulnerability - Security	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.0	31.0	36.0	36.0	36.0	36.0
		PEA	17.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Economic	Current land use	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.0	36.0	36.0	36.0	36.0	36.0
Grade of Positive Impacts																			
Grade of Negative Impacts																			
0-15.0		Little significant		0-15.0		Little significant													
15.1-28.0		Significant		15.1-28.0		Significant													
28.1-		Very significant		28.1-		Very significant													

Grade of Positive Impacts		Grade of Negative Impacts	
0-15.0	Little significant	0-15.0	Little significant
15.1-28.0	Significant	15.1-28.0	Significant
28.1-	Very significant	28.1-	Very significant

Source: Prepared based on PEAs of 6 Basins

It must be pointed out that in the Chinchu River basin only 15 out of a total of 62 negative impacts have been quantified as significant, and 2 have been quantified as very significant, during the construction stage. Meanwhile, out of a total of 7 negative impacts, only 5 have been quantified as significant, and 2 have been quantified as very significant, during the operation stage.

During the construction stage, the works site preparation component will significantly affect the land morphology. At the same time, the Riverbed Excavation and Filling component will affect the “Chico1”, “Ma1”, and “Ma2” points. During the operation stage, river morphology and aquatic fauna will be significantly affected at the “Ma3” points, where the river basin will be unclogged.

The Environmental Management Plan will be detailed in 3 Environmental Management Plans for Probable Impacts.



**Table 2.21 Environmental Impact Assessment Matrix – The Pisco River Basin**

			The Pisco River Basin											
			Construction Stage						Operation Stage					
Medio	Componente	Acciones del proyecto	Civil Work (Concreting)	I&O of stone pits and material production plants	DME I&O	Camps work I&O	Carriage Staff	Transportation of machinery, equipment, materials and supplies	Pi1	Pi2	Pi3	Pi4	Pi5	Pi6
		Puntos de Obras: Factores Ambientales	Pi 1,3,4 y 6	Pi 1,3,4 y 6	Pi 1-6	Pi 1-5	Pi 1-6	Pi 1-6						
Physique	Air	PM-10 (Particulate matter)	0.0	-11.5	-18.0	0.0	-11.5	-11.5	0.0	0.0	0.0	0.0	0.0	0.0
		Gas emissions	-11.5	-11.5	-11.5	0.0	-11.5	-11.5	0.0	0.0	0.0	0.0	0.0	0.0
	Noise	Noise	-15.0	-12.0	-15.0	-15.0	-12.0	-12.0	0.0	0.0	0.0	0.0	0.0	0.0
		Soil	Soil fertility	0.0	0.0	-14.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Land Use		0.0	-15.0	-15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Water	Calidad del agua superficial	0.0	-15.0	0.0	-15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Cantidad de agua superficial	-9.0	0.0	0.0	0.0	0.0	0.0	26.0	31.0	26.0	26.0	0.0	0.0
	Physiography	Morfología fluvial	0.0	-23.0	0.0	0.0	0.0	0.0	-25.5	-30.5	-25.5	-25.5	0.0	0.0
Morfología terrestre		0.0	0.0	-28.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Biotic	Flora	Terrestrial flora	0.0	0.0	-22.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Aquatic flora	0.0	-14.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fauna	Terrestrial fauna	0.0	0.0	-22.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Aquatic fauna	0.0	-15.0	0.0	0.0	0.0	0.0	-25.5	-30.5	-25.5	-25.5	0.0	0.0
Socio-economic	Esthetic	Visual landscape	0.0	-12.0	-12.0	0.0	0.0	0.0	36.0	36.0	36.0	36.0	0.0	0.0
		Quality of life	0.0	0.0	0.0	-18.0	-18.0	-17.5	36.0	36.0	36.0	31.0	41.0	36.0
	Social	Vulnerability - Security	0.0	0.0	0.0	0.0	0.0	0.0	36.0	36.0	36.0	31.0	41.0	36.0
		PEA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Economic	Current land use	0.0	0.0	0.0	0.0	0.0	0.0	36.0	36.0	36.0	36.0	41.0	36.0
Grade of Positive Impacts														
	0-15.0 Little significant													
	15.1-28.0 Significant													
	28.1- Very significant													
Grade of Negative Impacts														
	0-15.0 Little significant													
	15.1-28.0 Significant													
	28.1- Very significant													

Grade of Positive Impacts			Grade of Negative Impacts		
0-15.0	Little significant		0-15.0	Little significant	
15.1-28.0	Significant		15.1-28.0	Significant	
28.1-	Very significant		28.1-	Very significant	

Source: Prepared based on PEAs of 6 Basins

It must be pointed out that in the Pisco River basin only 12 out of a total of 67 negative impacts have been quantified as significant, and 2 have been quantified as very significant, during the construction stage. Meanwhile, out of a total of 8 negative impacts, only 6 have been quantified as significant, and 2 have been quantified as very significant, during the operation stage.

During the construction stage, the works site preparation component will significantly affect the land morphology. At the same time, the Riverbed Excavation and Filling component will affect the “Pi1”, “Pi2”, “Pi3”, and “Pi4” points. During the operation stage, river morphology and aquatic fauna will be significantly affected at the “Pi2” points, where the river basin will be unclogged.

The Environmental Management Plan will be detailed in 3 Environmental Management Plans for Probable Impacts.

**Table 2.22 Environmental Impact Assessment Matrix – The Yauca River Basin**

			The Yauca River Basin																	
			Construction Stage										Operation Stage							
Medio	Componente	Acciones del proyecto	Labor Recruitment	Site preparation work (Cleaning, land grading, Levelled)	Diversion of riverbed (Cofferdams)	Digging and refilling in riverside	Digging and refilling in riverbed	Civil Work (Concreting)	I&O of stone pits and material production plants	DME I&O	Camps work I&O	Carriage Staff	Transportation of machinery, equipment, materials and supplies	Ya1	Ya2	Ya3	Ya4	Ya5	Ya6	
			Puntos de Obras: Factores Ambientales	Ya 1-6	Ya 1-6	Ya 1-6	Ya 4-6	Ya 1, 2 y 3	Ya 1, 3, 4, 5 y 6	Ya 1-6	Ya 1-6	Ya 1-6	Ya 1-6							Ya 1-6
Physique	Air	PM-10 (Particulate matter)	0.0	-15.0	-11.5	-12.0	-12.0	0.0	-18.0	-18.0	0.0	-12.0	-12.0	0.0	0.0	0.0	0.0	0.0	0.0	
		Gas emissions	0.0	-11.5	-11.5	-11.5	-11.5	-11.5	-15.0	-11.5	0.0	-11.5	-11.5	0.0	0.0	0.0	0.0	0.0	0.0	
	Noise	Noise	0.0	-12.0	-15.0	-15.0	-15.0	-15.0	-15.0	-15.0	-15.0	-15.0	-15.0	0.0	0.0	0.0	0.0	0.0	0.0	
		Soil fertility	0.0	-14.5	0.0	0.0	0.0	0.0	-14.2	-14.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.0	31.0
	Soil	Land Use	0.0	-14.2	0.0	0.0	0.0	0.0	-15.0	-15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Water	Calidad del agua superficial	0.0	0.0	-17.5	-15.0	-23.0	-14.5	-15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.0	31.0
		Cantidad de agua superficial	0.0	0.0	0.0	0.0	0.0	-9.0	0.0	0.0	-15.0	0.0	0.0	0.0	26.0	31.0	26.0	26.0	0.0	0.0
		Physiography	Morfología fluvial	0.0	0.0	-12.0	-26.0	-31.0	0.0	-23.0	0.0	0.0	0.0	0.0	-25.5	-30.5	-25.5	0.0	0.0	0.0
Biotic	Flora	Morfología terrestre	0.0	-33.0	0.0	0.0	0.0	0.0	0.0	-28.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Terrestrial flora	0.0	-24.5	0.0	0.0	0.0	0.0	0.0	-22.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fauna	Aquatic flora	0.0	0.0	0.0	0.0	-14.5	0.0	-14.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Terrestrial fauna	0.0	-24.2	0.0	0.0	0.0	0.0	0.0	-22.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Aquatic fauna	0.0	0.0	-12.0	-11.5	-17.5	0.0	-14.5	0.0	0.0	0.0	0.0	-25.5	-30.5	-25.5	0.0	0.0	0.0	0.0
		Socio-economic	Visual landscape	0.0	0.0	0.0	0.0	0.0	-12.0	-12.0	0.0	0.0	0.0	0.0	36.0	36.0	36.0	0.0	36.0	36.0
Socio-economic	Social	Quality of life	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-14.5	-17.5	-17.5	36.0	36.0	36.0	31.0	36.0	36.0	
		Vulnerability- Security	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.0	36.0	36.0	31.0	36.0	36.0	
	Economic	PEA	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Current land use	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0

Grade of Positive Impacts

0-15.0

15.1-28.0

28.1-

Little significant

Significant

Very significant

Grade of Negative Impacts

0-15.0

15.1-28.0

28.1-

Little significant

Significant

Very significant

Grade of Positive Impacts		Grade of Negative Impacts	
0-15.0	Little significant	0-15.0	Little significant
15.1-28.0	Significant	15.1-28.0	Significant
28.1-	Very significant	28.1-	Very significant

Source: Prepared based on PEAs of 6 Basins

It must be pointed out that in the Yauca River basin only 14 out of a total of 65 negative impacts have been quantified as significant, and 2 have been quantified as very significant, during the construction stage. Meanwhile, out of a total of 6 negative impacts, only 4 have been quantified as significant, and 2 have been quantified as very significant, during the operation stage.

During the construction stage, the works site preparation component and the DME installation and operation component will significantly affect the land morphology. At the same time, the Riverbed Excavation and Filling component will affect the “Ya1”, “Ya2”, and “Ya3” points. During the operation stage, river morphology and aquatic fauna will be significantly affected at the “Ya2” points, where the river basin will be unclogged.

The Environmental Management Plan will be detailed in 3 Environmental Management Plans for Probable Impacts.

**Table 2.23 Environmental Impact Assessment Matrix – The Majes-Camaná River Basin**

			The Majes-Camaná River Basin										
Medio	Componente	Acciones del proyecto	Construction Stage										Operation Stage
			Labor Recruitment	Site preparation work (Clearing, land grading, Levelled)	Digging and refilling in riverside	Civil Work (Concreting)	I&O of stone pits and material production plants	DME I&O	Camps work I&O	Carriage Staff	Transportation of machinery, equipment, materials and supplies	MC1-MC7	
			MC1-MC7	MC1-MC7	MC1-MC7	MC1-MC7	MC1-MC7	MC1-MC7	MC1-MC7	MC1-MC7	MC1-MC7		
Physique	Air	PM-10 (Particulate matter)	0.0	-12.0	-12.0	0.0	-18.0	-18.0	0.0	-12.0	-12.0	0.0	
		Gas emissions	0.0	-11.5	-11.5	-11.5	-11.5	-11.5	0.0	-11.5	-11.5	0.0	
	Noise	Noise	0.0	-15.0	-12.0	-12.0	-15.0	-15.0	-15.0	-15.0	-15.0	0.0	
		Soil fertility	0.0	-11.5	0.0	0.0	-14.2	-14.2	0.0	0.0	0.0	0.0	
	Soil	Land Use	0.0	-14.2	0.0	0.0	-15.0	-15.0	0.0	0.0	0.0	0.0	
		Calidad del agua superficial	0.0	0.0	-12.0	0.0	-15.0	0.0	0.0	0.0	0.0	0.0	
	Water	Cantidad de agua superficial	0.0	0.0	0.0	-9.0	0.0	0.0	-15.0	0.0	0.0	26.0	
		Morfología fluvial	0.0	0.0	0.0	0.0	-23.0	0.0	0.0	0.0	0.0	-25.5	
	Physiography	Morfología terrestre	0.0	-33.0	-15.0	0.0	0.0	-28.0	0.0	0.0	0.0	-25.5	
		Terrestrial flora	0.0	-28.0	0.0	0.0	0.0	-22.5	0.0	0.0	0.0	0.0	
Biotic	Flora	Aquatic flora	0.0		-14.5	0.0	-14.5	0.0	0.0	0.0	0.0	0.0	
		Terrestrial fauna	0.0	-24.2	0.0	0.0	0.0	-22.5	0.0	0.0	0.0	0.0	
	Fauna	Aquatic fauna	0.0	0.0	-14.5	0.0	-15.0	0.0	0.0	0.0	0.0	-25.5	
		Visual landscape	0.0	0.0	0.0	0.0	-12.0	-12.0	0.0	0.0	0.0	36.0	
Socio-economic	Esthetic	Quality of life	17.0	0.0	0.0	0.0	0.0	0.0	-17.5	-17.5	-17.5	36.0	
		Vulnerability - Security	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.0	
	Economic	PEA	17.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
		Current land use	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.0	

Grade of Positive Impacts		Grade of Negative Impacts	
0-15.0	Little significant	0-15.0	Little significant
15.1-28.0	Significant	15.1-28.0	Significant
28.1-	Very significant	28.1-	Very significant

Source: Prepared based on PEAs of 6 Basins

It must be pointed out that in the Majes-Camaná River basin 11 out of a total of 14 negative impacts have been quantified as significant, and 1 has been quantified as very significant, during the construction stage. Meanwhile, 3 significant negative impacts have been quantified as during the operation stage.

During the construction stage, the works site preparation component will significantly affect the land morphology. During the operation stage, river morphology and aquatic fauna will be significantly affected all the point, where the dikes will be built.

The Environmental Management Plan will be detailed in 3 Environmental Management Plans for Probable Impacts.

During the construction stage, actions that will generate most significant negative impacts along all 6

basins include: “Site Works Preparation and Clearance”, “Riverbed Excavation and Filling”, and “Surplus Material Deposits Operation (DME, in Spanish).” “Site works Preparation and Clearance” will bring about a significant modification to the land morphology, whereas “Riverbed Excavation and Filling” will bring about a significant modification to river morphology.

During the operation stage, hydraulic infrastructure works that will bring about most significant negative environmental impacts include “Basin Unclogging” that will cause a modification to the river morphology and subsequently, decreased river habitability conditions that will directly impact the aquatic fauna.

Most significant positive impacts are related to all works to be constructed along the river basins, and are directly related to improve the quality of the lives of the population around the area of influence, improve the “Current Use of land / soil”, improve the security conditions, and reduce vulnerability at social and environmental levels.

## 2.2.5 Priority of all 36 Investment Points from the Environmental and Social Impact Point of View

The matrix below is the outcome of the priority of the investment points from an environmental and social impact point of view, compared to the environmental impact and social values. All 36 investment points along all 6 basins were prioritized, based on the matrix. The least impact value means the least negative impact.

**Table 2.24 Priority of the Investment Points from the Point of View of the Environmental and Social Impacts**

Basin	Investment Points	Evaluation Points of Environmental and Social Impact during the Construction Stage	Evaluation Points of Environmental and Social Impact during the Operation Stage	Total Points	Priority based on the point of view of the Environmental and Social Impacts
Chira	Chira1	-843.8	119.0	-724.8	1
	Chira2	-843.8	119.0	-724.8	1
	Chira3	-843.8	119.0	-724.8	1
	Chira4	-808.3	114.0	-694.3	11
Cañete	Ca1	-808.3	114.0	-694.3	11
	Ca2	-808.3	119.0	-689.3	14
	Ca3	-808.3	114.0	-694.3	11
	Ca4	-813.8	152.0	-661.8	16
	Ca5	-813.8	206.0	-607.8	27
Chincha	Chico1	-843.8	119.0	-724.8	1
	Chico2	-813.8	157.0	-656.8	17
	Chico3	-813.8	170.5	-643.3	18
	Ma1	-843.8	119.0	-724.8	1
	Ma2	-647.1	114.0	-533.1	30

Basin	Investment Points	Evaluation Points of Environmental and Social Impact during the Construction Stage	Evaluation Points of Environmental and Social Impact during the Operation Stage	Total Points	Priority based on the point of view of the Environmental and Social Impacts
Pisco	Pi1	-818.6	119.0	-699.6	9
	Pi2	-556.6	114.0	-442.6	31
	Pi3	-818.6	119.0	-699.6	9
	Pi4	-818.6	109.0	-709.6	8
	Pi5	-426.6	123.0	-303.6	32
	Pi6	-387.8	108.0	-279.8	33
Yauca	Ya1	-834.3	119.0	-715.3	6
	Ya2	-784.3	114.0	-670.3	15
	Ya3	-834.3	119.0	-715.3	6
	Ya4	-800.8	152.0	-648.8	18
	Ya5	-800.8	206.0	-594.8	28
	Ya6	-800.8	206.0	-594.8	28
Majes-Camaná	Mc1	-710.8	93.5	-617.3	20
	Mc2	-710.8	93.5	-617.3	20
	Mc3	-710.8	93.5	-617.3	20
	Mc4	-710.8	93.5	-617.3	20
	Mc5	-710.8	93.5	-617.3	20
	Mc6	-710.8	93.5	-617.3	20
	Mc7	-710.8	93.5	-617.3	20

Source: JICA Study Team



## **CHAPTER 3 ENVIRONMENTAL MANAGEMENT PLAN FOR PROBABLE IMPACTS**

### **3.1 Follow-Up and Monitoring Plan**

The objective of the Socio-Environmental Plans is to internalize both positive and negative significant and very significant environmental impacts that are related to the Project's construction and operation stages, so that prevention and/or mitigation of significant and very significant negative impacts, preservation of environmental heritage, and Project sustainability are ensured.

During the construction stage, Projects of all 6 basins have set out the following measures: "Local Hiring Program", "Works Sites Management and Control Program", "Riverbed Diversion Program", "Riverbank Excavation and Filling Management", "Riverbed Excavations and Filling Management", "Quarry Management", "DME Management", "Camp and Site Residence Standards", and "Transportation Activity Management." During the operation stages, Projects for all 6 basins have considered the development of activities with regard to "Riverbed and Aquatic Fauna Management". These activities should develop riverbed conditioning downstream the intervention points, for erosion probabilities to be reduced, and habitability conditions to be provided for aquatic fauna species. The following are measures related to those negative impacts to be mitigated or those positive impacts to be potentiated. Overall measures have been established for all 6 basins, based on the impacts, as identified in all basins.

**Table 3.1 EMP Summary**

Measure Name	Description	Person / Entity in charge of the execution	Periodicity
Local Hiring Program	Design of a local labor hiring program that maximizes local hand labor hiring benefits. A document with policies and procedures will be developed.	The holder or contractor, in coordination with the municipality and the worker unions.	Prior to the beginning of the construction activities
	The State should request the contractor to execute works, and that over 50 % of its non – qualified hand labor has been hired locally.	The holder	
	The Program will consider the development-prior to the works execution -based on a register of the labor supply in the Project's area of direct influence. This register will include the following data: Full name, DNI (ID) No., age, gender, No. of depending family members, occupation, etc., place of residence. Based on the gathered data, a list of local hireable labor will be prepared; this list will prioritize those applicants having less economic income and a larger number of dependent family members.	The Project holder or a specialist third party under the holder's supervision.	
Work Sites Management and Control Program	The Contractor will prepare a policy and procedure document, in response to the impact on land morphology caused by permanent works construction, as this is an inevitable impact. In this way, only mitigation will be accomplished.	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision	

Measure Name	Description	Person / Entity in charge of the execution	Periodicity
	Measure consists in carrying out strict control and follow – up to those areas to be intervened, as a part of the works execution. Thus, areas or areas that have not been foreseen in the Project formulation should not be unnecessarily damaged.	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision	During the construction period.
	The Contractor should make a commitment to affect up to a maximum of 110 % of the areas contemplated in the engineering designs for works execution purposes (both temporary and permanent)	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision	
	In addition, those areas affected by the works should be restored once the construction period is over (see Closure Plan)	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision	
Riverbed Diversion Program	Works construction activities should be scheduled during the low tide season.	The contractor in coordination with the holder.	
	As much as possible, water diversion will be carried out through pipes, so that soil and sediment contact with water is reduced.	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision	
	Prior to the riverbed diversion activities (cofferdams), all necessary considerations should be taken into account for earth movements in contact with the water course to be prevented.	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision	
	In the case of earth diversion structures, these should be compacted enough to prevent any sediment inputs to the water body.	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision	
Riverbank Excavations and Filling Management	Riverbank excavation and filling activities should be scheduled during the low tide season to reduce any impact occurrence probabilities.	The contractor in coordination with the holder	Prior to the beginning of the construction activities.
	Intervention areas should be suitably delimited during the construction from those areas that have been defined in the engineering studies, so that damages to river morphology are limited as much as possible.	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision	During the construction period
	Surplus excavated and / or removed material should be transported to the material disposal sites, and shall not be left and / or abandoned on the Yauca River bed.	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision	
	In addition, intervention areas should have a preventive surface runoff control and management system, when faced with such an occurrence.	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision	
Riverbed Excavations and Filling Management	Riverbed excavation and filling activities should be scheduled during the low tide season	The contractor in coordination with the holder	Prior to the beginning of the construction activities
	Activities will be progressively developed, as the Yauca River's natural circulation is prevented from being disrupted at all times.	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision	During the construction period.
	The riverbed diversion during the unclogging activities should be carried out in such a way that the river's natural course during this time is limited only in	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision	



Measure Name	Description	Person / Entity in charge of the execution	Periodicity
	the intervention sectors, thus, preventing downstream impacts.		
Quarry Management	Prior to the quarry exploitation activities, the Contractor should submit an exploitation plan that must be previously approved by the supervision. This plan shall include all necessary measures for the quarry closure and the surface morphology restoration	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision	Prior to the construction activities
	Quarry exploitation areas will have a catchment and surface runoff drainage to prevent any material – sediments – input to the river course.	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision	During the construction period
	In addition, an access area for the materials' carriers (loading yard) will be set up with all the necessary soil safety / security and protection measures.	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision	
	The material exploitation areas will be permanently moisture to prevent any dust scattering, etc. The moisturizing level will be just the necessary, thus preventing any laminar flow generations.	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision	
	Transportation of material will be carried out with the use of protection sheets to prevent dust scatterings.	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision	
DME Management	Prior to the works execution, the Contractor will submit to the Supervision a surplus material disposal plan. This plan will identify the location of the material disposal areas and the disposal system.	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision	Prior to the beginning to the construction activities.
	In addition, the disposal plan will include an analysis for a disposal site selection and a description of their environmental characteristics. The purpose of this is to ensure that fragile flora ecosystems, if any, are not affected.	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision	
	Areas for materials' disposal will be permanently moisturized to prevent any dust scatterings, etc. The moist level will only be the necessary one, thus preventing any laminar flow generations.	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision.	During the construction period
	Once surplus material is disposed of, closure and restoration of these areas will take place.	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision	
	Restoration will involve planting vegetation coverage with local fast growing species.	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision	
Transportation activities Management	The use of car horns, sirens, and other annoying noise – generating devices will be forbidden to all vehicles running along the Project area.	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision	
	Vehicles will strictly follow the established route, and shall not be allowed to run along non - authorized routes or sites.	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision	
	Vehicle speed will be strictly defined for vehicles with and without load. Vehicles	Of the execution: The Contractor Of the supervision: The Project	

Measure Name	Description	Person / Entity in charge of the execution	Periodicity
	without load can make use of their less weight to speed up and / or pass other vehicles on the way.	holder or a specialist third party under the holder's supervision	
	Heavy machinery traffic will warned by a vehicle running ahead, for road clearance purposes.	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision	
	Vehicles carrying material will insure their load, in compliance with each vehicle's established capacity.	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision	
	All transportation vehicles must be duly registered, and will park at the pre – established parking spaces in front of each works site.	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision	
	When any of the trucks breaks down, material being carried by it must be totally moved to another truck, so that no material is left behind on the way, where the first truck broke down.	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision	
Camp and Works Site Residence Standards	Staff residence in the works camp will be subject to coexistence standards. These standards will be communicated to the staff and workers when hired.	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision	
	Contractor will establish a Code of Conduct that will be effective in camps. Once hired, a worker must comply with the rules, as established in such Code.	Of the execution: The Contractor Of the supervision: The Project holder or a specialist third party under the holder's supervision	
Riverbed and Aquatic Fauna Management	Riverbed conditioning actions downstream the intervention points should be developed (towards erosion probability reductions and enhanced habitability conditions or aquatic fauna species)	The Project holder or a specialist third party under the holder's supervision.	During the operation period
	A regular monitoring to aquatic fauna downstream the intervention points should be carried out.	The Project holder or a specialist third party under the holder's supervision.	

Source: JICA Study Team

The table below shows the Environmental Management Plans for each one of the investment points in all 6 basins.

**Table 3.2 EMP Relevant to each Program Point**

Environmental Management Program	Intervention Points														Stage
	The Chira river basin				The Cañete river basin					The Chincha river basin					
	Chira1	Chira2	Chira3	Chira4	Ca1	Ca2	Ca3	Ca4	Ca5	Chico1	Chico2	Chico3	Ma1	Ma2	
Local employment Program	●	●	●	●	●	●	●	●	●	●	●	●	●	●	Before starting the construction
Worksite Management Program	●	●	●	●	●	●	●	●	●	●	●	●	●	●	Before starting the construction and during the construction stage
Riverbed Descavacion Program	●	●	●	●	●	●	●	●	●	●	●	●	●	●	During the construction stage
River Side Escavacion Program								●	●		●	●			Before starting the construction and during the construction stage
River Side Escavacion and Land Filling Program	●	●	●	●	●	●	●			●			●	●	Before starting the construction and during the construction stage
Quarry Management Program	●	●	●	●	●	●	●	●	●	●	●	●	●	●	Before starting the construction and during the construction stage
DWE Management Program	●	●	●	●	●	●	●	●	●	●	●	●	●	●	Before starting the construction and during the construction stage
Campping Site Management Program	●	●	●	●	●	●	●	●	●	●	●	●	●	●	During the construction stage
Transportation Activities Program	●	●	●	●	●	●	●	●	●	●	●	●	●	●	During the construction stage
Aquatic Biota Monitoring Program	●	●	●	●	●	●	●			●		●	●	●	During the operation stage

Environmental Management Program	Intervention Points																	Stage		
	The Pisco river basin						The Yauca river basin						The Majes-Camaná river basin							
	P1	P2	P3	P4	P5	P6	Ya1	Ya2	Ya3	Ya4	Ya5	Ya6	MC1	MC2	MC3	MC4	MC5		MC6	MC7
Local employment Program	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	Before starting the construction
Worksite Management Program	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	Before starting the construction and during the construction stage
Riverbed Descavacion Program	●		●	●			●	●	●	●	●	●								During the construction stage
River Side Escavacion Program					●					●	●	●								Before starting the construction and during the construction stage
River Side Escavacion and Land Filling Program	●	●	●	●			●	●	●											Before starting the construction and during the construction stage
Quarry Management Program	●					●	●	●	●	●	●	●	●	●	●	●	●	●	●	Before starting the construction and during the construction stage
DWE Management Program	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	Before starting the construction and during the construction stage
Camping Site Management Program	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	During the construction stage
Transportation Activities Program	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	During the construction stage
Aquatic Biota Monitoring Program	●	●	●	●			●	●	●				●	●	●	●	●	●	●	During the operation stage

Source: Prepared by the JICA Study Team

### 3.2 Follow – Up and Monitoring Plan

The follow-up and control plan involves 2 types of activities:

- 1) Follow-up: These are activities that check the set out management measures.
- 2) Control: These are monitoring and measurement activities towards compliance with the environmental regulations, either Environmental Quality Standards (EQS) or Maximum Permissible Limits (MPL).

The Project holder or a third party under the holder's supervision is to be held accountable for follow-up and control, as the General Environmental Law's (Law No. 28611) Articles 74 and 75 establish that all Project operations holders are to be held accountable for emissions, effluents, discharges, and any other negative impacts generated on the environment, health, and natural resources, as a result of their activities, and must adopt in advance all risk and environmental damage prevention measures on all the sources that generate these negative impacts. Such responsibility includes all environmental risks and damages that might be generated by action or omission.

### 3.2.1 Construction Stage

During the Project construction stage to be developed for all 6 basins, the Follow-up and Control Plan will be focused on checking i) the compliance with all measures that have been designed as part of the Environmental Management Plan and ii) the compliance with all the environment – related standards and regulations that exist in the Peruvian Legislation. The following monitoring parameters are highlighted:

#### 1) Water Quality and Biological Parameters:

Control should be carried out on water quality and biological parameters, nearby waters, and at intervention points. **Table 3.3** shows specifications to be followed:

**Table 3.3 Monitoring to Water Quality and Biological Parameters**

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Country's Standards
pH	pH			"National Standard for Water Quality" D.S. No. 002-2009 MINAM
TSS	mg/l			
BOD/COD	mg/l			
DO	mg/l			
Total Nitrogen	mg/l			
Heavy Metals	mg/l			
Temperature	°C			
Biological Diversity indices: Shannon; Pielou; richness and abundance				

[Measurement Points]

-50 meters upstream the intervention points

-50 meters downstream the intervention points

-100 meters downstream the intervention points

[Frequency]

Quarterly

[Person in charge of Implementation]

DGIH-MINAG, or a third party under the project holder's supervision

Source: JICA Study Team

#### 2) Air Quality:

Impact analyses in the Projects to be developed for all 6 basins did not register any significant impacts on the hydraulic infrastructure works activities; however, work area, and subsequently, health of workers and local population are always affected by dust generation and atmospheric contaminant emissions. Thus, air quality monitoring is set out as an essential aspect in the Control Plan. **Table 3.4** below shows details for such monitoring.

**Table 3.4 Monitoring to Air Quality**

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Peruvian Standards (D.S. No 074-2001-PCM)	Referred International Standards
SO <sup>2</sup>				"National Standard for Air Quality" D.S. No.074-2001-PCM	National Ambient Air Quality Standards (NAAQS) (Updated in
NO <sup>2</sup>					
CO					
O <sup>3</sup>					

PM-10					2008)
PM-2.5					

[Measurement Points]

\*02 stations per monitoring point: Windward and downwind (upwind and against the wind direction)

-1 point at the working zones

-1 point at a quarry, away from the river (the largest and / or the closest point to a populated area)

-1 point at a D.M.E. (the largest and / or the closest point to a populated area)

[Frequency]

Quarterly

[Person in charge of the Implementation]

DGIH-MINAG, or a third party under the project holder's supervision

Source: JICA Study Team

### 3) Noise Quality

Likewise, monitoring to noise quality is set out at the potential receivers that are located around the noise generating points per work front. The Table below (**Table 3.5**) shows specifications to follow:

**Table 3.5 Monitoring to Noise Quality**

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Country's Standards	Referred International Standards
Noise level	LAeqT (dB(A))			National Environmental Quality Standards for noise (EQS) - S.N. N° 085-2003-PCM	-IEC 651/804 – International -IEC 61672- New Law: Replaces IECs 651/804 -ANSI S 1.4 – America

[Measurement Point]

Monitoring to acoustic contamination levels will be carried out at the potential receivers that are located around the noise emission points per work front.

01 point per potential receiver will be monitored.

[Frequency]

Every two months during construction phase

[Person in charge of the Implementation]

DGIH-MINAG, or a third party under the project holder's supervision

Source: JICA Study Team

#### 3.2.2 Operation Stage

Operation stages in all Projects especially recommend a follow – up to biological parameters and water quality downstream the intervention points that negatively affect aquatic morphology and aquatic fauna. The Table below (**Table 3.6**) shows these details:

**Table 3.6 Monitoring to Water Quality (Operation Stage)**

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Country's Standards
pH	pH			“National Standard for Water Quality” D.S. No. 002-2009 MINAM
TSS	mg/l			
BOD/COD	mg/l			
DO	mg/l			
Total Nitrogen	mg/l			
Heavy Metals	mg/l			
Temperature	°C			
Biological Diversity indices: Shannon; Pielou; richness				

and abundance				
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[Measurement Points]

-50 meters upstream the intervention points

-50 meters downstream the intervention points

-100 meters downstream the intervention points

[Frequency]

Quarterly in first two years of operation phase

[Person in charge of Implementation]

DGIH-MINAG, or a third party under the project holder's supervision

Source: JICA Study Team

### **3.3 Closure or Abandonment Plan**

Closure or abandonment plans have been carried out for each basin. These plans will be implemented at the completion of the construction activities, and involve dismantling all temporary works and restoring intervened areas and / or areas that were affected by the works execution. Restoration involves removing contaminated soils, final disposal of waste materials, restoration of soil morphology, and restoration of vegetation coverage in the intervened sites.

### **3.4 Civil Participation**

Civil Participation Plans have been prepared for each basin. These plans are to be implemented before and during the construction, and at the works completion stage. Recommended activities would include:

- Before the construction activities:
  - Dissemination workshops in the communities around the area of influence to share about the Project and the benefits it would bring to the local population.
  - In addition, posters would be placed in public areas informing about the Project execution period, its major objectives, and beneficiaries.
- During the construction:
  - Dissemination of progress made during works construction, in coordination with the local population in assemblies or other communication / informational spaces.
  - Identification and enforcement of solution proposals to probable complaints from the population that might emerge during the works execution. Proposed solution measures should be previously agreed upon with the population.
- Upon completion of works:

Workshops to inform about the works completion. Local authorities and general public will be invited, and assets / facilities will be handed over, that is, completed works will be handed over to the population.

### **3.5 Cost of Environmental Management Plan**

Next table shows the cost of Environmental Management Plan for this program. The cost (1) is per one work site and (2) is per basin.

**Table 3.7 Cost of Environmental Management Plan**

(1) Cost per one work site					(2) Cost per Basin					
Item	Unit	Quantity	Unit Price (S/.)	Parcial Price (S/.)	Chira Basin (4 sites)	Cañete Basin (5 sites)	Chincha Basin (5 sites)	Pisco Basin (6 sites)	Yauca Basin (6 sites)	Majes-Camaná Basin (7 sites)
Work duration	Month				23.5	18.5	30	26	15	38
1) Transportation Activities Program	Month	-	S/. 1,400.0	-	S/. 32,900.0	S/. 25,900.0	S/. 42,000.0	S/. 36,400.0	S/. 21,000.0	S/. 53,200.0
2) Industrial wastes Management Program	Month	-	S/. 4,200.0	-	S/. 98,700.0	S/. 77,700.0	S/. 126,000.0	S/. 109,200.0	S/. 63,000.0	S/. 159,600.0
3) Landscape management within the project site	Month	-	S/. 2,800.0	-	S/. 65,800.0	S/. 51,800.0	S/. 84,000.0	S/. 72,800.0	S/. 42,000.0	S/. 106,400.0
4) Worksite Management Program	Month	-	S/. 1,960.0	-	S/. 46,060.0	S/. 36,260.0	S/. 58,800.0	S/. 50,960.0	S/. 29,400.0	S/. 74,480.0
5) Noise control program	Month	-	S/. 1,120.0	-	S/. 26,320.0	S/. 20,720.0	S/. 33,600.0	S/. 29,120.0	S/. 16,800.0	S/. 42,560.0
6) Environmental Management Activities	Month	-	S/. 4,480.0	-	S/. 105,280.0	S/. 82,880.0	S/. 134,400.0	S/. 116,480.0	S/. 67,200.0	S/. 170,240.0
7) Training for control of foil and water contamination	Month	-	S/. 2,520.0	-	S/. 59,220.0	S/. 46,620.0	S/. 75,600.0	S/. 65,520.0	S/. 37,800.0	S/. 95,760.0
8) Monitoring to Water Quality, Flow, and				S/. 11,239.20	S/. 44,956.8	S/. 56,196.0	S/. 56,196.0	S/. 67,435.2	S/. 67,435.2	S/. 78,674.4
Indíces de diversidad	Monitoring	3	S/. 672.0	S/. 2,016.00						
Caudal	Monitoring	3	S/. 588.0	S/. 1,764.00						
T°, pH, OD	Monitoring	3	S/. 571.2	S/. 1,713.60						
DBO	Monitoring	3	S/. 638.4	S/. 1,915.20						
Sólidos disueltos totales	Monitoring	3	S/. 638.4	S/. 1,915.20						
Sólidos suspendidos totales	Monitoring	3	S/. 638.4	S/. 1,915.20						
9) Monitoring to Air quality and noise				S/. 37,500.0	S/. 150,000.0	S/. 187,500.0	S/. 187,500.0	S/. 225,000.0	S/. 225,000.0	S/. 262,500.0
Monitoring of air emission	Monitoring	3	S/. 4,500.0	S/. 13,500.0						
Monitoring of PM	Monitoring	3	S/. 5,000.0	S/. 15,000.0						
Monitoring of noise	Monitoring	3	S/. 3,000.0	S/. 9,000.0						
<b>Total</b>					<b>S/. 629,236.8</b>	<b>S/. 585,576.0</b>	<b>S/. 798,096.0</b>	<b>S/. 772,915.2</b>	<b>S/. 569,635.2</b>	<b>S/. 1,043,414.4</b>

Source: JICA Study Team





## **CHAPTER 4 CONCLUSIONS AND RECOMMENDATIONS**

### **4.1 Conclusions**

According to the Preliminary Environmental Appraisals to all 6 basins, most impacts identified during the construction and operation stages were found out to be of little significance. Significant and very significant negative impacts can be controlled or mitigated, as long as suitable Environmental Management Plans are carried out. In addition, the Project will be implemented in the short term, as environmental conditions will be quickly restored. However, the execution of a follow – up and monitoring plan is important, and in the event that unexpected impacts are generated, immediate mitigation measures must be taken.

In addition, significant positive impacts are also present, especially during the operation stage. These positive impacts include: An enhanced security / safety and a decreased vulnerability at social and environmental levels; an improved quality of life among the population in the area of influence, and an improved “Current use of land / soil”.

The following table shows a summary of all probable impacts and their mitigation measures.

**Table 4.1 Check List of Environmental and Social Considerations**

Category	Environmental Item	Main Check Items	Yes: Y No: N	The name of the corresponding points.	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1. Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process? (b) Have EIA reports been approved by authorities of the host country's government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(a) Y (b) Y/N (c) N (d) N	All 36 points.	(a) The 6 PEA were elaborated and submitted to the DGAA. (b) The DGAA issued the DIA (Environmental Permission) for Chira, Chincha, Cañete and Pisco basins on December 2011. The DIA for Majes-Camana basin will be issued on May 2012. (c) There is no additional condition for the approval of PEA. (d) There are no other required environmental permits in addition to the DIA.
	(2) Explanation to the Local Stakeholders	(a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders? (b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?	(a) Y (b) Y	All 36 points.	(a) The stakeholders meeting took place in 6 basins, and the environmental and social considerations were explained in each. (b) The JICA Study Team did not receive the comments related in environmental and social impacts.
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) Y	All 36 points.	(a) The 36 alternatives have been examined and, they have been prioritized based on the results of the 6 PEAs.
2. Pollution Control	(1) Water Quality	(a) Is there a possibility that changes in river flow downstream (mainly water level drawdown) due to the project will cause areas that do not comply with the country's ambient water quality standards?	(a) N	All 36 points.	(a) That is because there is few possibility of the increment of the water level.
	(2) Wastes	(a) In the case of that large volumes of excavated/dredged materials are generated, are the excavated/dredged materials properly treated and disposed of in accordance with the country's standards?	(a) Y	Chira4, Chira6, Ca1, Ca3, Ma2, Pi2, Ya2, Chico2, Pi5, Pi6	(a) The construction will use the exiting material in the place where the work is realized. Therefore there is few possibility of the generation of large volumes of excavated materials. In the case of YES, the excavated materials will be treated properly and disposed in accordance with Peruvian standards. It is not foreseen that the excavated materials would contain heavy metal, according to the interviews which are conducted to the irrigation associations of 6 basins and regional government officials. Also the JICA Study Team carried out field survey and did not see any sign of pollution by heavy metal. Yauca basin is the only basin which can

Category	Environmental Item	Main Check Items	Yes: Y No: N	The name of the corresponding points.	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
					have pollution by heavy metal because there is one informal mine in its headwaters. However, it is not foreseen the pollution by that mine because the mine is located in northeast about 40km from the river and the flow and the river width are enough big and wide so high concentrated pollution is not foreseen. On the other hand, the project of Yauca basin was rejected by OPI according to the results of socioeconomic evaluation. Therefore the JICA Study Team proposes that the soil quality survey should be carried out on its EAP when the project will be realized in future.
			(a) N	The other points.	(a) The large volumes of excavated will not generate.
	(3) Subsidence	(a) Is there a possibility that the excavation of waterways will cause groundwater level drawdown or subsidence? Are adequate measures taken, if necessary?	(a) N	All 36 points.	(a) The characteristic of the geological layer is gravel and does not contain the clay in the Cañete, Chinchá, Pisco y Yauca rivers. Therefore, the groundwater level will not be affected by the Project.
3. Natural Environment	(1) Protected Areas	(a) Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a) N	All 36 points.	(a) There is no Natural Protected Area in the influence area of the 36 points.
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? (b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? (c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? (d) Is there a possibility that hydrologic changes, such as reduction of the river flow, and seawater intrusion up the river will adversely affect downstream aquatic organisms, animals, vegetation, and ecosystems? (e) Is there a possibility that the changes in water flows due to the project will adversely affect aquatic environments in the river? Are adequate measures taken to reduce the impacts on aquatic environments, such as	(a) N (b) Y (c) Y (d) N (e) Y	All 36 points.	(b) The Acacia Macracantha grows in the Chira river basin, which is in the IUCN Red List (NT Category), but it is not planned to cut them by the project. Also, the flamingos (Phoenicopiterus Chilensis) come to the basin from November to March. It is recommended to carry out the earth work during dry season when the flamingos are not in the basin, though the project site is not the same area where the flamingos come. (c) The adequate mitigation plan is developed to not generate the significant ecological impact. (e) The direct influence area is so small that the impact can be recovered easily after the construction. However, the Mitigation Plan should be run in the Construction Stage.

Category	Environmental Item	Main Check Items	Yes: Y No: N	The name of the corresponding points.	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		aquatic organisms?			
3. Natural Environment	(3) Hydrology	(a) Is there a possibility that hydrologic changes due to the project will adversely affect surface water and groundwater flows?	(a) Y	Chira4, Chira6, Ca1, Ca3, Ma2, Pi2, Ya2.	(a) The direct influence area is so small that the impact can be recovered easily after the construction. However, the Mitigation Plan should be run in the Construction Stage.
			(a) N	The other points.	
	(4) Topography and Geology	(a) Is there a possibility that excavation of rivers and channels will cause a large-scale alteration of the topographic features and geologic structures in the surrounding areas?	(a) N	All 36 points.	
4. Social Environment	(1) Resettlement	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? (b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement? (c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement? (d) Is the compensations going to be paid prior to the resettlement? (e) Is the compensation policies prepared in document? (f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples? (g) Are agreements with the affected people obtained prior to resettlement? (h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? (i) Are any plans developed to monitor the impacts of resettlement? (j) Is the grievance redress mechanism established?	(a) N (b) - (c) - (d) - (e) - (f) - (g) - (h) - (i) - (j) -	All 36 points.	(a) The involuntary resettlement does not cause by the project.

Category	Environmental Item	Main Check Items	Yes: Y No: N	The name of the corresponding points.	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(2) Living and Livelihood	(a) Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary? (b) Is there a possibility that the amount of water (e.g., surface water, groundwater) used by the project will adversely affect the downstream fisheries and other water uses? (c) Is there a possibility that water-borne or water-related diseases (e.g., schistosomiasis, malaria, filariasis) will be introduced?	(a) Y (b) N (c) N	All 36 points.	(a) Some owner will lost a part of their actual land located near to the river, which can be illegal. In the Detailed Design Stage, the DGIH, as a titular of this project, should 1) determinate the line of the river basin area of each basin; 2) identificate the areas which will be bought by the Peruvian Government; 3) take the process of land acquisition according to the General Expropriation Law.
	(3) Heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a) N	All 36 points.	(a) There is no archeological, historical, cultural and religious heritage in the influence area of the Project. However, every project is needed to obtain the CIRA in Peru, so DGIH should take the process for that before starting the construction.
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a) N	All 36 points.	(a) There is no important land escape in the project area.
4. Social Environm ent	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples?(b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources to be respected?	(a) N(b) -	All 36 points.	(a) There is no indigenous community in the project area.(b)

Category	Environmental Item	Main Check Items	Yes: Y No: N	The name of the corresponding points.	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(6) Working Conditions	<p>(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project?</p> <p>(b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials?</p> <p>(c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.?</p> <p>(d) Are appropriate measures taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?</p>	<p>(a) Y</p> <p>(b) Y</p> <p>(c) Y</p> <p>(d) Y</p>	All 36 points.	<p>(a) The Industry Safety, Security and Health Rules should be considered in the TOR of the Constructor.</p> <p>(b) The Industry Safety, Security and Health Rules should be considered in the TOR of the Constructor.</p> <p>(c) The Transportations Activity Plan should be considered in the TOR of the Constructor.</p> <p>(d) The security guards should be considered in the TOR of the Constructor.</p>
5. Others	(1) Impacts during Construction	<p>(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)?</p> <p>(b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts?</p> <p>(c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?</p>	<p>(a) Y</p> <p>(b) Y</p> <p>(c) Y</p>	All 36 points.	<p>(a) This point should be considered in the TOR of the Contract for the Construction Stage.</p> <p>(b) The installations of safety equipment is considered in the Construction Stage.</p> <p>(c) They are considered in the Environmental Mitigation Plan.</p>

Category	Environmental Item	Main Check Items	Yes: Y No: N	The name of the corresponding points.	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(2) Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? (b) What are the items, methods and frequencies of the monitoring program? (c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? (d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	(a) Y (b) Y (c) - (d) Y	All 36 points.	(a) The water quality monitoring, the biodiversity monitoring, the air quality and noise monitoring will be taken place in the construction stage. (b) Based on the National Environmental Water Quality Standards (S.D. No. 002-2008-MINAM), Environmental Air Quality Standards are approved (S.D. No. 003-2008-MINAM), and Rules for National Environmental Noise Quality Standards (S.D. No. 085-2003-PCM). (c) The monitoring system will be constructed by the Constructor. (d) Yes.

Source: JICA Study Team

## **4.2 Recommendations**

We mainly recommend that the beginning of the construction activities coincides with the beginning of the dry seasons in the region (May to November) when the level of water is very low or the river dries up. Each river characteristics / features should be taken into account, that is, that the Chira and Cañete Rivers are year - round rivers, and that the Chico, Matagente, Pisco, and Yauca Rivers are seasonal rivers. At the same time, the crop season cycle in the areas of direct influence should be taken into account, so that traffic jams caused by the large trucks and farming machinery is prevented.

Second, it must be taken into account that flamingo birds migrate to the Chira River basin from November to March; therefore, works execution during that period should be prevented, so that any negative impacts on these birds and the surrounding aquatic fauna are mitigated.

Third, it is recommended that the Project holder (DGIH) should define the limit of river area during detailed design stage, and identify the people who live within the river area illegally. Continually the DGIH should carry on the process of land acquisition based on the Land Acquisition Law, which are; Emission of Resolution for land acquisition by the State, Proposition of land cost and compensation for land owner, Agreement of the State and land owner, Payment, archaeological assessment certification.

Fourth, the DGIH has to proceed the process to obtain the CIRA in the detail design stage. The process to be taken is 1) Application form, 2) Copies of the location drawings and outline drawings, 3) voucher, 4) Archaeological Assessment Certificate.

Fifth, the participation of the women in the workshops can be promoted through the existing women group such as *Vaso de Leche*.

Finally, the DGAA submitted the resolutions (Environmental Permissions) for four basins (Chira, Cañete, Chíncha y Pisco). The four projects have been categorized as “Category I”, which means that these four projects are not required to carry out neither EIA-sd nor EIA-d. The EAP report of Majes-Camana Basin is under revision by DGAA-MINAG. The submission of the resolution of categorization will be on June 2012.



**Ministry of Agriculture  
Republic of Peru**

**THE PREPARATORY STUDY  
ON  
PROJECT OF THE PROTECTION OF  
FLOOD PLAIN AND VULNERABLE  
RURAL POPULATION AGAINST FLOOD  
IN THE REPUBLIC OF PERU**

**FINAL REPORT  
I-6 SUPPORTING REPORT  
ANNEX-12 TECHNICAL ASSISTANCE**

**March 2013**

**JAPAN INTERNATIONAL COOPERATION AGENCY  
(JICA)**

**YACHIYO ENGINEERING CO., LTD.  
NIPPON KOEI CO., LTD.  
NIPPON KOEI LATIN AMERICA –  
CARIBBEAN Co., LTD.**





## Study Area



## ABBREVIATION

Abbreviation	Official Form or Meaning
ANA	Autoridad Nacional del Agua/National Water Authority
ALA	Autoridad Local del Agua/ Local Water Authority
B/C	Costo Benefit Ratio/Benefit Cost Ratio
GDP	Gross Domestic Product/Gross Domestic Product
GIS	Geographic Information System/ Geographic Information System
DGAA	Dirección General de Asuntos Ambientales/General Directorate of Environmental Affairs
DGFFS	Dirección General de Forestal y de Fauna Silvestre/Directorate General of Forest and Wildlife
DGIH	Dirección General de Infraestructura Hidráulica/Directorate General for Water Infrastructure
DGPI (Paleo-DGPM)	Dirección General de Política de Inversiones/Directorate General of Investment Policy
DNEP	Dirección Nacional de Endeudamiento Público/National Directorate of Public Debt
DRA	Dirección Regional de Agricultura/Regional Directorate Agriculture
EIA	Evaluación de Impacto Ambiental/Environmental Impact Assessment
FAO	Agricultura y la Alimentación Organización de las Naciones Unidas/ Food and Agriculture Organization of the United Nations
F/S	Estudio de factibilidad/Feasibility Study
GORE	Gobierno Regional/Regional Government
HEC-HMS	Centros de Ingeniería Hidrológica Sistema de Modelación Hidrológica Método / Hydrologic Engineering Centers Hydrologic Modeling System Method
HEC-RAS	Centros de Ingeniería Hidrológica del Río de Análisis del Sistema Método/Hydrologic Engineering Centers River Analysis System Method
IGN	Instituto Geográfico Nacional/National Geographic Institute
IGV	Impuesto General a Ventas/General Sales Tax
INDECI	Instituto Nacional de Defensa Civil/ National Institute of Civil Defense
INEI	Instituto Nacional de Estadística/National Institute of Statistics
INGEMMET	Instituto Nacional Geológico Minero Metalúrgico/National Geological and Mining Metallurgical Institute
INRENA	Instituto Nacional de Recursos Naturales/Natural Resources Institute
IRR	Tasa Interna de Retorno (TIR)/ Internal Rate of Return
JICA	Japonés de Cooperación Internacional /Japan International Cooperation Agency
JNUDRP	Junta Nacional de Usuarios de Distritos del Perú/National Board of Peru Districts Users
L/A	Convenio de Préstamo/Loan Agreement
MEF	Ministerio de Economía y Finanzas/Ministry of Economy and Finance
MINAG	Ministerio de Agricultura/Ministry of Agriculture
M/M	Acta de la reunion/Minutes of Meeting
NPV	Valor Actual Neto (VAN)/NET PRESENT VALUE
O&M	Operación y mantenimiento/Operation and maintenance
OGA	Oficina General de Administración/General Office of Administration
ONERRN	Oficina Nacional de Evaluación de Recursos Naturales/National Bureau of Natural Resource Evaluation
OPI (OPP)	Oficina de Programación e Inversiones/Programming and Investment Office (Oficina de Planificación e Presupuesto/Office of Planning and Budget)
PBI	Producto Bruto Interno/Gross Domestic Product

PE	Exp. Proyecto Especial (PE) Chira-Piura/Exp. Special Project Chira-Piura
PES	Pago por Servicios Ambientales (PSA)/Payment for Environmental Services
PERFIL	PERFIL/PROFILE (Preparatory survey of project before investment)
Pre F/S	Estudio de Prefactibilidad/Pre-Feasibility Study
PERPEC	Programa de Encauzamiento de Ríos y protección de Estructura de Captación
PRONAMACHIS	Programa Nacional de Manejo de Cuencas Hidrográficas y Conservación de Suelos/ National Program of River Basin and Soil Conservation Management
PSI	Programa de Sub Sectorial de Irrigaciones/Program of Sub Irrigation Sector
SCF	Factor de conversión estándar/Standard conversion factor
SENAMHI	Servicio Nacional de Meteorología y Hidrología/National Service of Meteorology and Hydrology
SNIP	Sistema Nacional de Inversión Pública/National Public Investment System
UF	Unidad formuladora/Formulator unit
VALLE	Valle/Valley
VAT	Impuesto al valor agregado/Value-added tax

## **PHOTOS**



**Interview with the Water Users Association in  
Pisco**



**Workshop in Pisco**



**Workshop in Chira**



**Interview with Farmer in Pisco**



**Local Women in Caniete**



**Interview with Farmers in Chincha**



**Estudio Local con Junta de Usuario de Majes**



**Junta de Usuarios de Camana**





**THE PREPARATORY SURVEY ON PROJECT OF THE PROTECTION  
OF  
FLOOD PLAIN AND VULNERABLE RURAL POPULATION AGAINST FLOOD  
IN THE REPUBLIC OF PERU  
FEASIBILITY STUDY REPORT  
SUPPORTING REPORT**

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## **Attachment**

**Attachment-1: Organization Chart**

**Attachment-2: Problems Tree**

**Attachment-3: Questionnaire**

**Attachment-4: Contents of Activities**

**Attachment-5: Cost**



## **CHAPTER 1 EXECUTIVE SUMMARY**

### **1.1 Name of the Public Investment Project**

“TRAINING TO AWARENESS RAISING OF THE VULNERABLE POPULATION ON FLOODING RISK MANAGEMENT IN SIX (6) VALLEYS IN THE PERU”

### **1.2 Project Objectives**

#### **Primary Objective**

Primary problem, as identified in the cause- problem – effect tree is:

“Lack of a suitable capability by farmers and technicians to apply risk management towards reducing damages caused by floodings.”

### **1.3 Supply – Demand Balance**

Estimated demand is made up of the vulnerable population that will be served by the Investment Program. This is identified in the table under “demanding population.”

Current supply is made up of the population served by interventions from institutions such as INDECI, the Regional Governments, Water Users Associations, AGRORURAL, etc.

#### **(1) The Demand Gap**

The table below shows information on supply and demand in all six (6) valleys under study, and allows for establishing the unmet demand or the demand gap resulting from a difference between the demand and the supply.

**Table 1.1 Balance of Supply - Demand**

<b>Year</b>	<b>Demanding Population</b>	<b>Actual Supply</b>	<b>Unsatisfied Demand</b>
2009	47,839	3,048	44,791
2010	48,604	3,097	45,508

Source: PERPEC-MINAG

#### **(2) Target Population**

Vulnerable areas have been defined in the Investment Program profile, by simulating flooding, establishing the vulnerable areas in each valley, and identifying their relevant populations that are the target population to be served.

**Table 1.2 Target Population by Valleys**

Valley	Region	Families	Population
CHIRA	PIURA	9,240	46,200
CANETE	LIMA	5,596	27,980
CHINCHA	ICA	3,274	16,370
PISCO	ICA	5,638	28,190
YAUCA	AREQUIPA	576	2,880
MAJES- CAMANA	AREQUIPA	2,211	9,947
<b>TOTAL</b>		<b>26,535</b>	<b>130,567</b>

Source: PERPEC, Equipo Estudio JICA

## 1.4 Technical Description of PIP

The Project is made up of four (4) components, and its proposal is primarily focused on training on, and awareness raising of risk management knowledge and implementation, via participatory workshops with local leaders and water users associations, as their leadership and call capabilities are best used for an efficient replication effect.

### **Component 1: Knowledge of River Bank Protection in consideration of Agriculture and Natural Environment**

Course	a) River Bank Operation and Maintenance b) River Bank Plant Management c) Erosion Prevention and Mitigation Natural Resource Management
Objectives	a) In this project, local populations learn suitable technology to operate and give maintenance to constructions and works from prior projects. b) Local populations learn suitable technology on river bank plants and vegetation for flooding control purposes. c) Local populations learn suitable technology on erosion and natural resources for flooding control purposes.
Participants	a) Engineers and / or technicians from local Governments b-c) Engineers and / or technicians from local Governments and Water Users Associations, Community representatives
Times	a) 12 times in all (every six (6) hours) b) 12 times in all (every five (5) hours) c) 26 times in all (every three (3) hours)
Lecturers	a) Contractors of constructions and works, Engineers from MINAG and / or the Regional Government b-c) Engineers from MINAG and / or the Regional Government, College professors (From universities, institutes, NGOs, etc.)
Contents	a-1) Suitable operation and maintenance technology for constructions and works from prior projects a-2) Suitable operation and maintenance technology for constructions and works in this project b-1) River bank protection with the use of plants b-2) The importance of river bank vegetation in flooding control b-3) Types of river bank plants and their characteristics c-1) Evaluation of the erosion conditions c-2) Evaluation of natural resource conditions c-3) Erosion approach for flooding control c-4) Natural resource approach for flooding control c-5) Environmental consideration approach c-6) Use of water resources c-7) Alternatives for suitable farming crops

## **Component 2: Preparation of Community Disaster Management Plan for Flood Control**

Course	a) Risk management Plan Formulation b) Detailed Risk management Plan Formulation c) Early Warning System for Flood Control
Objectives	a) Local populations gain knowledge and learn technology to prepare a flooding control plan b) Ditto c) Implementation of early warning system with local participation
Participants	a-c) Engineers and / or technicians from local Governments and Water Users Associations, Community representatives
Times	a) 19 times in all (every four (4) hours) b) 34 times in all (every five (5) hours) c) 24 times in all (every five (5) hours)
Lecturers	a-b) Engineers from MINAG and / or the Regional Government, Community Development Expert, Facilitator (local participation )
Contents	a-1) Flooding control plan preparation manuals a-2) Current condition analyses for flooding control a-3) Community development alternatives by means of local participation a-4) Workshop for flooding control plan preparation b-1) Community activity planning in consideration of ecological zoning b-2) Risk management b-3) Preparation of community disaster management plan c-1) Risk management and Early warning system c-2) Joint activity with local governments, users' association, etc.

## **Component 3: Basin Management for Anti – River Sedimentation Measures**

Courses	a) Hillside (damaged areas in the middle – upper reaches) Conservation Techniques b) Forest Seedling Production c) Forest Seedling Planting d) Forest Resource Management and Conservation
Objectives	a) Local populations learn suitable technology on hillside conservation for flooding control purposes in the damaged areas of the middle – upper reaches b) Local populations learn suitable technology on forest seedling production c) Local populations learn suitable technology on forest seedling planting d) Local populations learn suitable technology on forest resource management and conservation
Participants	a-d) Engineers and / or technicians from local Governments and Water Users Associations, Community representatives, and local people
Times	a) 12 times in all (every five (5) hours) b-d) 40 times in all for three (3) “Courses on Basin Management for Anti - River Sedimentation Measures” (every five (5) hours)
Lecturers	a-d) Engineers from MINAG and / or the Regional Government, College professors (From universities, institutes, NGOs, etc.)
Contents	a-1) Soil characteristics and conservation on hillsides a-2) Hillside agroforestry system a-3) Animal herding system on hillsides in the damaged area of middle – upper reaches a-4) Reforestation with traditional vegetation and plants a-5) Hillside conservation and alleviation alternatives in the damaged area of middle – upper reaches b-1) A selection of plants that are suitable to the local characteristics b-2) Forest seedling production technology b-3) Control carried out by the local population's involvement c-1) Candidate areas for forestation

	c-2) Forest plantation control technology c-3) Forest plantation soil technology c-4) Control carried out by the local population's involvement d-1) Forestation for flooding control purposes d-2) Forest plantation control technology d-3) Forest plantation output technology d-4) Control carried out by the local population's involvement
--	--

#### **Component 4: Information Networks on Flooding Risk management**

Courses	a) Risk management and Forecasting and Warning Usefulness (using existing system) b) Workshop – Meeting with Local Authorities (using existing system)
Objectives	a) Local populations learn suitable technology on risk management and forecasting and warning usefulness. b) Cooperation preparedness between local Governments, Water Users Associations, communities, and local populations for flooding control purposes.
Participants	a-b) Engineers and / or technicians from local Governments and Water Users Associations, Community representatives
Times	a) 12 times in all (every five (5) hours) b) 12 times in all (every five (5) hours)
Lectures	a-b) Engineers from MINAG and / or the Regional Government, Forecasting and warning usefulness contractors and College professors (From universities, institutes, NGOs, etc.)
Contents	a-1) Disaster risk conditions and forecasting and warning usefulness a-2) Comprehensive risk management technology for flooding control a-3) Forecasting and warning usefulness technology a-4) Forecasting and warning usefulness control carried out by the local population's involvement b-1) Setting up an information network for Disaster risk conditions and forecasting and warning usefulness b-2) Local cooperation set up for forecasting and warning usefulness b-3) Preparation of a disaster risk plan that includes Forecasting and warning usefulness

### **1.5 Cost**

As previously explained, in this case, the incremental costs are equivalent to “with project” costs, as “without project” costs are zero; this means, the incremental costs amount S/. 831,125 Nuevos Soles.



Item	Activities Alternative 1	Measure ment Unit	No. of Valleys	TOTAL	Year 1st.	Year 2nd.
1.00	<b>Knowledge on River Bank Protection Actions</b>					
1.1.	Workshop on Works Operation and Maintenance	Event	6	55,800	27900	27900
1.2.	Workshop on River Bank Plant Management	Event	6	55,800	27900	27900
	Prevention and Mitigation for Erosion	Event	6	55,800	27900	27900
	Natural Resources Management	Event	6	55,800	27900	27900
2.00	<b>Preparation of Commnity Disaster Management Plan for Flood Control</b>					
2.1	Workshop on Risk Management Plan	Event	6	50,220	25110	25110
2.2	(in detail)					
	Communny activity planning in consideartion of ecological zoning	Event	6	73,200	36600	36600
	Risk management	Event	6	73,200	36600	36600
	Resource management	Event	6	73,200	36600	36600
	Preparation of community disaster management plan	Event	6	73,200	36600	36600
2.3	Risk management and Early warning system	Event	6	55,800	27900	27900
	Joint activity with local governments, users association, etc.	Event	6	33,480	16740	16740
3.00	<b>Hillside Management for River silting up Prevention</b>					
3.1	Field works for hillside conservation technique	Event	6	45,000	22500	22500
	Forest seedling productions	Event	6	47,400	23700	23700
	Fores plantation setting up	Event	6	47,400	23700	23700
	Forest reource management and conservation	Event	6	47,400	23700	23700
3.2	Difusion of posters and leaflets		6	21,600	10800	10800
4.00	<b>Risk Management Information and Instruments</b>					
4.1	Workshop on risk management and forecasting & warning system	Event	1	9,300	4650	4650
4.2	Workshop with local authorities	Event	1	5,580	2790	2790
	<b>TOTAL</b>			<b>879,180</b>	<b>439,590</b>	<b>439,590</b>

Source: JICA Study Team

## 1.6 Benefits

Major benefit generated by the Project is social – focused, as it primarily serves the population in terms of training and awareness raising.

This type of benefits cannot be appraised in monetary terms, but can be quantified through a social appraisal, namely, the Cost Effectiveness methodology.

### a) Benefits in the “Without Project”

As no activities that are focused on improving the population’s capability to apply risk management are carried out or scheduled in the “without project “ situation, benefit will be equal to zero.

### b) Benefits in the “With Project”

The training service to be set up will primarily provide qualitative benefits, namely:

- Bank protection works sustainability is ensured through a suitable maintenance.

- Population is prone to contribute with hand labor and other means to bank protection works construction, and to play an active role in the other actions.
- Beneficiaries know about actions to be taken before, during, and after the emergencies for overflows and floodings.
- Criteria to identify spaces that are most vulnerable to overflows and floodings, and to set up most convenient measures are identified.
- Non structural measures are set up to reduce overflow and flooding risks, thus ensuring compliance with participation and citizen vigilance.
- Knowledge on formulations and evaluations in irrigation infrastructure project is confirmed for risk management to be applied on these projects.
- River silting up is reduced, as the population in the higher and middle parts of the basin is made aware of the application of forestation and soil conservation techniques.
- Forecasting and warning systems are known for human losses and, as much as possible, material damages to be prevented, and also, for prevention measures to be applied.
- Damages to the river bank vegetation are reduced, as the population settled in the valleys is made aware.

## **1.7 Sustainability**

Sustainability analysis aims at foreseeing that, once the Project investments are completed, capabilities developed in the beneficiaries and the institutionality that brings them together, along with the local and regional entities, will carry on with awareness raising activities on behalf of the population.

### **(1) Institutional Arrangements**

The OGA-MINAG gets in charge of the Investment Program's execution, with the support of the Regional Agriculture Directorates. Therefore, these offices will be in charge of keeping the coordination links between the beneficiaries and the local and regional Governments, INDECI, etc. Tasks to be carried out by these institutions include training the population for disaster prevention purposes.

In this sense, institutional alliances will be important. These alliances will become formal, as a result of the meetings held with the local governments to formulate the risk management plan that aims at strengthening risk management institutionality. These meetings are led by the Civil Defense Committees that include local population, local and regional governments, and other institutions.

The major aspect for river bank protection's institutionality strengthening is the RISK MANAGEMENT PLAN consolidation and implementation that will be formulated in this Project,

and involves all the interested organizations and institutions the aim at soil, crop, infrastructure, and population protections. These organizations and institutions include INDECI, AGRORURAL, etc.

Another important aspect that ensures the project's sustainability is the regional Government's institutional strengthening via training to their professional staff on: Ecological Zoning, Risk management, Resource Management, and Project Formulation. This will come along with a commitment to carry on raising awareness of those vulnerable populations within their intervention scopes.

Local Government will be essential for the participation of operation and maintenance in river bank protection infrastructure. Forestation and soil conservation on hillsides and river banks will be carried out in close coordination with AGRORURAL, as this institution's tasks involve carrying on with awareness raising to the identified population.

## **(2) Management Capacity**

For training actions to be given sustainability, local and regional Governments will be engaged, and beneficiary users, grassroots organizations, and community representatives will be articulated. In addition, NGOs are foreseen to participate, so that once the project intervention is completed, these institutions carry on with the training actions.

The MINAG is in charge of executing organization and has rich experience of ex-PERPEC with broad experience in river bank protection project executions.

## **1.8 Environmental Impact**

Due to its nature, the project does not generate any negative environmental impacts; it rather contributes to environmental protection, as training actions focus on ensuring a suitable maintenance of the riverbed. Thus, the project's environmental impact is positive: The agricultural activity's climatologically information service conditions will be improved, and the population's sanitation conditions will not be affected, namely, the project will significantly improve the living conditions.

### **a) Environmental Ecological Impacts**

Environmental, soil, air, and sociocultural climate are improved, as the river bank vegetation protection and natural resource conservation in the middle and high parts of the basin are promoted. This will allow for awareness raising among the population that resource depredations affecting the environment should be prevented.

### **b) Socioeconomic Impacts**

#### *Job Generations*

A first major change, as a result of training offered to counter floodings that directly affect agricultural sector, is the safe investments that encourage employment in agricultural activities; therefore, this is a positive impact.

#### *Improvements to the Local Population's Economy and Well – Being*

Indirectly benefited population is basically devoted to farming as a livelihood; therefore, assurance granted to farming investments makes farming development to be sustainable. Upon that basis, improvements to the agricultural sector will allow for farming activity and hand labor employment increases, and a population's subsequent living improvement.

#### *Reappraisal of Farming Soil*

With regard to the agricultural sector, farming land economic value will increase, based on the certainty that land will not get flooded, and farming investments will not get lost. This is a significant effect, as farmers will be able to access further investment opportunities, bank loans, and technical assistance.

#### *Cultural Impacts*

The protection of culture will become strengthened, as a natural vegetation protection will be encouraged, and a rational riverbed management, an aggregate balanced extraction, and a rational forest exploitation will be consolidated.

### **1.9 Organization and Management**

According to the effective law, formulation and execution of this clear Public Investment Project responds to the Ministry of Agriculture's inherent competence. As a public entity, the Ministry of Agriculture is committed to interact with other public entities that carry out a specific task during the formulation, execution, and post – investment stages, with regard to this type of projects.

The following operative scheme has been foreseen for this project's implementation:

- The Executing (or Implementation) Unit (MINAG's Central Administration) will coordinate with the National Hydraulic Infrastructure Directorate to pay out the disbursements that are relevant to the Regions included in the project, for a timely execution of the foreseen activities.
- Based on the program coordinations in each region, the Regional Agriculture Directorates will execute the project. In this sense, the relevant training plans and specific schedules will be prepared with the support of the consultant – facilitators' support.
- The logistical support will be provided by means of PSI's coordination. For this to be carried out, third party services will be hired with the project resources, as stipulated under the overhead item.

- Courses will be coordinated with the regional Governments, especially with the Civil Defense Directorates and other interested entities, such as the National Water Authority (ANA), AGRORURAL, etc.
- In such locations where works are being executed, works residents and administrators will support the call by means of the Water Users Associations.

#### **1.10 Conclusions**

1. This project will allow for making the beneficiary population aware for execution and maintenance of both structural and non structural measures for river bank protection.
2. Risk management Plans will be available, and will allow for guiding grassroots organizations' management and dealing with floodings, in close coordination with the public and private institutions.
3. Institutional capabilities will be strengthened among local and regional governments. This will lead to carry on training the vulnerable population. In addition, professional staff will be duly trained on formulation and appraisal of projects that consider risk management as a significant evaluation element.
4. Project investment cost is S/. 879,180 at market price, to be executed in 2 years.
5. Finally, project execution is recommended, as project proves to be technically, socially, and environmentally viable.

## 1.11 Lografame Matrix

The Logframe Matrix for the chosen alternative is shown in the table below.

	OBJECTIVES	INDICATORS	SOURCES	ASSUMPTIONS
<b>END</b>	To contribute to the intervention scope's sustainable and competitive growth			There are no changes in Agriculture – related Government policies.
<b>PURPOSE</b>	Farmers' and technicians' suitable capability to apply Risk management towards reducing flooding damages	By the end of the project, around 26,535 family heads will have been made aware and trained on Overflow and Flooding Risk management techniques.	Reports from technical coordinators in the relevant DRAs (Regional Agriculture Directorates) where the project is executed.	There are no obstacles that prevent, or interfere in the project execution.
<b>COMPONENTS</b>	1. River bank protection knowledge.  2. Organizational capability for disaster prevention and care  3. Hillside management actions for river silting up  4. Risk management instruments	1. 48 training events throughout six (6) valleys, located in the same number of regions, will be developed.  2. 52 training events throughout six (6) valleys will be developed. 18 of these events, on Risk management Plan formulation, are addressed to community leaders in the chosen scopes, 34 events are addressed to project – involved professional staff, and 24 events are addressed to local people.  3. 60 training events throughout six (6) valleys will be developed, and posters and three (3) page leaflets will be disseminated throughout Peru's scope.  4. 4 training events and 2 workshop meetings will be developed with local authorities	Monthly progress reports by the executing (implementation) unit.  Idem  Idem  Idem	The executing (implementation) unit foresees the whole organization for a smooth project execution  Funds devoted to the project are provided to the relevant executing (implementation) units.  Project beneficiaries participate in an active and committed way.

	ACTIVITIES	INDICATORS	RESOURCES	ASSUMPTIONS
ACTIVITIES	Workshop course: Works Operation and Maintenance	12 developed training events	S/. 55,800	The Executing (Implementation) Unit has available qualified technical staff for planning, organization, direction, monitoring, and evaluation of each one and all of the training events.
	Workshop course on river bank plant management	12 developed events.	S/. 55,800	
	Courses on erosion prevention and mitigation and natural resource management	24 developed events.	S/. 111,600	
	Workshop meetings for Risk management Plan formulation	18 developed events.	S/. 50,220	
	Courses to increase Overflow and Flooding Risk management institutional capabilities to local and regional Government professional staff within the project scope.	34 developed events.	S/. 407,225	
	Field actions (in days) on hillside conservation techniques	12 developed events.	S/ 59,520	
	Courses on forest seedling productions; installation, management, and conservation of forest resources..	36 developed events.	S/. 142,200	
	Handing out of posters and three (3) page leaflets	10,000 units of disseminating material handed out throughout six (6) valleys	S/. 21,600	
	Course on Risk management and usefulness of forecasting and warning systems	2 developed events.	S/. 9,300	
	Workshop meetings with local authorities	2 developed events.	S/. 5,580	





## **CHAPTER 2 GENERAL ASPECTS**

### **2.1 Name of the Public Investment Project**

“TRAINING TO AWARENESS RAISING OF THE VULNERABLE POPULATION ON  
FLOODING RISK MANAGEMENT IN SIX (6) VALLEYS OF THE COUNTRY”

### **2.2 Formulating and Executing (Implementation) Unit**

#### **2.2.1 Formulating Unit (FU)**

The General Hydraulic Infrastructure Directorate (DGIH) - PERPEC, Ministry of Agriculture (MINAG) is a public sector entity that, in keeping with its promoting organism policy, is in charge of carrying on with, and supporting farming campaigns, as well as setting up risk management in execution and maintenance of intakes, irrigation channels, etc., so that farming investment is ensured, both for the areas adjacent to the bank strips and the areas irrigated by the hydraulic infrastructure. With this goal in mind, actions that promote and carry on with, and support productive activities are being carried out nationwide for rural population's quality of life enhancement / improvement.

Sector	:	Agriculture
Statement by	:	Ministry of Agriculture - MINAG
Name of FU	:	General Hydraulic Infrastructure Directorate
Person in charge of FU	:	
E-mail	:	
Address	:	Av. Benavides N° 395-Miraflores
Telephone No.	:	(511) 6148100

#### **2.2.2 Executing / Implementation Unit (EU)**

##### General Executing / Implementation Unit:

Program's executing / implementation unit is the Ministry of Agriculture – Central Administration.

Sector	:	Agriculture
Statement by	:	Ministry of Agriculture
Name	:	Ministry of Agriculture – Central Administration
Person in charge	:	
E-mail	:	
Address	:	Av. Alameda El Corregidor N° 155 – La Molina
Telephone No.	:	(511) 6135800

Responsibility of the Investment Project execution, in terms of coordination, management, and control, is shared at a central level with the participating organisms. This involves all actions that allow for meeting objectives and goals, as set out in the Project.

On the other hand, the Ministry of Agriculture's General Administration Office (OGA – MINAG) is to be held accountable for the Project's financial and administrative performance.

Project executors / implementation agency:

Regional Agriculture Directorates of: Piura, Lima, Ica, Arequipa, and San Martin will be in charge of executing the Project training and awareness raising actions.

Physical execution and control of, and follow – up to the Project will be carried out by the Regional Agriculture Directorates, via their Technical Coordination Office under the PSI with River Channeling and Intake Structure Protection Program – Ex-PERPEC.

The Technical Coordinator will be in charge of supervising all training and awareness raising actions.

Under the set out scheme, the Formulating Unit has the technical and logistical capability to taken on the Project's execution.

## **2.3 Participation of Involved Entities and Beneficiaries**

Institutions engaged and participating in the investment program's development and implementation include:

### **2.3.1 National Government Entities**

- **Ministry of Economy and Finances (MEF)**

The national government entity in charge of designing, proposing, executing, and evaluating, with efficiency and transparency, the country's economic and financial policy that will lead to achieving growth as a basic condition towards steady economic development, thus implying the population's accomplished overall wellbeing. MEF's involvement consists in arranging the allotment of those economic resources from the Treasury to the Ministry of Agriculture's River Channeling and Intake Structure Protection Program – PERPEC.

- **Ministry of Agriculture (MINAG)**

The national government institution is in charge of promoting the development of farming producers, who are organized in productive chains within the basin framework. It carries out this action as the natural resource management unit for a developed agriculture to be accomplished in terms of economic, social and environmental sustainability.

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In order to effectively and efficiently contribute to meeting its objectives, MINAG has launched, since 1999 and on a regular basis, the River Channeling and Intake Structure Protection Program – PERPEC. By means of this program, funds are provided to the regional Governments for river bank protection project executions.

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MINAG Offices with a relevant participation in the PERPEC include:

- **MINAG's General Administration Office, MINAG - OGA**  
In charge of the Program's administrative and budgetary execution  
In charge of establishing the administrative and financial alignments.
- **MINAG's General Agricultural Planning Office, MINAG - OGPA.**  
In charge of follow – up to the budgetary management.  
In charge of negotiating funding for necessary resources for Program execution.
- **General Hydraulic Infrastructure Directorate (DGIH)**  
In charge of suggesting the new policies, strategy and plans towards encouraging the hydraulic infrastructure development, in accordance with the National Hydric Resource Policy and the National Environment Policy, the development of the Hydraulic Infrastructure involves studies, works, operation, maintenance, and risk management during the construction, refurbishment / upgrading, improvement, and extension of dams, intakes, river channels, irrigation channels, drains, meters, small intakes, groundwater wells, and plot irrigation upgrading.
- **National Water Authority (ANA)**  
The highest technical law issuing authority in charge of promoting, supervising, and controlling the policies, plans, programs, projects, and laws on the sustainable use of hydric resources nationwide.

Functions developed by this entity are directed towards: Promoting a refined technical, legal, and law issuing framework for the hydric resources' sustainable management; supervising and evaluating actions carried out by the local water local authorities; preserving and promoting the hydric resources' sustainable exploitation, territorial arrangement, and the formulation of master negotiation / management plans; and carrying out studies and projects with both domestic and international economic technical cooperation.

### **2.3.2 Regional Government Entities**

- **Regional Governments (GORE)**

The top regional level of authority in charge of promoting comprehensive, sustainable regional development, by promoting public and private investment and employment, ensuring full exertion of rights and equal opportunities for their populations, in compliance with the national, regional, and local development plans and programs.

- **Regional Agriculture Directorates (DRAs)**

The Regional Agriculture Directorate is led by a Regional Director, who is appointed by the Regional President, and its major functions include:

- Formulating, approving, evaluating, leading, controlling, and managing the regional agriculture plans and policies, in accordance with the domestic policies, the sectoral plans, and the promotional propositions for rural development set out by the rural municipalities.
- Administrating and supervising agricultural service activities' management, in keeping with the policy and laws in the relevant sectors and the regional potentialities.
- Participating in the sustainable management of hydric resources within the basin entities' framework and the National Water Authority policies.
- Promoting the transformation, commercialization, exports, and consumption of regional natural and agribusiness products.
- Promoting and executing projects and irrigation works, irrigation improvements, suitable hydric resource and soil management and conservation.
- Ensure a suitable compliance with the laws that are relevant to the farming, environment, and natural resource sectors, in accordance with the domestic policies and sectoral plans.

### 2.3.3 Beneficiaries

- **Water Users Associations**

Beneficiary population involvement implies the presence of the Water Users Associations in the Chira, Cañete, Chincha, Pisco, Yauca and Majes-Camana valleys.

**Table 2.1 Commissions of Water Users Association**

**CHIRA VALLEY**

Sectores de Riego	Comision de regantes	Areas Bajo Riego (Has)	Nº de Beneficiarios	Rio
Miguel Checa	Miguel Checa	9998.00	5579.00	Chira
El Arenal	El Arenal	3549.00	1625.00	
Poechos - Pelados	Poechos - Pelados	4450.00	1848.00	
Cieneguillo	Cieneguillo	7903.00	1192.00	
Margen Derecha	Margen Derecha	7205.00	2365.00	
Margen Izquierda	Margen Izquierda	3805.00	1117.00	
<b>TOTAL</b>		<b>36,910.00</b>	<b>13,726.00</b>	

Source: JICA Study Team

### CAÑETE VALLEY

Sectores de Riego	Comision de regantes	Areas Bajo Riego (Has)	Nº de Beneficiarios	Rio
Roma Rinc. La Huerta Lateral A Cantera Almenares Lateral B Lateral T Túnel Grande Quebrada Ihuanca Cantagallo-U Campesina Caltopa Caltopilla	Canal Nuevo Imperial	8015	2254	Cañete
Casa Pintada Sn Isidro Cerro Alegre Huaca Chivato Conde Chico Ungara Josefina Sta. Glicería	Canal Viejo Imperial	3689	1022	
Tres Cerros Montejato La Quebrada Hualcara Cerro de Oro Chilcal	Canal María Angola	1815	472	
Montalván-Arona-La Qda.-T Lúcumo - Cuiva - Don Germ Lateral 74-La Melliza-Sta Bá Casa Blanca - Los Lobos	Canal San Miguel	3686	881	
Lúcumo - Cuiva - Don Germ Huanca Media Huanca Baja Huanca Alta	Canal Huanca	2305	424	
Gr.9.2 lateral 4 Gr.9.1 lateral 3 Gr.8.2 lateral 2 Gr.8.1 lateral 1 Gr.7 compuerta 10 Y 11 Gr.6 compuerta 9 Gr.5 compuerta 6,7 Y 8 Gr.4 compuerta 5 Gr.3 compuerta 4 Y 12 Gr.2 compuerta 2 Y 3 Gr.11 Basombrio Gr.10 Pachacamilla Vieja Gr.1 compuerta 1	Canal Pachacamilla	946	233	
Palo Herbay Alto	Canal Palo Herbay	2011	568	
<b>TOTAL</b>		<b>22,467.00</b>	<b>5,854.00</b>	

Source: JICA Study Team

### CHINCHA VALLEY

Sectores de Riego	Comision de regantes	Areas Bajo Riego (Has)	Nº de Beneficiarios	Rio
La Pampa	Chochocota	1,464.59	412.00	Matagente
	Belen	1,183.91	263.00	Matagente
	San Regis	1,262.99	329.00	Matagente
	Pampa Baja	3,293.66	681.00	Matagente
Chincha Baja	Matagente	1,944.70	430.00	Matagente
	Chillon	1,630.19	443.00	Matagente
	Rio Viejo	1,500.80	377.00	Matagente
	Chincha Baja	1,036.97	242.00	Matagente
Chincha Alta	Rio Chico	298.29	105.00	Chico
	Cauce Principal	1,145.64	467.00	Chico
	Pilpa	117.54	545.00	Chico
	Ñoco	639.46	1890.00	Chico
	Acequia Grande	589.52	1475.00	Chico
	Irrigacion Pampa de Ñoco	2,658.62	875.00	Chico
<b>TOTAL</b>		<b>18,766.88</b>	<b>8,534.00</b>	

Source: JICA Study Team

### PISCO VALLEY

Sectores de Riego	Comision de regantes	Areas Bajo Riego (Has)	Nª de Beneficiarios	Rio
Pisco	Casalla	2,273.00	515.00	Pisco
Pisco	El Pueblo Figueroa	757.00	138.00	
Pisco	Caucato	1,612.00	325.00	
Independencia	Agua Santa - El Porvenir	463.00	63.00	
Independencia	Francia	931.00	125.00	
Pisco	Chongos	447.00	76.00	
Chacarilla	Condor	1,970.00	318.00	
Dadelso				
Jose Olaya				
Mencia				
San Jacinto				
Urrutia				
Cabeza de Toro	Cabeza de Toro	6,118.00	633.00	
Independencia	Montalván	1,596.00	275.00	
Independencia	Manrique	1,555.00	289.00	
Murga	Murga - Casaconcha	1,345.00	268.00	
Humay	San Ignacio	333.00	66.00	
Murga	La Floresta	303.00	51.00	
Murga	Bernales	1,319.00	305.00	
Humay	Montesierpe	449.00	118.00	
Humay	Pallasca Tambo Colorado	145.00	65.00	
Murga	Miraflores	129.00	35.00	
Humay	Huaya Letrayoc	238.00	57.00	
Murga	Chunchanga	456.00	76.00	
TOTAL		22,439.00	3,798.00	

Source: JICA Study Team

### YAUCA VALLEY

Sectores de Riego	Comision de regantes	Areas Bajo Riego (Has)	Nº de Beneficiarios	Rio
Yauca	Yauca	523.00	384.00	YAUCA
Mochica	Mochica	454.00	63.00	
Jaqui	Jaqui	635.00	200.00	
<b>TOTAL</b>		<b>1,612.00</b>	<b>647.00</b>	

Source: JICA Study Team

### MAJES – CAMANA VALLEY

Sectores de Riego	Comision de regantes	Areas Bajo Riego (Has)	No de Beneficiarios	Rio
Majes	Majes	8,046.43	2,342	Majes
Camana	Camana	7,087.88	3,425	Camana
<b>Total</b>		<b>15,134.31</b>	<b>5,767</b>	

Fuente: Equipo del Estudio JICA

These boards that represent the organized users in the above mentioned valleys have decided to take on the cost for the Works proposed in the Investment Program. In addition, they will carry out operation and maintenance to the river bank protection works, once the works are completed. Therefore, the execution of the program's training and awareness raising components, as detailed in this project, is critical to guarantee i) the beneficiaries' input commitment becoming effective and ii) the project's sustainability at the operation stage, as the organized users, local and regional authorities get involved. The table below shows the matrix of the involved parties:

**Table 2.2 Matrix of The Involved Parties**

GRUPOS	INTERESES	PROBLEMAS PERCIBIDOS	RECURSOS Y MANDATOS
Comision de Regantes	Tener conocimientos necesarios para afrontar los riesgos de inundación, haciendo un uso adecuado de las obras de protección a sus cultivos y canales.	Las avenidas de los rios generan inundaciones de los canales y campos de cultivo de los pobladores de las zonas, debido a la vulnerabilidad de las riberas de los rios	Participación activa en coordinacion con las entidades involucradas en el sector agrario y proteccion de estructuras en los rios
Junta de Usuarios	Tener la seguridad que sus cultivos y cosechas no seran afectados por las avenidas de los rios	Las Avenidas de los rios afectan a los canales de riego generando problemas de deterioro, y mayor gasto de mantenimiento, debido a la falta de seguridad y proteccion de las riberias del rio	Apoyo al proyecto en virtud que se protegeran los campos de cultivo y las cosechas
Autoridad Local de Agua	Cumplir con su mision de resguardar la preservacion, conservacion y uso racional del recurso hidrico, forestal y de los demas recursos naturales	La infraestructura de riego, los cultivos y poblaciones en riesgo de inundación y colapso ante las avenidas extraordinarias del rio	Supervision de las obras a realizar, en coordinacion directa con la DRA.
Agencia Agraria	Cumplir con su mision de promover y orientar el desarrollo agrario en la region hacia una agricultura sostenible y competitiva, bajo las estrategias de manejo de cuencas y cadenas productivas	Las inundaciones producidas por las avenidas de los rios generan la perdida de cultivos de los agricultores, generando problemas en la comercializacion del los productos agricolas	Ejecutar con el personal tecnico y administrativo, el proyecto de inversion
Programa de Encauzamiento de Rios y Proteccion de Estructuras de Captacion - PERPEC	Cumplir con su objetivo de disminuir los riesgos de desbordes de los rios de erosion de los terrenos agricolas y colapso de las obras de captacion y conduccion	Escasa proteccion de las riberas del rio, observando ademas escasas acciones de forestacion y cobertura vegetal.	Efectuar la supervision, Coordinacion, Monitoreo, Seguimiento y Apoyo a la ejecucion de las obras de proteccion en las reberasde los rios
Gobierno Local	Cumplir con las normas de seguridad de la poblacion pertenecientes a la zona del proyecto, considerando que son parte activa del comité de Defensa Civil.	En la actualidad las poblaciones de la zonas no cuentan con medidas de seguridad y proteccion contra las avenidas de los rios	Brindar apoyo para que se cumplan las normas de seguridad para el beneficio de los pobladores de las zonas

Source: JICA Study Team

Both the state entities and the beneficiaries are absolutely interested in having the flooding damage risks removed. Beneficiaries are interested in the execution of actions leading to flooding risk reductions, thus, they commit themselves to participate along with the Government through the PERPEC that will, in turn, step in to reduce vulnerability in its croplands along the river bank areas.

## 2.4 Reference Framework

Agriculture in Peru is an activity carried out under high risk and vulnerability conditions, when faced with effects that have been brought about by climatic phenomena. Some of these phenomena can be prevented or mitigated, though.

The natural phenomena causing the greatest social and economic impact on the agricultural sector are the seasonal and extraordinary precipitations that bring about floodings with the river flow increases. Side effects of these phenomena are very significant, as they include damages and losses of great value that affect production, farmlands, and productive agricultural infrastructure (intakes, channels, etc.)

Adaptation measures to reduce flooding risks include structural and non structural measures that will be set up with the Investment Program and this training project. In this context, there is an international concern for natural disaster reduction, as the FAO 2008 report shows that floodings are the major cause for these disasters around the world. On the other hand, the U.S. National Ocean Atmosphere Administration Office (NOAA), the World Meteorological Organization (WMO), and the International Center for the El Niño Phenomenon Research have forecasted a high probability of occurrence for the El Niño Phenomenon for 2009; this situation would give a top priority or emergency status to set up this project.

Damages to yields and property deepen the poverty situation of small and middle – size farmers located along the river Banks. In addition, these damages affect people using the river water that is impounded from an intake for irrigation purposes, as floods flowing into an unprotected intake damage or destroy it (and silt it up, as well), and thus, it is no longer operative, and water cannot be carried through the main channel for its subsequent diversion to croplands.

- **National Prevention Plan**

Care to farming activity needs is framed within the Ministry of Agriculture's Third Sectoral Policy Strategic Objective, namely: "To contribute to natural resource sustainable exploitation, aiming at environmental protection, and turning the environment into an important asset for the rural population that will generate suitable conditions for economic and social development within the National Prevention Plan." This contribution will lead to decrease farming activity development risks, as agriculture in our country is a productive activity that is carried out under high risk and climatic vulnerability conditions that in many cases can be foreseen and mitigated.

- **Article 3° of the Ministry of Agriculture's Organic Law**

Article 3° of the Ministry of Agriculture's Organic Law states that the agriculture sector's scope involves riverbeds, river channels, river banks, water from rivers, lakes, and other aquifer sources for farming use..." This assertion precisely states that work on the river beds or channels, as well as hydric resource management for agricultural purposes, are the agricultural sector's responsibility.

- **Agriculture Policy Alignments for Perú – 2002**

Title 10, Sectoral Policy, of the "2002 Agricultural Policy Alignments for Peru" (as prepared by the Ministry of Agriculture's Policy Office), states that "Agriculture is a productive activity that is carried out under high risk and climatic vulnerability conditions that can be foreseen and mitigated..." in addition, it states that "The cost of damages to infrastructure, harvests, cattle, etc.



involved, becomes a limiting factor to the agriculture development, as a result of an increasing deterioration of the local, regional, and national living conditions.”

As these are recurring, hard – to – foresee, and significantly major events, a great need of protection is required. In addition, the execution capacity and the budget are limited; therefore, these works must be carried out on an ongoing and scheduled way through multi annual action plans that are in compliance with the sector work plans, for trust and security to be provided during the development of the productive activities.

The execution of river channeling and river bank protection works by the Ministry of Agriculture are framed within, and are supported by the following functions that are inherent to the sector, and are carried out for the irrigation infrastructure (intakes and aqueduct canal) and farmland to be protected:

- a. Keeping and / or restoring channel conditions, river adjacent lands, and nearby vegetation, on behalf of farmers and the local scenery.
- b. Assuring water supply for the crops is the State’s responsibility. This is carried out through the local water authority. Therefore, its involvement includes performance as a responsible authority, and contributes to a rational hydric resource exploitation during dry season.

The Agriculture Multi Annual Sectoral Strategic Plan 2007 – 2011 establishes six (6) strategic objectives, including:

- Increasing the water management efficiency and the hydric resource sustainable uses, by promoting, among other actions, disaster risk management when faced with hydric resource irregular behavior. In this sense, prevention measure formulations, contingency care, and rehabilitation are set out as strategies for loss risk reduction of farming surface land, productive infrastructure, and natural resources, in coordination with the relevant levels of authorities, and the participation of the RG and LG in the implementation of the suggested measures.
  - Focusing on the public sector’s intervention on poverty areas, mainly the Andes and the jungle, under a territorial and multisectoral approach, by organizing the populations around a program that supports productive and capacity building activities, increasing agriculture public investment in poverty and extreme poverty areas. This will involve agreements, projects, and programs aiming at territorial management capacity building for regional and local Government rural development.
1. Prevention works construction
  2. Training and awareness raising
  3. Forestation and reforestation
  4. Time and climate remote monitoring

- c. This work is coordinated with the government plans, and allows for fulfilling the commitments that were established by means of commercial agreements, such as the FTA. In this sense, farming production and the fulfillment of commercial commitments should be assured.
- d. Supervision and preservation of riverbeds is part of the local water authorities' (former ATDR) performance; part of their competences involve authorizing the execution of works in the riverbeds.
- e. Investment in preventive measures for farmland protection represents a low cost, compared to the rehabilitation and reclamation costs for this land. Therefore, it is important to prioritize protection works, as they are less costly, offer further benefits to the country, and provide savings to the State (Article 49 of the "Water Law Rules.")

During the El Niño Phenomenon's occurrence in 1997 – 1998, the Central Government launched the El Niño Emergency Plan - Stages 1 and 2, for the rehabilitation of the hydraulic infrastructure that was affected by this phenomenon. This plan was carried out by the Ministry of Agriculture.

The above mentioned experience and the goal involving mitigating the devastating effects of extraordinary, regular, and seasonal floods during the first months of the year (January – March) have prompted the Ministry of Agriculture to execute, since 1999 and on a regular basis, prevention actions leading to prevent river overflowing and damages to yields and farmland surface, under the "River Channeling and Intake Structure Protection Program" – PERPEC.

The General Hydraulic Infrastructure Directorate (DGIH) is in charge, among other functions, of preparing the operative plans for the "River Channeling and Intake Structure Protection Program" – PERPEC., upon the basis of the information supplied by the Regional Agriculture Directorates, in coordination with the ALAs (Local Water Authorities) and the participation of the Water Users Associations.

In that sense, and aiming at improving the result of the river bank protection and channeling works, it has been deemed convenient to schedule progressive works in the valleys, for these interventions to be led towards a comprehensive riverbed treatment to the valleys of Peru, supplemented with reforestation and training activities.

As a result of the river random behavior that causes changes in the priority for scheduled protection works execution (with a greater incidence on those changes to take place in future years), there is an emergence of areas in more critical or urgent situations than those originally proposed. This makes it necessary for the initial programming to be modified. In this sense, a conglomerate of river bank protection works is proposed for 2011 and 2012, with an open portfolio. This will allow for works scheduled in the Investment Program to be replaced by other viable options, as the approved budget is kept.

On the other hand, in compliance with the general agriculture policy alignments, it is stated that there must be "risk prevention, based on an agreement with the private sector on irrigation and

drainage infrastructure vulnerability decrease, and a risk management institutionalization, by means of preventing disaster mitigation.” According to the irrigation - related environmental measures: A joint agreement must be prioritized with other sectors on soil conservation in those areas where sediments damage assets and irrigation infrastructure.

All of this is based on “institutionalizing risk management, as a key strategy on disaster prevention and mitigation.” This situation could become a reality by means of strong awareness raising activities on behalf of the beneficiaries, the local and regional authorities, for them to take on their roles as promoters and regulators.



## **CHAPTER 3 IDENTIFICATION**

### **3.1 Diagnostic of The Current Situation**

#### **3.1.1 Description of Current Situation**

Erosion and floodings caused by the river overflows are the phenomena that occur most frequently in nature, and affect both fields and towns. They cause significant economic losses, and generate situations that pose high health risks. River floods are undoubtedly a threat occurring on a regular basis and are especially serious in the agricultural sector. They cause: Yield losses, damages to farming surfaces, erosion and devastation of croplands, damages to irrigation and production infrastructures.

As a result of yield and farmland losses caused by river overflows and floodings, and in keeping with its policy as a promoter agent that looks for continuity and support of agricultural campaigns in the valleys, the Ministry of Agriculture carries out coordinations with the Regional Agriculture Directorates and the Water User Organizations on a yearly basis. The purpose for this is that actions to be executed between January and December are defined.

According to the PERPEC 2007, there is a limited knowledge of works and prevention actions against floodings in the valleys identified in this program, in spite of the fact that there is a high awareness among the users of the flooding dangers, as shown in the following table:

**Table 3.1 Diagnostics for 2008 – 2010 Training**

<b>Region Valley</b>	<b>Piura</b>	<b>Lima</b>	<b>Ica</b>		<b>Arequipa</b>
	<b>Chira</b>	<b>Cañete</b>	<b>Chincha</b>	<b>Pisco</b>	<b>Yauca</b>
Perception on the flood mechanism	High	High	High	High	High
Perception of vulnerable area for flood	High	High	High	High	Middle
Perception of flood control	High	High	High	Middle	Middle
Participation in flood control projects and workshops	Middle	Middle	Middle	Middle	Middle

Source: PERPEC

#### **3.1.2 The Component's Objective**

The main reason that generates the program's proposal is to prevent any damages caused by the overflows and floodings in the irrigation sectors around the program scope that create "social instability" every year during the rainy season, when faced with the possibility for a new major hydrological event that produces a water mass that exceeds the drainage capacity.

Such "social instability" experienced in the affected area does not only represent a significant economic loss, but an obstacle to economic and social development, as it becomes a significant risk factor for new investments.

Since the launching of the River Channeling and Intake Structure Protection Program – PERPEC, river bank protection works have been carried out in those areas representing a critical risk for agriculture, as identified by users and local irrigation authorities.

### 3.1.3 Affected Areas and Population

Affected populations are located within the jurisdiction scope of all six (6) regions – Regional Agriculture Directorates in the regions of: Piura, Lima, Ica and Arequipa. The table below shows the information on location at district, provincial, and regional level. Area to give care to is both rural agricultural and urban, as it is located within the area of influence of the valleys subject to intervention.

**Table 3.2 Characteristics of the Affected Zones and Population**

Region	Province	District	Affected Area and Population		
			No. of Families	Low irrigated superficies with the flood risk (ha)	Superficies with risk of water shortage by damaged irrigation (ha)
PIURA	SULLANA-PAITA	Multidistrital	9,240	6,796	14,354
LIMA	CAÑETE	Multidistrital	5,596	390	20,302
ICA	CHINCHA	Multidistrital	3,274	2,178	13,867
ICA	PISCO	Multidistrital	5,638	496	17,905
AREQUIPA	CARAVELI	Yauca-Yaqui	576	239	1,052
AREQUIPA	CASTILLA-CAMANA	Multidistrital	2,211	4,525	14,615
TOTAL			<b>26,535</b>	<b>14,624</b>	<b>82,095</b>

Source: MINAG

Due to the economic activities developed in these areas, population / farmers have expressed their concern to the district, provincial, and regional authorities.

- **Population by Gender, Urban, and Rural Area**

The table below shows the information about the total population settled in the target area in this diagnostics. This includes both the directly and indirectly affected population that corresponds to the population in the areas within the program scope.

**Table 3.3 Population in the Influenced Areas of the Program**

Region	Province	District	Population		TOTAL
			Male	Female	
PIURA	SULLANA	SULLANA	75,934	80,667	156,601
		IGNACIO ESCUDERO	9,136	8,706	17,862
		MARCAVELICA	13,291	12,740	26,031
		QUERECOTILLO	12,361	12,091	24,452
		SALITRAL	3,072	3,025	6,097
	PAITA	AMOTAPE	1,210	1,095	2,305
		COLAN	6,304	6,028	12,332

		LA HUACA	5,664	5,203	10,867
		TAMARINDO	2,263	2,139	4,402
TOTAL			129,255	131,694	260,949
LIMA	CAÑETE	SAN VICENTE DE CAÑETE	22,877	23,587	46,464
		CERRO AZUL	3,525	3,368	6,893
		IMPERIAL	18,014	18,326	36,340
		NUEVO IMPERIAL	9,414	9,612	19,026
		SAN LUIS	5,941	5,999	11,940
TOTAL			59,771	60,892	120,663
ICA	CHINCHA	CHINCHA ALTA	29,195	30,379	59,574
		ALTO LARAN	3,184	3,036	6,220
		CHINCHA BAJA	6,129	6,066	12,195
		EL CARMEN	5,861	5,864	11,725
		TAMBO DE MORA	2,331	2,394	4,725
	PISCO	PISCO	27,768	27,229	54,997
		SAN CLEMENTE	9,650	9,674	19,324
		TUPAC AMARU INCA	7,328	7,348	14,676
		SAN ANDRES	6,835	6,316	13,151
		HUMAY	2,823	2,614	5,437
		INDEPENDENCIA	6,504	5,886	12,390
TOTAL			107.60	106.80	214.414
AREQUIPA	CARAVELI	YAUCA	75,934	80,667	156,601
		JAQUI	9,156	8,706	17,862
	CASTILLA	MAJES	19,568	17,546	37,114
	CAMANA	CAMANA	27,750	25,315	53,065
TOTAL			132,408	132,234	264,642
TOTAL			381.724	388.765	770.489

Source: Censo de Población y Vivienda 2007 – INEI

## • Education

The table below shows the education levels in the areas. Over 12 % of the population has not graduated from elementary school, and 43 % of the population has not graduated from high school. Educational levels in the districts of Piura and Arequipa are especially low: 48 % have not graduated from high school in Sullana, Piura, 61 % have not graduated from high school in Paita, Piura, and 65 % have not graduated from high school in Caravelí, Arequipa.

Based on the situation, the contents levels for this component should be taken into account:

**Table 3.4 Population by Education Level**

REGION	PROVINCE	Nivel de Educacion Alcanzado								
		Total	None	Initial Education	Primary	Secondary	Superior no University (incomplete d)	Superior no University (completed)	Superior no University (incomplete d)	Superior University (completed)
PIURA	SULLANA	216265	24547	7012	71766	68461	100387	16299	8195	9598
	PAITA	27991	4559	725	11711	7594	1151	1266	419	567
LIMA	CAÑETE	113129	10097	3115	31584	41983	7205	9000	4459	5686
ICA	CHINCHA	88444	5698	2530	25573	34354	5152	7130	3008	4999
	PISCO	112559	8065	2896	31182	44587	6623	10173	3693	5340
AREQUIPA	CARAVELI	3199	335	86	1082	1165	142	117	107	165
	CASTILLA	36178	5212	1074	11400	11998	1723	2256	811	1704
	CAMANA	50221	4605	1492	13714	16988	3604	4288	2139	3391
<b>TOTAL</b>		<b>677986</b>	<b>63118</b>	<b>18930</b>	<b>218012</b>	<b>237130</b>	<b>35991</b>	<b>50528</b>	<b>22831</b>	<b>31450</b>

Source: Censo de Población y Vivienda 2007 - INEI

### • Dwelling Type

It is relevant to mention that population in this diagnostics target area are settled in the rural area. 90 % of this population have semi – rustic dwellings that are predominantly adobe built, with concrete or plaster finishings, and a coat of mud and straw. Dwellings are independent.

**Table 3.5 Type of Dwellings in the Target Area**

REGION	PROVINCE	Type of Dwellings								
		Total	House Independentl y	Departament	Quinta	Negihbor house	Cottage	Improvised house	Local no dest. Para hab. Humana	Others
PIURA	SULLANA	54839	54289	251	68	56	47	93	31	4
	PAITA	7771	7712	0	6	36	8	4	5	0
LIMA	CAÑETE	35473	31949	455	378	230	905	1378	77	101
ICA	CHINCHA	25240	20707	408	283	329	835	2473	41	160
	PISCO	33431	25876	273	312	202	506	6054	42	166
AREQUIP A	CARAVELI	1411	1343	0	14	15	23	16	0	0
	CASTILLA	14701	13296	28	71	454	779	29	39	5
	CAMANA	18691	16251	274	134	236	1540	203	17	36
<b>TOTAL</b>		<b>191557</b>	<b>171423</b>	<b>1689</b>	<b>1266</b>	<b>1558</b>	<b>4643</b>	<b>10250</b>	<b>252</b>	<b>472</b>

Source: Censo de Población y Vivienda 2007 – INEI

### • Beneficiary

Major economic livelihood activity is agriculture, agro-export crops are especially grown both for exports and the domestic market.

On the whole, it can be said that a farmer's income generated from farming activities amounts S/. 500.00 Nuevos Soles per month. In addition, average daily wages in the area amount S/. 20.00 Nuevos Soles.

Poverty indicators by FONCODES in the target areas are shown in the table below.

Indicators	PIURA		LIMA	ICA		AREQUIPA		
	SULLANA	PAITA	CAÑETE	CHINCHA	PISCO	CARAVELI	MAJES	CAMANA
Population 2007	231043	29906	120663	94439	106824	174463	37,114	53,065
Carencias Indicator	0.1181	0.1758	0.0998	0.0774	0.0687	0.1859		
Quintil Indicator	3	3	3	3	3	3	2	3
% of Population without:								
without Water (%)	30	27	30	22	22	38	22	19
without Sewage (%)	15	27	16	11	18	35	22	12
without Electricity (%)	17	20	18	20	17	32	23	21
Analfabetismo (women) (%)	9	9	8	5	5	10	15	7
(0-12 years old) (%)	26	29	27	26	26	27	26	24
Malnutrition 1999 (%)	21	26	19	20	14	17	17	8
UNDP-Indicator of Human Development 2006	0.5936	0.58	0.6525	0.6421	0.6525	0.6183	0.6044	0.6305

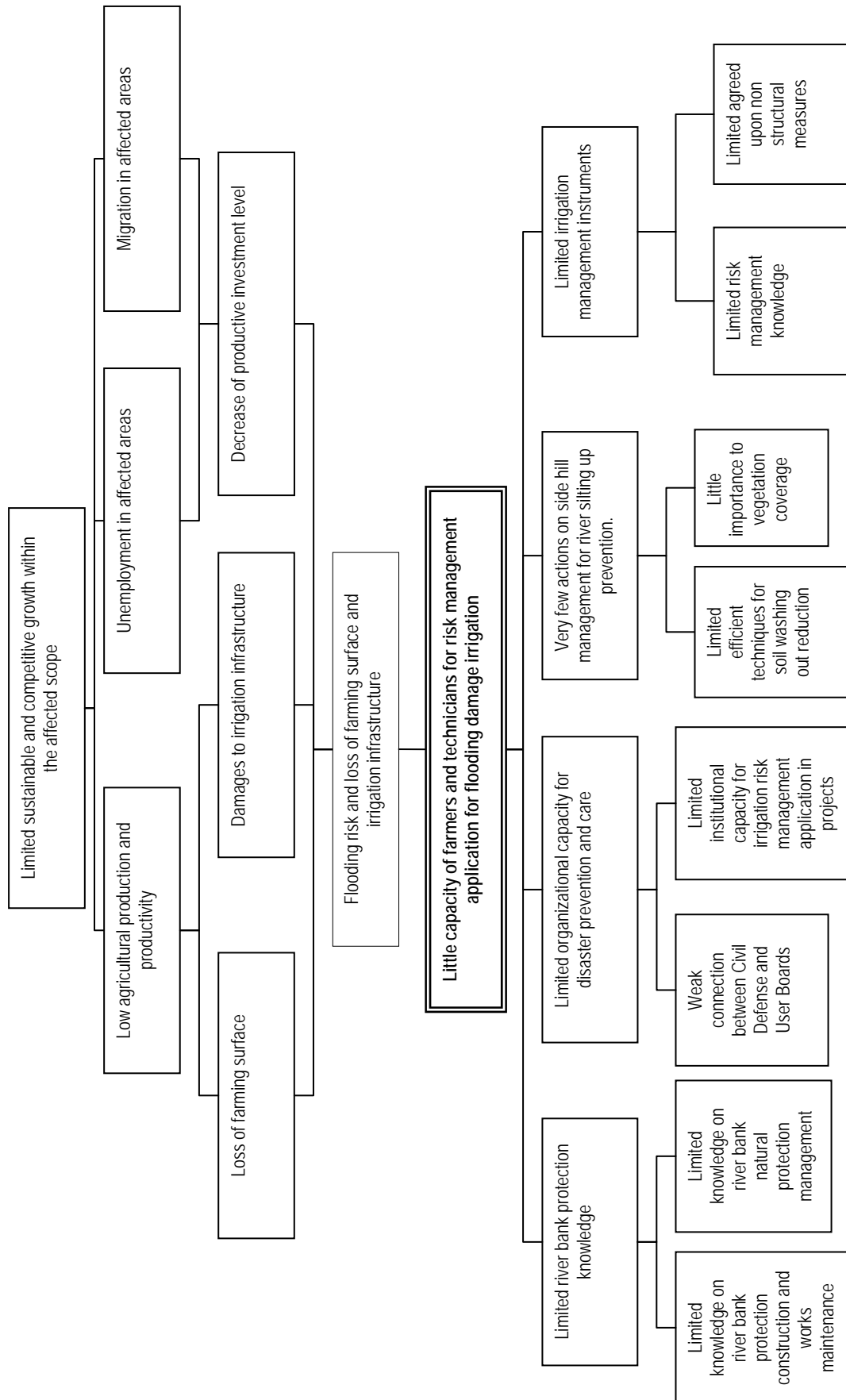
Source: Censo de Poblacion y Vivienda 2007-INEI, Censo de Talla Escolar 1999 - MINEDU

### Definition of Problem and its Causes

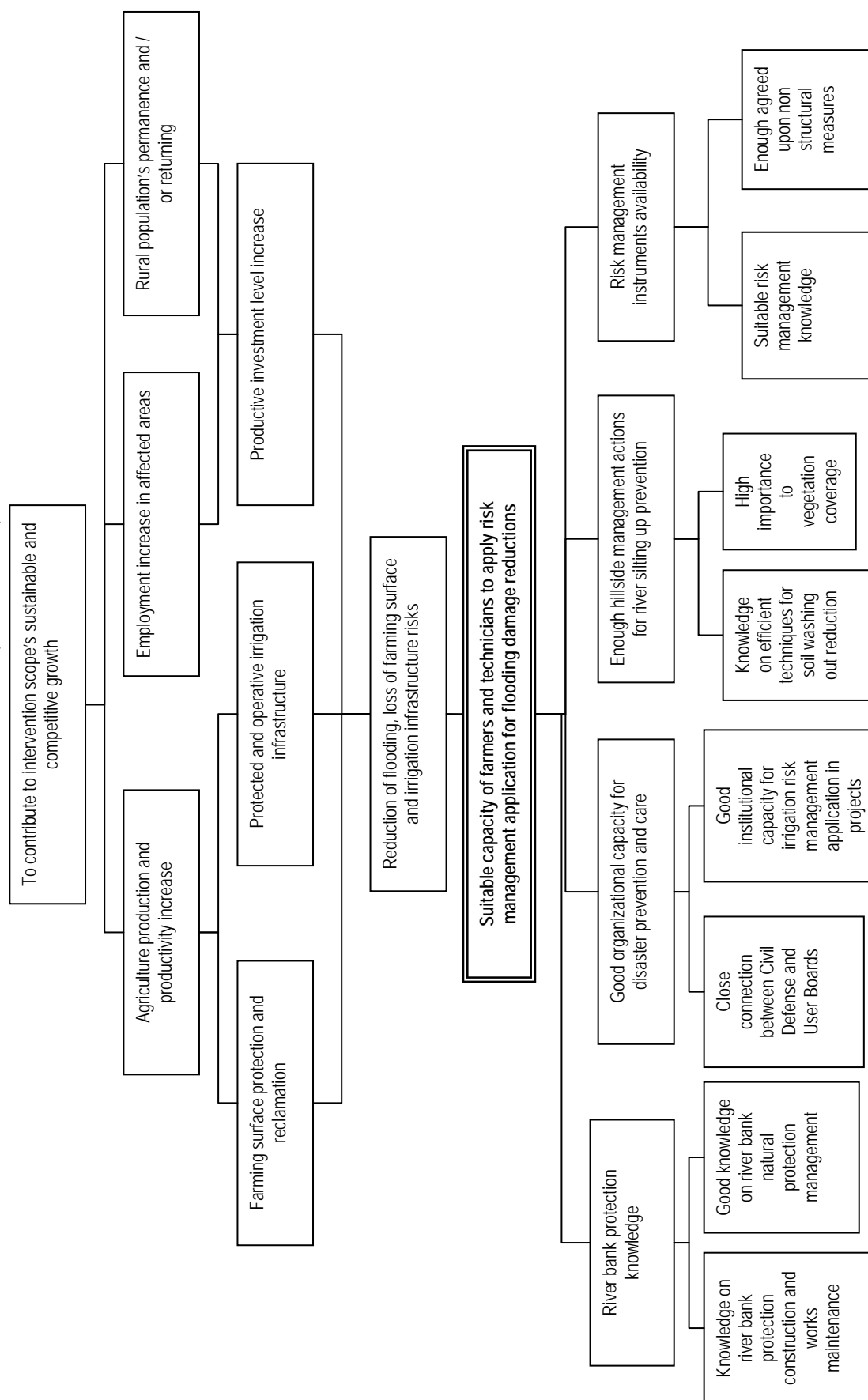
Definition of the problem and its causes has been formulated upon the basis of the diagnostics analysis. In this sense, the problem set out by i) the December 2007 Investment and Base Diagnostics Program for Training and Awareness Raising of PERPEC Users and ii) the November 2010 – February 2011 JICA Study workshops and surveys have been used as a basis. The Problem Tree and the Objectives Tree are shown below.



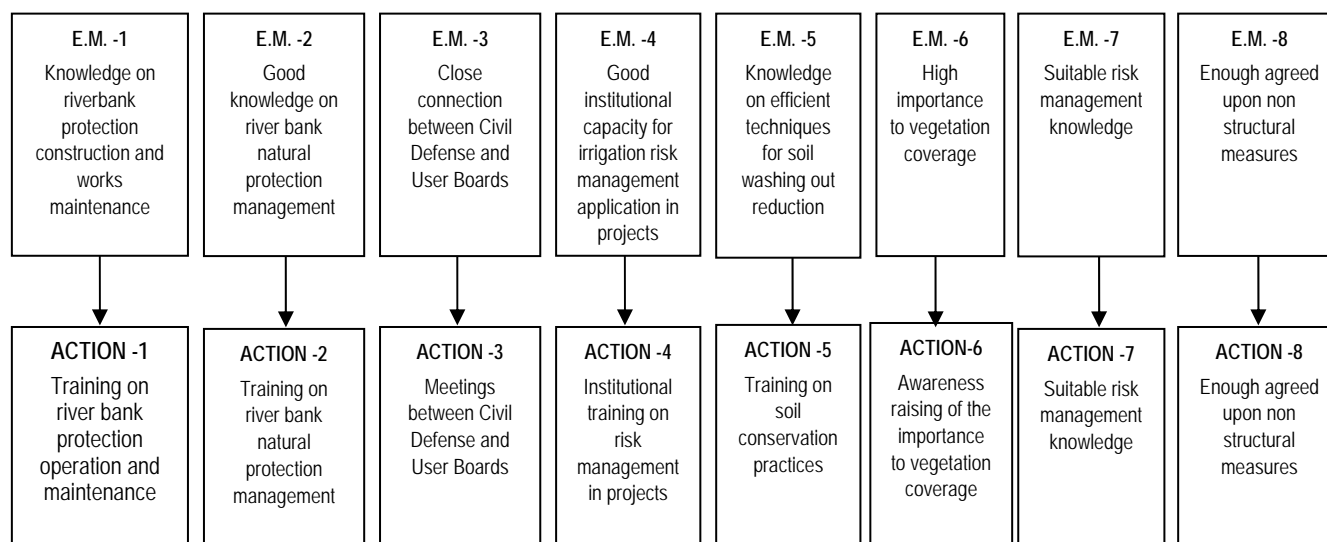
### PROBLEM TREE (Cause Effect)



### OBJECTIVES TREE (Means- Ends)



The following scheme shows actions relevant to each essential means; their fulfillment assures the project objective's fulfillment.



### 3.2 Setting Out of All Alternatives

Alternatives proposed for the project basically differ in their training and awareness raising methodologies that show particular aspects with regard to the suggested activities, as shown in the following matrices:

#### a) Alternative 1

Item	ESSENTIAL MEANS	ACTIVITIES
		ALTERNATIVE 1
1.00	Knowledge on river bank protection actions	
1.1	Knowledge on river bank protection construction and works maintenance	Workshop course on works operation and maintenance
1.2	Good knowledge on river bank natural protection management	Workshop courses on river bank plant management
		Prevention and mitigation of types of erosion
		Natural resource management
2.00	Preparation of Community Disaster Management Plan for Flood Control	
2.1	Close connection between Civil Defense and Water Users Associations	Workshop meetings for Risk management Plan formulation
2.2	Good institutional capacity for project risk management application	
		Community activity planning in consideration of ecological zoning
		Risk management
		Resource Management
		Preparation of community disaster management plan
2.3	Early Warning System (Simple method)	Risk management and Early warning system
		Joint activity with local governments, users' association, etc.
3.00	Hillside Management for River silting up Prevention	
3.1	Knowledge on efficient techniques for soil washing out reduction	Field actions (in days) for hillside conservation technique executions.
		Forest seedling productions
		Forest plantation setting up
		Forest resource management and conservation
3-2	High importance to vegetation coverage	Poster and 3 – page leaflet dissemination
4.00	Risk management Information and Instruments	
4.1	Suitable risk management treatment knowledge	Course on Risk management and forecasting and warning usefulness
4.2	Enough agreed upon non structural measures	Workshop meetings with local authorities

**b) Alternative 2**

Item	ESSENTIAL MEANS	ACTIVITIES
		ALTERNATIVE 2
1.00	Knowledge on river bank protection actions	
1.1	Knowledge on river bank protection construction and works maintenance	Radio Program on works operation and maintenance
1.2	Good knowledge on river bank natural protection management	Radio Program on river bank plant management
		Prevention and mitigation of types of erosion
		Natural resource management
2.00	Preparation of Community Disaster Management Plan for Flood Control	
2.1	Close connection between Civil Defense and Water Users Associations	Workshop meetings for Risk management Plan formulation
2.2	Good institutional capacity for project risk management application	
		Community activity planning in consideration of ecological zoning
		Risk management
		Resource Management
		Preparation of community disaster management plan
		Risk management and Early warning system
		Joint activity with local governments, users' association, etc.
3.00	Hillside Management for River silting up Prevention	
3.1	Knowledge on efficient techniques for soil washing out reduction	Field actions (in days) for hillside conservation technique executions.
		Forest seedling productions
		Forest plantation setting up
		Forest resource management and conservation
3-2	High importance to vegetation coverage	Poster and 3 – page leaflet dissemination
4.00	Risk management Information and Instruments	
4.1	Suitable risk management treatment knowledge	Course on Risk management and forecasting and warning usefulness
4.2	Enough agreed upon non structural measures	Workshop meetings with local authorities

It can be noticed that differences between both alternatives lies in the activity executions: Alternative 1 proposes to train and sensitize people by means of a direct training to the water users association leaders based on participatory workshops, whereas Alternative 2 proposes the dissemination of radio programs with the project – proposed themes.

## **CHAPTER 4 FORMULATION AND EVALUATION**

The project has a 15 – year evaluation period, in compliance with the return period that has been calculated for the river bank protection infrastructure and MEF recommendations. During this time, the investment program's sustainability will be evaluated.

### **4.1 Demand Analysis**

The Investment Program profile has defined the vulnerable areas in each and all of the valleys, by simulating floods, and establishing the relevant populations that make up the target population to be served.

**Table 4.1 Target Population by Valley**

<b>VALLEY</b>	<b>REGION</b>	<b>FAMILIES</b>	<b>POPULACION</b>
CHIRA	PIURA	9,240	46,200
CAÑETE	LIMA	5,596	27,980
CHINCHA	ICA	3,274	16,370
PISCO	ICA	5,638	28,190
YAUCA	AREQUIPA	576	2,880
MAJES-CAMANA	AREQUIPA	2,211	9,947
<b>TOTAL</b>		<b>26,535</b>	<b>131,567</b>

Source: PERPEC, JICA Study Team

There is a limit with regard to the total number of participants in the Component. Participating candidates include Water Users Association, local Government, and Community representatives.

Participants must define knowledge on the Component to the local populations by means of meetings, seminars, and workshops in each organization.

And gender balance should be considered, especially with regard to women's participation.

### **4.2 Supply Analysis**

At present, most service supplies to make flooding – vulnerable population to get trained and sensitized towards implementing Risk management and reducing existing vulnerability have not been supplied. Major suppliers include:

- The Water Users Associations promoted some training endeavors, as mentioned in the Base Diagnostics for the PERPEC 2007 as shown in the table below.

**Table 4.2 Realized Capacitation Course in the User's Association**

<b>VALLEY</b>	<b>REGION</b>	<b>COURSE(*)</b>	<b>FAMILIES</b>
CHIRA	PIURA	0	0
CAÑETE	LIMA	0	0
CHINCHA	ICA	7	210
PISCO	ICA	0	0
YAUCA	AREQUIPA	0	0
MAJES-CAMANA	AREQUIPA	0	0
<b>TOTAL</b>			<b>210</b>

Source: Diagnóstico base para capacitación y Sensibilización a Usuarios del PERPEC – 2007

- INDECI has carried out a series of training actions with the regional Governments that are mainly aimed at the urban areas; therefore, training to brigade members is the only training endeavor being contemplated, as reflected in the table below.

**Table 4.3 Realized Capactiation Course by INDECI**

REGION	Course (*)	Capacitated Population
PIURA	31	974
LIMA	5	260
ICA	4	300
AREQUIPA	13	660
<b>TOTAL</b>		<b>2,194</b>

Source: Compendio Estadístico de atención y prevención de desastres 2007

- On the other hand, AGRORURAL (former PRONAMACHCS) has been training on forestation and soil conservation in the high parts of the basins, and, according to their official statistics, around 30 % of the rural population would have been covered. Therefore, it is presumed that 1994 people (that is, 399 families) out of a total population identified in the investment program (6674 people) have been offered this knowledge.

#### 4.3 Supply – Demand Balance

- **The Demand Gap**

The table below shows information on supply and demand in all six (6) valleys under study, and the unmet demand or demand gap resulting from a difference between the demand and the supply, will be established.

**Table 4.4 Balance of Supplu - Demand**

Year	Demanding Population	Actual Supply	Unsatisfied Demand
2009	47,839	3,048	44,791
2010	48,604	3,097	45,508

Source: JICA Study Team

#### 4.4 Technical Plans

Two alternatives are presented as below:

- a) **Alternative 1**

**Component 1: Knowledge on River Bank Protection Actions in consideration of Agriculture and Natural Enviornment**

Course	d) River Bank Operation and Maintenance e) River Bank Plant Management
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	f) Erosion Prevention and Mitigation Natural Resource Management
Objectives	d) In this project, local populations learn suitable technology to operate and give maintenance to constructions and works from prior projects. e) Local populations learn suitable technology on river bank plants and vegetation for flooding control purposes. f) Local populations learn suitable technology on erosion and natural resources for flooding control purposes.
Participants	b) Engineers and / or technicians from local Governments b-c) Engineers and / or technicians from local Governments and Water Users Associations, Community representatives
Times	d) 12 times in all (every six (6) hours) e) 12 times in all (every five (5) hours) f) 26 times in all (every three (3) hours)
Lecturers	b) Contractors of constructions and works, Engineers from MINAG and / or the Regional Government b-c) Engineers from MINAG and / or the Regional Government, College professors (From universities, institutes, NGOs, etc.)
Contents	a-1) Suitable operation and maintenance technology for constructions and works from prior projects a-2) Suitable operation and maintenance technology for constructions and works in this project b-1) River bank protection with the use of plants b-2) The importance of river bank vegetation in flooding control b-3) Types of river bank plants and their characteristics c-1) Evaluation of the erosion conditions c-2) Evaluation of natural resource conditions c-3) Erosion approach for flooding control c-4) Natural resource approach for flooding control c-5) Environmental consideration approach c-6) Use of water resourceS c-7) Alternatives for suitable farming crops

## **Component 2: Preparation of Community Disaster Management Plan for Flood Control**

Course	a) Risk management Plan Formulation b) Detailed Risk management Plan Formulation
Objectives	a) Local populations gain knowledge and learn technology to prepare a flooding control plan b) Ditto
Participants	a-c) Engineers and / or technicians from local Governments and Water Users Associations, Community representatives
Times	a) 19 times in all (every four (4) hours) b) 34 times in all (every five (5) hours) c) 24 times in all (every five (5) hours)
Lecturers	a-c) Engineers from MINAG and / or the Regional Government, Community Development Expert, Facilitator (local participation )
Contents	a-1) Flooding control plan preparation manuals a-2) Current condition analyses for flooding control a-3) Community development alternatives by means of local participation a-4) Workshop for flooding control plan preparation b-1) Community activity planning in consideration of ecological zoning b-2) Risk management b-3) Resource management c-1) Preparation of community disaster management plan c-2) Joint activity with local governments, users' association, etc.

### **Component 3: Basin Management for Anti – River Sedimentation Measures**

Courses	e) Hillside Conservation Techniques f) Forest Seedling Production d) Forest Seedling Planting e) Forest Resource Management and Conservation
Objectives	c) Local populations learn suitable technology on hillside conservation for flooding control purposes d) Local populations learn suitable technology on forest seedling production f) Local populations learn suitable technology on forest seedling planting g) Local populations learn suitable technology on forest resource management and conservation
Participants	a-d) Engineers and / or technicians from local Governments and Water Users Associations, Community representatives and Local People
Times	b) 12 times in all (every five (5) hours) b-d) 40 times in all for three (3) “Courses on Basin Management for Anti - River Sedimentation Measures” (every five (5) hours)
Lecturers	a-d) Engineers from MINAG and / or the Regional Government, College professors (From universities, institutes, NGOs, etc.)
Contents	a-1) Soil characteristics and conservation on hillsides a-2) Hillside agroforestry system a-3) Animal herding system on hillsides a-4) Reforestation with traditional vegetation and plants a-5) Hillside conservation and alleviation alternatives b-1) A selection of plants that are suitable to the local characteristics b-2) Forest seedling production technology b-3) Control carried out by the local population’s involvement c-1) Candidate areas for forestation c-2) Forest plantation control technology c-3) Forest plantation soil technology c-4) Control carried out by the local population’s involvement d-1) Forestation for flooding control purposes d-2) Forest plantation control technology d-3) Forest plantation output technology d-4) Control carried out by the local population’s involvement

### **Component 4: Information Networks on Flooding Risk management**

Courses	c) Risk management and Forecasting and Warning Usefulness d) Workshop – Meeting with Local Authorities
Objectives	c) Local populations learn suitable technology on risk management and forecasting and warning usefulness. d) Cooperation preparedness between local Governments, Water Users Associations, communities, and local populations for flooding control purposes.
Participants	a-b) Engineers and / or technicians from local Governments and Water Users Associations, Community representatives
Times	c) 12 times in all (every five (5) hours) d) 12 times in all (every five (5) hours)
Lectures	a-b) Engineers from MINAG and / or the Regional Government, Forecasting and warning usefulness contractors and College professors (From universities, institutes, NGOs, etc.)
Contents	a-1) Disaster risk conditions and forecasting and warning usefulness a-2) Comprehensive risk management technology for flooding control a-3) Forecasting and warning usefulness technology a-4) Forecasting and warning usefulness control carried out by the local population’s



	involvement b-1) Setting up an information network for Disaster risk conditions and forecasting and warning usefulness b-2) Local cooperation set up for forecasting and warning usefulness b-3) Preparation of a disaster risk plan that includes Forecasting and warning usefulness
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**Table 4.5 Activity Matrix for Alternative 1**

Item	ESSENTIAL MEANS	ACTIVITIES	Meas urem ent Unit	No of Vall eys	No of Repetitio ns	Total Events
		ALTERNATIVE 1				
1.00	Knowledge on river bank protection actions					
1.1	Knowledge on river bank protection construction and works maintenance	Workshop course on works operation and maintenance	Event	6	2	12
1.2	Good knowledge on river bank natural protection management	Workshop courses on river bank plant management	Event	6	2	12
		Prevention and mitigation of types of erosion	Event	6	2	12
		Natural resource management	Event	6	2	12
2.00	Good organizational capacity to set up prevention measures and disaster care					
2.1	Close connection between Civil Defense and Water Users Associations	Workshop meetings for Risk management Plan formulation	Event	6	3	18
2.2	Good institutional capacity for project risk management application					
		Communy activity planning in consideartion of ecological zoning	Event	6	1	6
		Risk management	Event	6	1	6
		Resource management	Event	6	1	6
		Preparation of community disaster management plan	Event	6	1	6
		Risk management and Early warning system	Event	1	5	6
		Joint activity with local governments, users’ association, etc.	Event	1	5	6
3.00	Enough hillside management actions for river silting up prevention					
3.1	Knowledge on efficient techniques for soil washing out reduction	Field actions (in days) for hillside conservation technique executions.	Event	6	2	12
		Forest seedling productions	Event	6	2	12
		Forest plantation setting up	Event	6	2	12
		Forest resource management and conservation	Event	6	2	12
3-2	High importance to vegetation coverage	Poster and 3 – page leaflet dissemination	Millar	6	2	12
4.0	Risk management information and instruments availability					
4.1	Suitable risk management treatment knowledge	Course on Risk management and forecasting and warning usefulness	Event	1	2	2
4.2	Enough agreed upon non structural measures	Workshop meetings with local authorities	Event	1	2	2

Source: JICA Study Team

## **b) Alternative 2**

### **Component 1: Knowledge of River Bank Protection Actions in consideration of Agriculture and Natural Enviornment**

This component involves two (2) activities that will allow people in flooding vulnerability situation to carry out a suitable maintenance to river bank protection Works that are executed under the

Valley and Vulnerable Population Protection and Prevention Infrastructure Program or any other public or private funding source. In addition, it will allow this population to be aware and duly trained, in order to i) prevent depredation and subsequent lack of protection of natural vegetation along the river banks, and ii) participate in the introduction of suitable vegetable species along the different vulnerable areas. With this in mind, “Radio Programs” have been scheduled, as detailed in Attachment No. 01. These activities involve works operation and maintenance, and river bank vegetation handling for flooding protection purposes.

### **Component 2: Preparation of Community Disaster Management Plan for Flood Control**

This component’s execution will allow for local population and institutions to be duly strengthened by means of a Local Risk management Plan that must comply with the existing local and regional plans, and it must be formulated with the participation of the local population, as it is represented by local and regional leaders and authorities with a decision – making capacity. Three (3) workshop meetings will be held for agreements and commitments to be made for the Local Risk management Plan to be prepared.

On the other hand, the Water Users Association and the local and regional Governments require to be strengthened, as they are in charge of project formulations and approvals. In addition, they must consolidate their risk management application knowledge on public investment projects, by stressing the irrigation infrastructure projects that are part of SNIP, but with a very restricted current application. With this in mind, four (4) training courses are set out for each of the five (5) regions: Ecological Zoning, Risk management, Resource Management, and Project Formulation. The sole exception for this is the Piura Region (where the meteorological monitoring and forecasting and warning system will be set up): Two (2) courses, five (5) sessions each, are foreseen to be carried out there.

### **Component 3: Actions in Hillside Management for River Silting Up Prevention.**

As the washout of the eroded soils on the hillsides contribute to the silting up of the river beds, training and awareness raising actions on behalf of the populations settled on the middle and lower parts of the basin are necessary for soil conservation activities to be carried out in coordination with the Investment Program and AGRORURAL. In this sense, field actions (in days) are set out for activity learning purposes; in addition, posters, almanacs, full color three – page leaflets, and other presentation materials are produced for technique dissemination purposes.

### **Component 4: Risk Management Instruments**

Implementation of Risk management to reduce vulnerability in spaces and among populations that have been previously identified requires operative instruments that contribute to this objective; in that sense, it is first necessary to agree on non structural measures that help towards reducing river bank vulnerability and increasing bed stability, as they are related to bank strip protections, aggregate technical and rational extraction, controlled river bank forest exploitation, etc. These measures adjust to the effective laws, and there is a formal commitment for their implementation

by local authorities, and their mandatory compliance via civil vigilance. For this to be accomplished, two (2) agreement workshop meetings are set out for local authorities, community, and Water Users Association leaders. On the other hand, the population must have all necessary knowledge on risk management i) to set up prevention measures, as forecasting and warning systems are used wherever they are already in place, and other new forecasting and warning systems are set up; ii) to suitably respond in case of flooding emergencies; and iii) to know how to deal with reconstruction once the disaster has occurred. In order to achieve this, risk management training is set out with the participation of the water users association leaders in vulnerable conditions.

**Table 4.6 Activity Matrix for Alternative 2**

Item	ESSENTIAL MEANS	ACTIVITIES	Meas- ure- ment Unit	No of Valle- ys	No of Repet- itions	Total Events
		ALTERNATIVE 2				
1.00	Knowledge on River Bank Protection Actions in consideration of Agriculture and Natural Enviornment					
1.1	Knowledge on river bank protection construction and works maintenance	Radio Programs on works operation and maintenance	Event	6	2	12
1.2	Good knowledge on river bank natural protection management	Radio Programs on river bank plant management	Event	6	2	12
		Prevention and mitigation of types of erosion	Event	6	2	12
		Natural resource management	Event	6	2	12
2.00	Preparation of Commnity Disaster Management Plan for Flood Control					
2.1	Close connection between Civil Defense and Water Users Associations	Workshop meetings for Risk management Plan formulation	Event	6	3	18
2.2	Good institutional capacity for project risk management application					
		Communy activity planning in considertation of ecological zoning	Event	6	1	6
		Risk management	Event	6	1	6
		Resource management	Event	6	1	6
		Preparation of community disaster management plan	Event	6	1	6
		Risk management and Early warning system	Event	1	5	6
	Joint activity with local governments, users’ association, etc.	Event	1	5	6	
3.00	Enough hillside management actions for river silting up prevention					
3.1	Knowledge on efficient techniques for soil washing out reduction	Field actions (in days) for hillside conservation technique executions.	Event	6	2	12
		Forest seedling productions	Event	6	2	12
		Forest plantation setting up	Event	6	2	12
		Forest resource management and conservation	Event	6	2	12
3-2	High importance to vegetation coverage	Poster and 3 – page leaflet dissemination	Millar	6	2	12
4.0	Risk management information and instrumnts availability					
4.1	Suitable risk management treatment knowledge	Course on Risk management and forecasting and warning usefulness	Event	1	2	2
4.2	Enough agreed upon non structural measures	Workshop meetings with local authorities	Event	1	2	2

Source: JICA Study Team

## 4.5 Costs

The project costs of Alternative 1 and 2 are as follows. The unit prices are applied the actual prices in the PERPEC projects.

**Table 4.7 Project Cost (Alternative 1)**

Item	Activities Alternative 1	Measure ment Unit	No. of Valleys	TOTAL	Year 1st.	Year 2nd.
1.00	<b>Knowledge on River Bank Protection Actions in consideration of Agriculture and Natural Environment</b>					
1.1.	Workshop on Works Operation and Maintenance	Event	6	55,800	27900	27900
1.2.	Workshop on River Bank Plant Management	Event	6	55,800	27900	27900
	Prevention and Mitigation for Erosion	Event	6	55,800	27900	27900
	Natural Resources Management	Event	6	55,800	27900	27900
2.00	<b>Preparation of Community Disaster Management Plan for Flood Control</b>					
2.1	Workshop on Risk Management Plan	Event	6	50,220	25110	25110
2.2	(in detail)					
	Community activity planning in consideration of ecological zoning	Event	6	73,200	36600	36600
	Risk management	Event	6	73,200	36600	36600
	Resource management	Event	6	73,200	36600	36600
	Preparation of community disaster management plan	Event	6	73,200	36600	36600
2.3	Risk management and Early warning system	Event	6	55,800	27900	27900
	Joint activity with local governments, users' association, etc.	Event	6	33,480	16740	16740
3.00	<b>Hillside Management for River silting up Prevention</b>					
3.1	Field works for hillside conservation technique	Event	6	45,000	22500	22500
	Forest seedling productions	Event	6	47,400	23700	23700
	Forest plantation setting up	Event	6	47,400	23700	23700
	Forest resource management and conservation	Event	6	47,400	23700	23700
3.2	Diffusion of posters and leaflets		6	21,600	10800	10800
4.00	<b>Risk Management Information and Instruments</b>					
4.1	Workshop on risk management and forecasting & warning system	Event	1	9,300	4650	4650
4.2	Workshop with local authorities	Event	1	5,580	2790	2790
	<b>TOTAL</b>			<b>879,180</b>	<b>439,590</b>	<b>439,590</b>

Source: JICA Study Team

**Table 4.8 Project Cost (Alternative 2)**

Item	ACTIVIDADES	Unidad medida	No de Valles	No de repeticiones	Total eventos	PRECIO UNITARIO (Social)	TOTAL (Social)
	ALTERNATIVA 2						
1.00	Conocimiento de acciones de protección de las márgenes de los ríos						
1.1.	Programa Radial sobre operación y mantenimiento de obras	Mes	6	2	12	8,300	99,600.00
1.2.	Programa Radial sobre el manejo de plantas ribereñas	Mes	6	2	12	8,300	99,600.00
	Prevención y mitigación de tipos de erosión	Evento	6	2	12	4,650	55,800.00
	Manejo de recursos naturales	Evento	6	2	12	4,650	55,800.00
2.00	Buena capacidad organizativa para implementar medidas de prevención y atención de desastres						
2.1	Reuniones Taller para formular el Plan de Gestión de Riesgo	Evento	6	3	18	12,200	219,600.00
2.2							
	Zonificación Ecológica	Evento	6	1	6	12,200	73,200.00
	Gestión de Riesgos	Evento	6	1	6	12,200	73,200.00
	Gestión de Recursos	Evento	6	1	6	12,200	73,200.00
	Formulación de Proyectos	Evento	6	1	6	12,200	73,200.00
	Manejo de estaciones Meteorológicas	Evento	1	5	5	4,145	20,725.00
	Manejo de estaciones Hidrológicas	Evento	1	5	5	4,100	20,500.00
3.00	Suficientes acciones en manejo de laderas para evitar la colmatación de ríos						
3.1	Días de Campo en ejecución de técnicas de conservación de laderas	Evento	6	2	12	3,750	45,000.00
	Producción de Plantones Forestales	Evento	6	2	12	3,950	47,400.00
	Instalación de Plantaciones Forestales	Evento	6	2	12	3,950	47,400.00
	Manejo y Conservación de Recursos Forestales	Evento	6	2	12	3,950	47,400.00
3.2	Difusión de Spot Publicitario en Programas Radiales	Mes	6	2	12	5,300	63,600.00
4.00	Se cuenta con información e instrumentos de Gestión de riesgo						
4.1	Curso sobre Gestión de Riesgo y utilidades de alerta temprana	Evento	1	2	2	4,650	9,300.00
4.2	Reuniones Taller con Autoridades locales	Evento	1	2	2	2,790	5,580.00
	TOTAL						1,130,105.00

Source: JICA Study Team

## 4.6 Benefits

Major benefit generated by the Project is social – focused, as it primarily serves the population in terms of training and awareness raising.

This type of benefits cannot be appraised in monetary terms, but can be quantified through a social appraisal, namely, the Cost Effectiveness methodology.

### Benefits in the “Without Project”

As no activities that are focused on improving the population’s capability to apply risk management are carried out or scheduled in the “without project “ situation, benefit will be equal to zero.

### Benefits in the “With Project”

The training service to be set up will primarily provide qualitative benefits, namely:

- Bank protection works sustainability is ensured through a suitable maintenance.
- Population is prone to contribute with hand labor and other means to bank protection works construction, and to play an active role in the other actions.
- Beneficiaries know about actions to be taken before, during, and after the emergencies for overflows and floodings.
- Criteria to identify spaces that are most vulnerable to overflows and floodings, and to set up most convenient measures are identified.
- Non structural measures are set up to reduce overflow and flooding risks, thus ensuring compliance with participation and citizen vigilance.
- Knowledge on formulations and evaluations in irrigation infrastructure projects is confirmed for risk management to be applied on these projects.
- River silting up is reduced, as the population in the higher and middle parts of the basin is made aware of the application of forestation and soil conservation techniques.
- Forecasting and warning systems are known for human losses and, as much as possible, material damages to be prevented, and also, for prevention measures to be applied.
- Damages to the river bank vegetation are reduced, as the population settled in the valleys is made aware.

#### **4.7 Sustainability Analysis**

Sustainability analysis aims at foreseeing that, once the Project investments are completed, capabilities developed in the beneficiaries and the institutionality that brings them together, along with the local and regional entities, will carry on with awareness raising activities on behalf of the population.

##### **Institutional Arrangements**

The OGA-MINAG gets in charge of the Investment Program's execution, with the support of the Regional Agriculture Directorates. Therefore, these offices will be in charge of keeping the coordination links between the beneficiaries and the local and regional Governments, INDECI, etc. Tasks to be carried out by these institutions include training the population for disaster prevention purposes.

In this sense, institutional alliances will be important. These alliances will become formal, as a result of the meetings held with the local governments to formulate the Risk management Plan that aims at strengthening risk management institutionality. These meetings are led by the Civil Defense Committees that include local population, local and regional governments, and other institutions.

The major aspect for river bank protection's institutionality strengthening is the RISK MANAGEMENT PLAN consolidation and implementation that will be formulated in this Project, and involves all the interested organizations and institutions the aim at soil, crop, infrastructure, and population protections. These organizations and institutions include INDECI, AGRORURAL, etc.

Another important aspect that ensures the project's sustainability is the regional Government's institutional strengthening via training to their professional staff on: Ecological Zoning, Risk management, Resource Management, and Project Formulation. This will come along with a commitment to carry on raising awareness of those vulnerable populations within their intervention scopes.

Local Government will be essential for the participation in operation and maintenance in river bank protection infrastructure. Forestation and soil conservation on hillsides and river banks will be carried out in close coordination with AGRORURAL, as this institution's tasks involve carrying on with awareness raising to the identified population.

### **Management Capacity**

For training actions to be given sustainability, local and regional Governments will be engaged, and beneficiary users, grassroots organizations, and community representatives will be articulated. In addition, NGOs are foreseen to participate, so that once the project intervention is completed, these institutions carry on with the training actions.

The Hydraulic Infrastructure Directorate is in charge of PERPEC, an organization with broad experience in river bank protection project executions.

## **4.8 Environmental Impact**

Due to its nature, the project does not generate any negative environmental impacts; it rather contributes to environmental protection, as training actions focus on ensuring a suitable maintenance of the riverbed. Thus, the project's environmental impact is positive: The agricultural activity's climatologically information service conditions will be improved, and the population's sanitation conditions will not be affected, namely, the project will significantly improve the living conditions.

### **a) Environmental Ecological Impacts**

Environmental, soil, air, and sociocultural climate are improved, as the river bank vegetation protection and natural resource conservation in the middle and high parts of the basin are promoted. This will allow for awareness raising among the population that resource depredations affecting the environment should be prevented.

### **b) Socioeconomic Impacts**

### Job Generations

A first major change, as a result of training offered to counter floodings that directly affect agricultural sector, is the safe investments that encourage employment in agricultural activities; therefore, this is a positive impact.

### Improvements to the Local Population's Economy and Well – Being

Indirectly benefited population is basically devoted to farming as a livelihood; therefore, assurance granted to farming investments makes farming development to be sustainable. Upon that basis, improvements to the agricultural sector will allow for farming activity and hand labor employment increases, and a population's subsequent living improvement.

### Reappraisal of Farming Soil

With regard to the agricultural sector, farming land economic value will increase, based on the certainty that land will not get flooded, and farming investments will not get lost. This is a significant effect, as farmers will be able to access further investment opportunities, bank loans, and technical assistance.

### Cultural Impacts

The protection of culture will become strengthened, as a natural vegetation protection will be encouraged, and a rational riverbed management, an aggregate balanced extraction, and a rational forest exploitation will be consolidated.

## **4.9 Selection of Alternative**

Alternative 1 is chosen because of the following reasons:

- Local populations could participate in Alternative 1 activities more than in Alternative 2 activities.
- There are no environmental impacts caused by neither Alternative 1 nor Alternative 2.
- Total cost amount for Alternative 1 is less than for Alternative 2.

## **4.10 Implementation Plan**

Following its schedule, the project implementation plan should be carried out in two (2) years, by proportionally distributing the events and training activities, during Project years 1 and 2.

The relevant schedule is shown below.



**Table 4.9 Implementation Plan**

Item	Activities Alternative 1	Measure ment Unit	No. of Valleys	TOTAL	Year 1st.	Year 2nd.
1.00	<b>Knowledge on River Bank Protection Actions in consideration of Agriculture and Natural Environment</b>					
1.1.	Workshop on Works Operation and Maintenance	Event	6	55,800	27900	27900
1.2.	Workshop on River Bank Plant Management	Event	6	55,800	27900	27900
	Prevention and Mitigation for Erosion	Event	6	55,800	27900	27900
	Natural Resources Management	Event	6	55,800	27900	27900
2.00	<b>Preparation of Community Disaster Management Plan for Flood Control</b>					
2.1	Workshop on Risk Management Plan	Event	6	50,220	25110	25110
2.2	(in detail)					
	Community activity planning in consideration of ecological zoning	Event	6	73,200	36600	36600
	Risk management	Event	6	73,200	36600	36600
	Resource management	Event	6	73,200	36600	36600
	Preparation of community disaster management plan	Event	6	73,200	36600	36600
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	Joint activity with local governments, users' association, etc.	Event	6	33,480	16740	16740
3.00	<b>Hillside Management for River silting up Prevention</b>					
3.1	Field works for hillside conservation technique	Event	6	45,000	22500	22500
	Forest seedling productions	Event	6	47,400	23700	23700
	Forest plantation setting up	Event	6	47,400	23700	23700
	Forest resource management and conservation	Event	6	47,400	23700	23700
3.2	Diffusion of posters and leaflets		6	21,600	10800	10800
4.00	<b>Risk Management Information and Instruments</b>					
4.1	Workshop on risk management and forecasting & warning system	Event	1	9,300	4650	4650
4.2	Workshop with local authorities	Event	1	5,580	2790	2790
	<b>TOTAL</b>			<b>879,180</b>	<b>439,590</b>	<b>439,590</b>

#### 4.11 Organization and Administration

According to the effective law, formulation and execution of this clear Public Investment Project responds to the Ministry of Agriculture's inherent competence. As a public entity, the Ministry of Agriculture is committed to interact with other public entities that carry out a specific task during the formulation, execution, and post – investment stages, with regard to this type of projects.

The following operative scheme has been foreseen for this project's implementation:

- The Executing (or Implementation) Unit (MINAG's Central Administration) will coordinate with the National Hydraulic Infrastructure Directorate to pay out the disbursements that are relevant to the Regions included in the project, for a timely execution of the foreseen activities.
- Based on the program coordinations in each region, the Regional Agriculture Directorates will execute the project. In this sense, the relevant training plans and specific schedules will be prepared with the support of the consultant – facilitators' support.

- The logistical support will be provided by means of PERPEC's coordination. For this to be carried out, third party services will be hired with the project resources, as stipulated under the overhead item.
- Courses will be coordinated with the regional Governments, especially with the Civil Defense Directorates and other interested entities, such as the National Water Authority (ANA), AGRORURAL, etc.
- In such locations where works are being executed, works residents and administrators will support the call by means of the Water Users Associations.

#### **4.12 Conclusiones**

- 1) This project will allow for making the beneficiary population aware for execution and maintenance of both structural and non structural measures for river bank protection.
- 2) Risk management plans will be available, and will allow for guiding grassroots organizations' management and dealing with floodings, in close coordination with the public and private institutions.
- 3) Institutional capabilities will be strengthened among local and regional governments. This will lead to carry on training the vulnerable population. In addition, professional staff will be duly trained on formulation and appraisal of projects that consider risk management as a significant evaluation element.
- 4) Project investment cost is S/. 831,125 at market price, to be executed in 2 years.
- 5) Finally, project execution is recommended, as project proves to be technically, socially, and environmentally viable.

#### 4.13 Logframe Matrix for the Selected Alternative

The Logframe Matrix for the selected alternative is shown below.

	OBJECTIVES	INDICATORS	SOURCES	ASSUMPTIONS
<b>END</b>	To contribute to the intervention scope's sustainable and competitive growth			There are no changes in Agriculture – related Government policies.
<b>PURPOSE</b>	Farmers' and technicians' suitable capability to apply Risk management towards reducing flooding damages	By the end of the project, around 26,535 family heads will have been made aware and trained on Overflow and Flooding Risk management techniques.	Reports from technical coordinators in the relevant DRAs (Regional Agriculture Directorates) where the project is executed.	There are no obstacles that prevent, or interfere in the project execution.
<b>COMPONENTS</b>	1. River bank protection knowledge.	1. 48 training events throughout six (6) valleys, located in the same number of regions around the, will be developed.	Monthly progress reports by the executing (implementation) unit.	The executing (implementation) unit foresees the whole organization for a smooth project execution  Funds devoted to the project are provided to the relevant executing (implementation) units.  Project beneficiaries participate in an active and committed way.
	2. Organizational capability for disaster prevention and care	2. 52 training events throughout six (6) valleys will be developed. 18 of these events, on Risk management Plan formulation, are addressed to community leaders in the chosen scopes, and 34 events are addressed to project – involved professional staff, and 24 for addressed to local people.	Idem	
	3. Hillside management actions for river silting up	3. 60 training events throughout six (6) valleys will be developed, and posters and three (3) page leaflets will be disseminated throughout Peru's scope.	Idem	
	4. Risk management instruments	4. 4 training events and 2 workshop meetings will be developed with local authorities	Idem	

	ACTIVITIES	INDICATORS	RESOURCES	ASSUMPTIONS
ACTIVITIES	Workshop course: Works Operation and Maintenance	12 developed training events	S/. 55,800	The Executing (Implementation) Unit has available qualified technical staff for planning, organization, direction, monitoring, and evaluation of each one and all of the training events.
	Workshop course on river bank plant management	12 developed events.	S/. 55,800	
	Courses on erosion prevention and mitigation and natural resource management	24 developed events.	S/. 111,600	
	Workshop meetings for Risk management Plan formulation	18 developed events.	S/. 50,220	
	Courses to increase Overflow and Flooding Risk management institutional capabilities to local and regional Government professional staff within the project scope.	34 developed events.	S/. 407,225	
	Field actions (in days) on hillside conservation techniques	12 developed events.	S/ 45,000	
	Courses on forest seedling productions; installation, management, and conservation of forest resources.	36 developed events.	S/. 142,200	
	Handing out of posters and three (3) page leaflets	10,000 units of disseminating material handed out throughout six (6) valleys	S/. 21,600	
	Course on Risk management and usefulness of forecasting and warning systems	2 developed events.	S/. 9,300	
	Workshop meetings with local authorities	2 developed events.	S/. 5,580	

**ATTACHMENT**

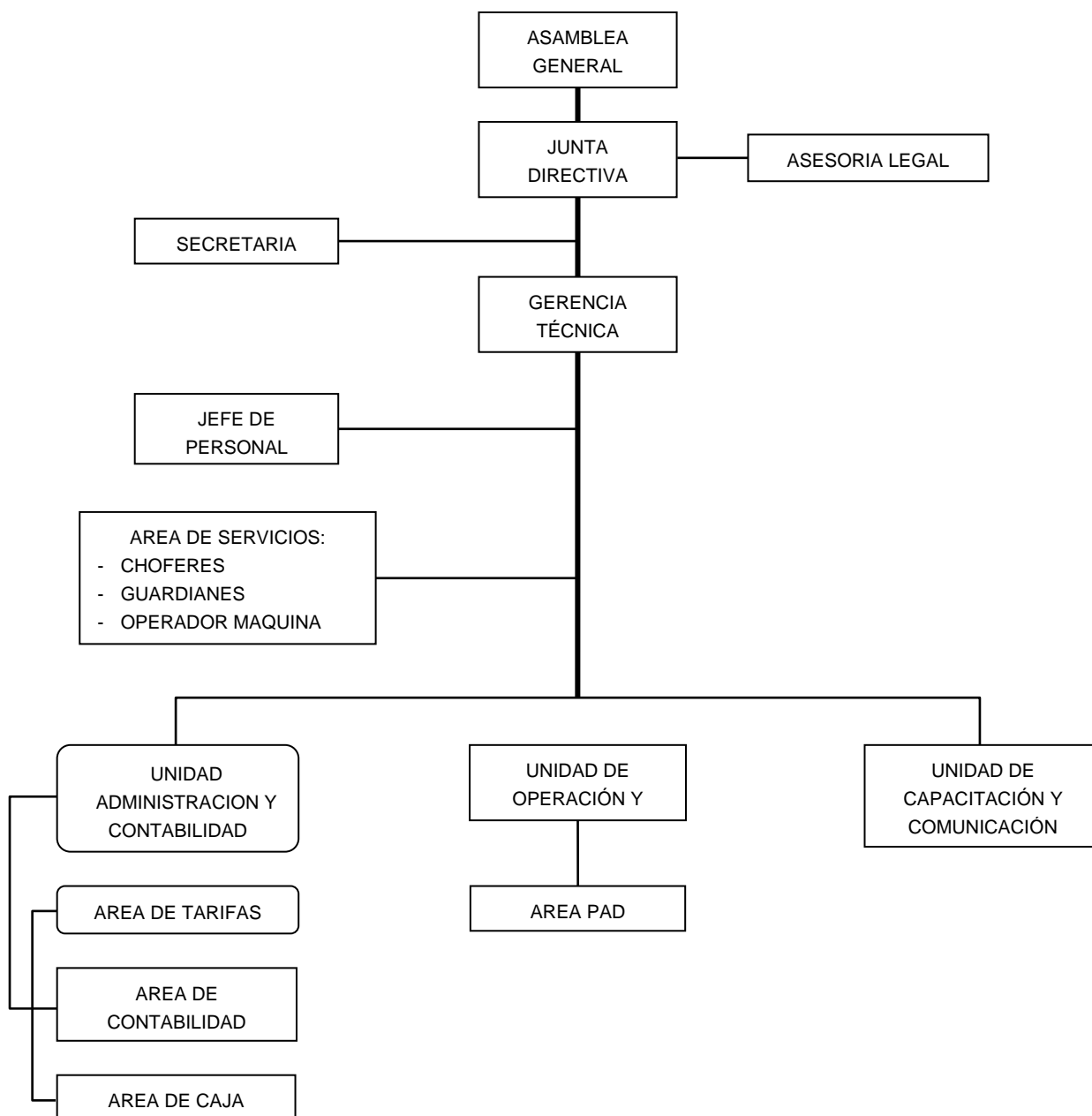


**Attachment-1:**  
***Organizational Chart***





**ORGANIZATIONAL CHART OF JUNTA DE USUARIOS CHIRA**

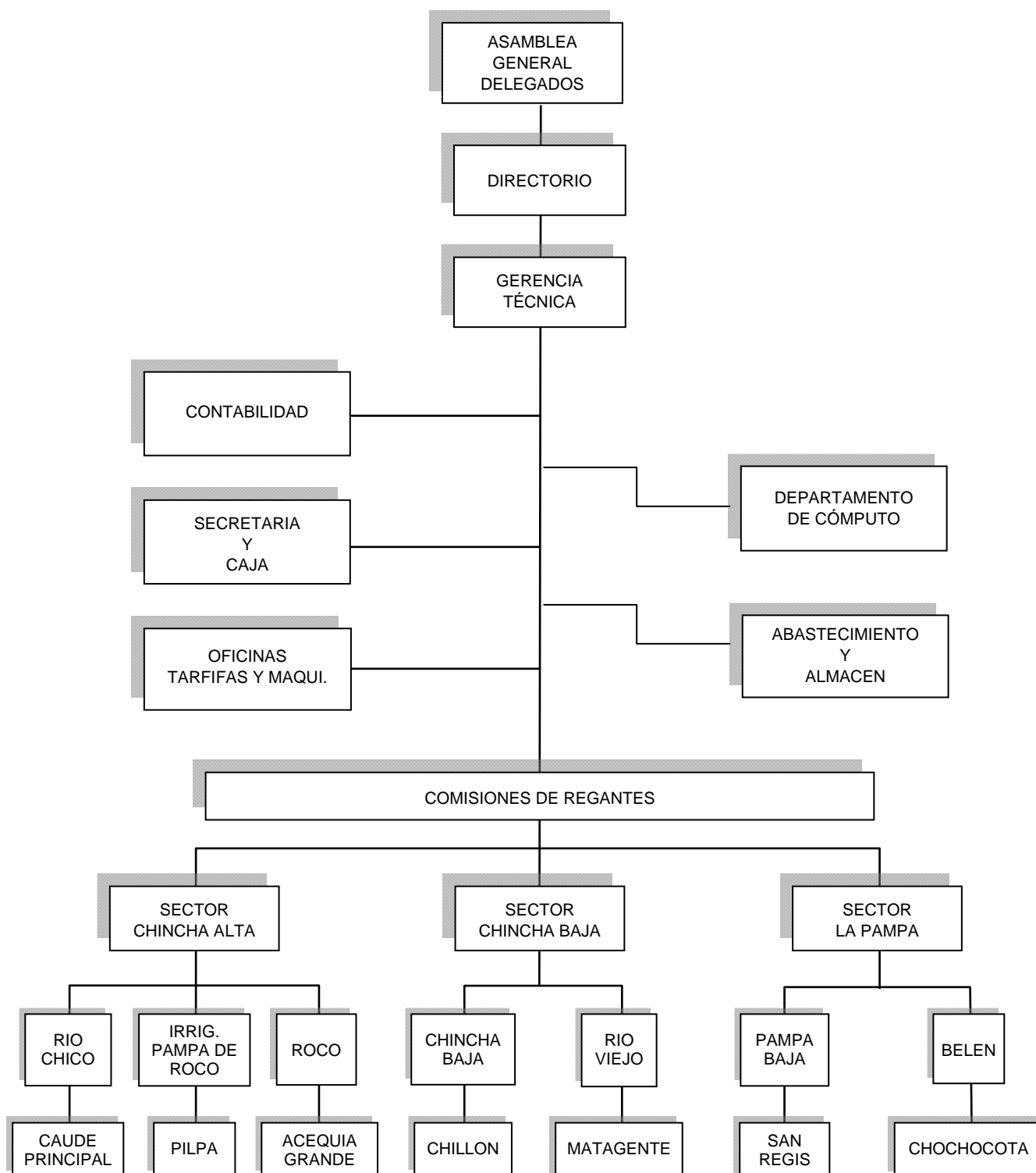


**ORGANIZATIONAL CHART OF LA JUNTA DE USUARIOS CAÑETE**

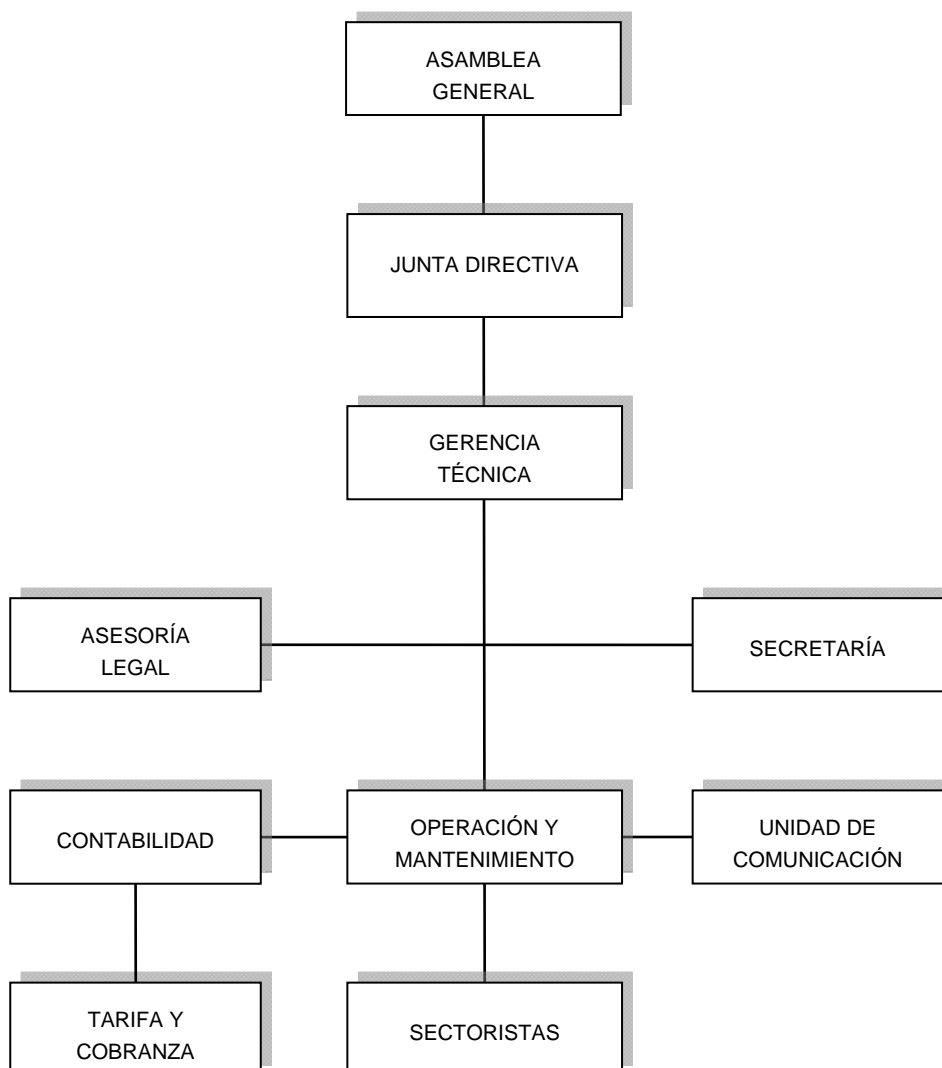


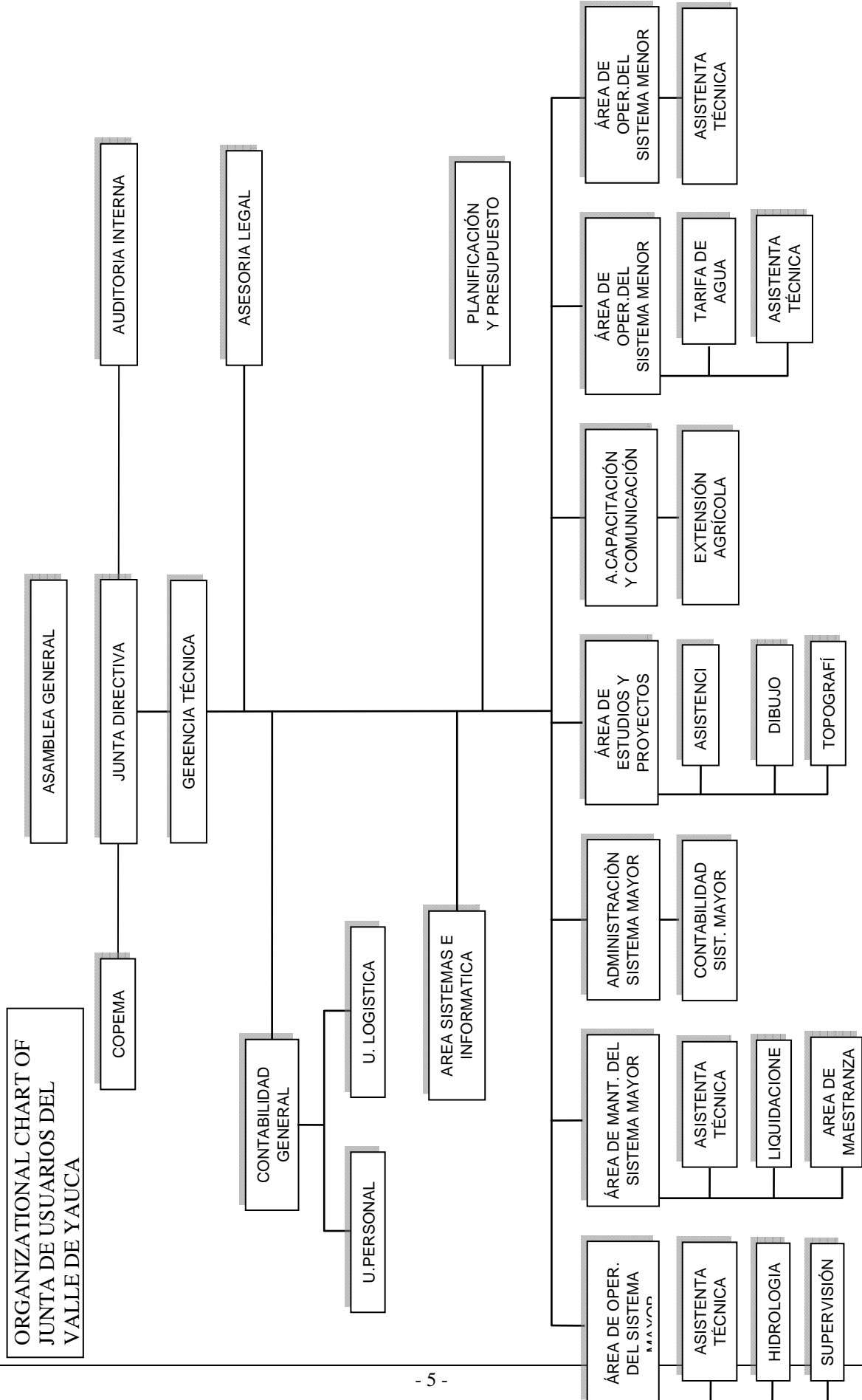
NOTA: UNIDAD DE CAPACITACION POR IMPLEMENTARSE

**ORGANIZATIONAL CHART OF USUARIOS DEL VALLE DE CHINCHA**

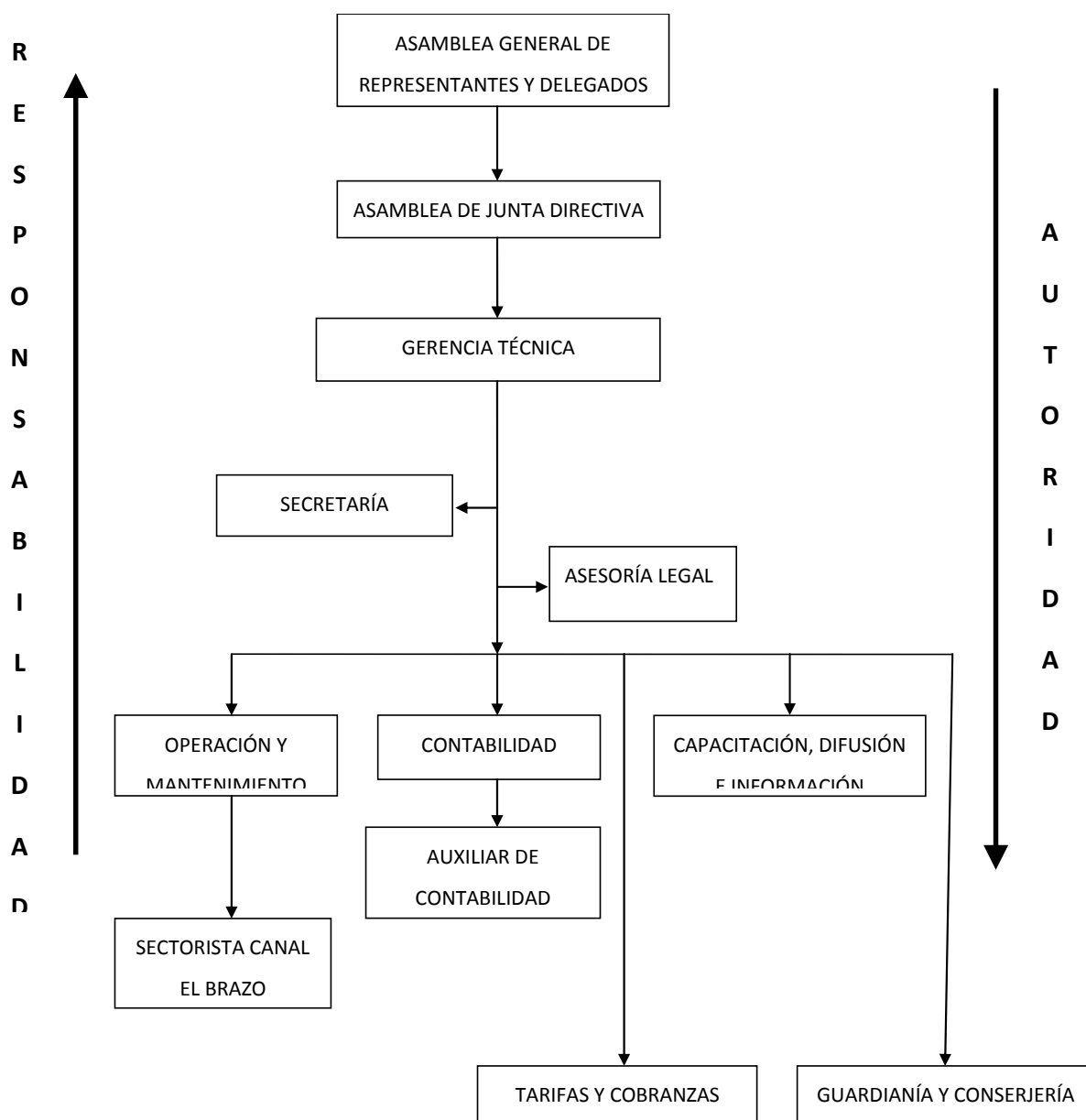


**ORGANIGRAMA JUNTA DE USUARIOS DEL VALLE DE PISCO**





**ORGANIZATIONAL CHART OF JUNTA DE USUARIOS DEL VALLE DE MAJES-  
CAMANA**

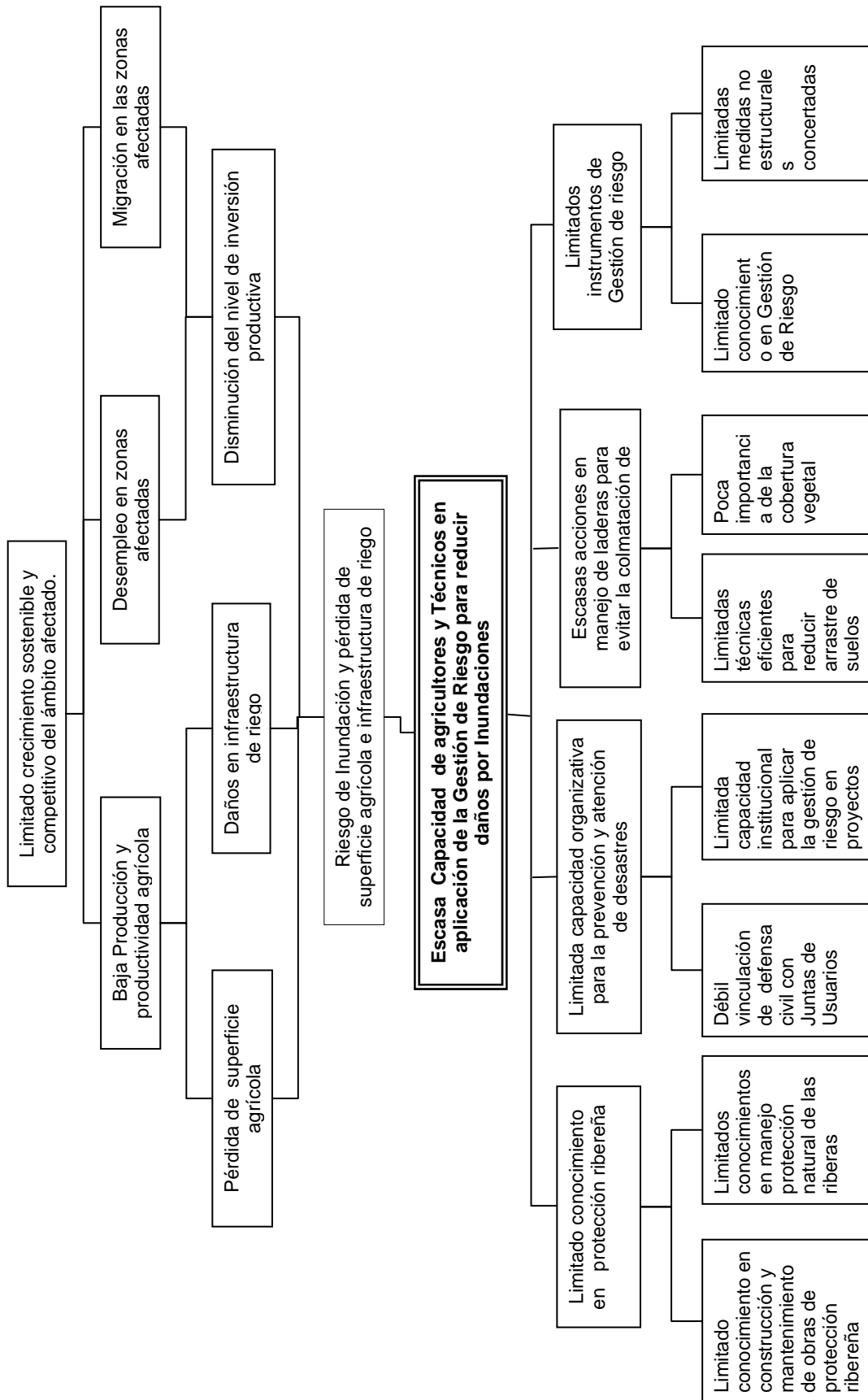


**Attachment-2:**  
***Problems Tree***

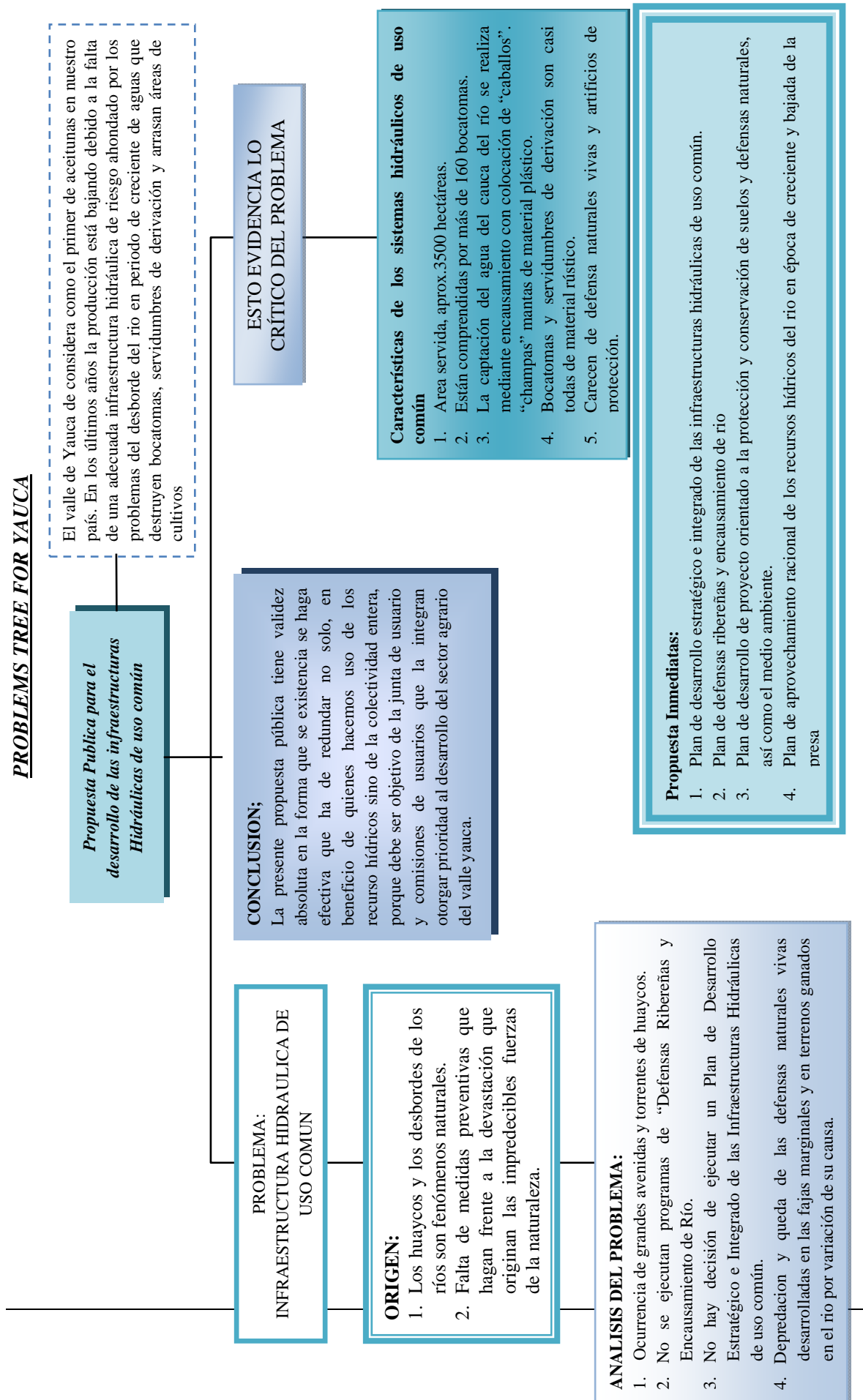




**PROBLEMS TREE FOR CHIRA, CAÑETE, CHINCHA y PISCO**



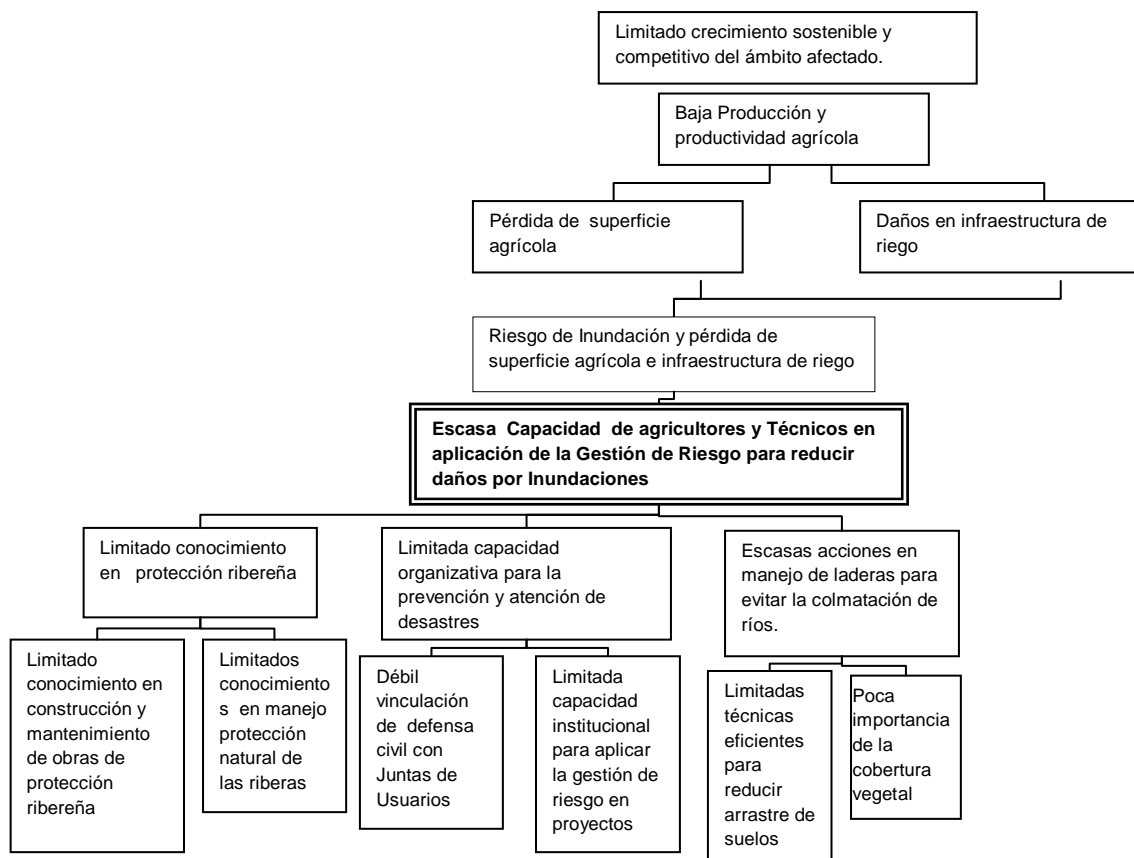
## PROBLEMS TREE FOR YAUCA



**PROBLEM TREE FOR MAJES**



**PROBLEMS TREE FOR CAMANA**



**Attachment-3:**  
***Questionnaire***



## **QUESTIONNAIRE ANSWERED IN CHIRA**

1. What essential means do you consider to be important. List them from most important to least important, according to your criterion.

- ( 3 ) Knowledge on river bank protection
- ( 2 ) Good organizational training for prevention measure and disaster care
- ( 1 ) Enough hillside management for river silting up prevention
- ( 4 ) Information and Management instruments availability
- ( ) Other: \_\_\_\_\_

2. From the essential means, which activities do you consider to be the most important under knowledge on river bank protection measures; list them from most important to least important.

- ( 3 ) Works operation and maintenance
- ( 5 ) River bank plant management
- ( 4 ) Prevention and mitigation of types of erosion
- ( 2 ) Natural resource management
- ( ) Other: \_\_\_\_\_

3. From the essential means, which activities do you consider to be the most important under good organizational capacity for disaster prevention and care measures; list them from most important to least important.

- ( 5 ) Workshop meetings for risk management plan
- ( 4 ) Risk zoning
- ( 2 ) Risk management
- ( 1 ) Resource management
- ( 3 ) Project formulation
- ( 7 ) Meteorological station management
- ( 6 ) Hydrological station management
- ( ) Other: \_\_\_\_\_

4. From the essential means, which activities do you consider to be the most important under enough actions on hillside management for river silting up prevention; list them from most important to least important

( 6 ) Field actions (in days) for hillside conservation technique

( 4 ) Forest seedling productions

( 3 ) Forest plantation setting up

( 5 ) Forest resource management and conservation

( 2 ) Poster and 3 – page leaflet dissemination

( 1 ) Spots in radio programs

( ) Other: \_\_\_\_\_

5. From the essential means, which activities do you consider to be the most important under risk management information and instruments availability; list them from most important to least important

( 3 ) Course on risk management and forecasting & warning usefulness

( 2 ) Workshop meetings with local authorities

( 1 ) Other: \_\_\_\_\_



## **QUESTIONNAIRE ANSWERED IN CAÑETE**

1. What essential means do you consider to be important. List them from most important to least important, according to your criterion.

- ( 1 ) Knowledge on river bank protection
- ( 3 ) Good organizational training for prevention measure and disaster care
- ( 4 ) Enough hillside management for river silting up prevention
- ( 2 ) Information and Management instruments availability
- ( ) Other: \_\_\_\_\_

2. From the essential means, which activities do you consider to be the most important under knowledge on river bank protection measures; list them from most important to least important.

- ( 1 ) Works operation and maintenance
- ( 3 ) River bank plant management
- ( 4 ) Prevention and mitigation of types of erosion
- ( 2 ) Natural resource management
- ( ) Other: \_\_\_\_\_

3. From the essential means, which activities do you consider to be the most important under good organizational capacity for disaster prevention and care measures; list them from most important to least important.

- ( 1 ) Workshop meetings for risk management plan
- ( 3 ) Risk zoning
- ( 4 ) Risk management
- ( 5 ) Resource management
- ( 2 ) Project formulation
- ( 6 ) Meteorological station management
- ( 7 ) Hydrological station management
- ( ) Other: \_\_\_\_\_

4. From the essential means, which activities do you consider to be the most important under enough actions on hillside management for river silting up prevention; list them from most important to least important

( 1 ) Field actions (in days) for hillside conservation technique

( 5 ) Forest seedling productions

( 6 ) Forest plantation setting up

( 2 ) Forest resource management and conservation

( 3 ) Poster and 3 – page leaflet dissemination

( 4 ) Spots in radio programs

( ) Other: \_\_\_\_\_

5. From the essential means, which activities do you consider to be the most important under risk management information and instruments availability; list them from most important to least important

( 2 ) Course on risk management and forecasting & warning usefulness

( 1 ) Workshop meetings with local authorities

( ) Other: \_\_\_\_\_

## **QUESTIONNAIRE ANSWERED IN CHINCHA**

1. What essential means do you consider to be important. List them from most important to least important, according to your criterion.

- ( 3 ) Knowledge on river bank protection
- ( 1 ) Good organizational training for prevention measure and disaster care
- ( 2 ) Enough hillside management for river silting up prevention
- ( 4 ) Information and Management instruments availability
- ( ) Other: \_\_\_\_\_

2. From the essential means, which activities do you consider to be the most important under knowledge on river bank protection measures; list them from most important to least important.

- ( 1 ) Works operation and maintenance
- ( 2 ) River bank plant management
- ( 4 ) Prevention and mitigation of types of erosion
- ( 3 ) Natural resource management
- ( ) Other: \_\_\_\_\_

3. From the essential means, which activities do you consider to be the most important under good organizational capacity for disaster prevention and care measures; list them from most important to least important.

- ( 1 ) Workshop meetings for risk management plan
- ( 2 ) Risk zoning
- ( 5 ) Risk management
- ( 4 ) Resource management
- ( 3 ) Project formulation
- ( 7 ) Meteorological station management
- ( 6 ) Hydrological station management
- ( ) Other: \_\_\_\_\_

4. From the essential means, which activities do you consider to be the most important under enough actions on hillside management for river silting up prevention; list them from most important to least important

( 4 ) Field actions (in days) for hillside conservation technique

( 3 ) Forest seedling productions

( 1 ) Forest plantation setting up

( 2 ) Forest resource management and conservation

( 6 ) Poster and 3 – page leaflet dissemination

( 5 ) Spots in radio programs

( ) Other: \_\_\_\_\_

5. From the essential means, which activities do you consider to be the most important under risk management information and instruments availability; list them from most important to least important

( 1 ) Course on risk management and forecasting & warning usefulness

( 2 ) Workshop meetings with local authorities

( ) Other: \_\_\_\_\_

## **QUESTIONNAIRE ANSWERED IN PISCO**

1. What essential means do you consider to be important. List them from most important to least important, according to your criterion.

- ( 3 ) Knowledge on river bank protection
- ( 7 ) Good organizational training for prevention measure and disaster care
- ( 2 ) Enough hillside management for river silting up prevention
- ( 1 ) Information and Management instruments availability
- ( ) Other: \_\_\_\_\_

2. From the essential means, which activities do you consider to be the most important under knowledge on river bank protection measures; list them from most important to least important.

- ( 4 ) Works operation and maintenance
- ( 1 ) River bank plant management
- ( 2 ) Prevention and mitigation of types of erosion
- ( 3 ) Natural resource management
- ( ) Other: \_\_\_\_\_

3. From the essential means, which activities do you consider to be the most important under good organizational capacity for disaster prevention and care measures; list them from most important to least important.

- ( 7 ) Workshop meetings for risk management plan
- ( 5 ) Risk zoning
- ( 4 ) Risk management
- ( 3 ) Resource management
- ( 6 ) Project formulation
- ( 1 ) Meteorological station management
- ( 2 ) Hydrological station management
- ( ) Other: \_\_\_\_\_

4. From the essential means, which activities do you consider to be the most important under enough actions on hillside management for river silting up prevention; list them from most important to least important

( 6 ) Field actions (in days) for hillside conservation technique

( 1 ) Forest seedling productions

( 3 ) Forest plantation setting up

( 2 ) Forest resource management and conservation

( 5 ) Poster and 3 – page leaflet dissemination

( 4 ) Spots in radio programs

( ) Other: \_\_\_\_\_

5. From the essential means, which activities do you consider to be the most important under risk management information and instruments availability; list them from most important to least important

( 1 ) Course on risk management and forecasting & warning usefulness

( 2 ) Workshop meetings with local authorities

( ) Other: \_\_\_\_\_

## **QUESTIONNAIRE ANSWERED IN YAUCA**

1. What essential means do you consider to be important. List them from most important to least important, according to your criterion.

- ( 4 ) Knowledge on river bank protection
- ( 2 ) Good organizational training for prevention measure and disaster care
- ( 3 ) Enough hillside management for river silting up prevention
- ( 1 ) Information and Management instruments availability
- ( 5 ) Other: PONER EN EJECUCION PONER LOS CUATRO PUNTOS ANTERIORES

2. From the essential means, which activities do you consider to be the most important under knowledge on river bank protection measures; list them from most important to least important.

- ( 1 ) Works operation and maintenance
- ( 2 ) River bank plant management
- ( 4 ) Prevention and mitigation of types of erosion
- ( 3 ) Natural resource management
- ( 5 ) Other: PROGRAMA DE LIMPIEZA, ENCAUSAMIENTO, CAUCE RIO

3. From the essential means, which activities do you consider to be the most important under good organizational capacity for disaster prevention and care measures; list them from most important to least important.

- ( 3 ) Workshop meetings for risk management plan
- ( 7 ) Risk zoning
- ( 4 ) Risk management
- ( 6 ) Resource management
- ( 5 ) Project formulation
- ( 1 ) Meteorological station management
- ( 8 ) Hydrological station management
- ( ) Other: \_\_\_\_\_

4. From the essential means, which activities do you consider to be the most important under enough actions on hillside management for river silting up prevention; list them from most important to least important

( 3 ) Field actions (in days) for hillside conservation technique

( 4 ) Forest seedling productions

( 7 ) Forest plantation setting up

( 6 ) Forest resource management and conservation

( 2 ) Poster and 3 – page leaflet dissemination

( 1 ) Spots in radio programs

( 5 ) Other: EJECUCION ACCIONES PROTECCION, DEFENSAS NATURALES

5. From the essential means, which activities do you consider to be the most important under risk management information and instruments availability; list them from most important to least important

( 1 ) Course on risk management and forecasting & warning usefulness

( 2 ) Workshop meetings with local authorities

( 1 ) Other: FINANCIAMIENTO Y EJECUCION PREVENTIVA DE RIEGO



## **QUESTIONNAIRE ANSWERED IN MAJES**

1. Que medios fundamentales le parece importante. Enumere de mayor si le parece mas importante a menor si le parece menos importante .  
  
( 2 ) Conocimiento de acciones de protección de las márgene de los rios  
  
( 1 ) Buena capacidad organizativa para implementar medidas de prevención y atención de desastres.  
  
( 3 ) Suficiente acciones en manejo de laderas para evitar la colmatación de ríos  
  
( 4 ) Se cuenta con información e instrumentos de gestión  
  
( 5 ) Otros: \_\_
2. Del medio fundamental, conocimiento de acciones de pritección de las margenes de los rios , cual actividad le parece mas importante enumere de mayor a menor.  
  
( 1 ) Programa sobre operación y mantenimiento de obras  
  
( 3 ) Programa de manejo de plante ribereñas  
  
( 2 ) Prevención y mitigación de tipos de erosión  
  
( 4 ) Manejo de recursos naturales  
  
( 5 ) Otros: \_\_
3. Del medio fundamental , buena capacidad organizativa para implementar medidas de prevención y atención de desastres , cual acitvidad le parece mas importante enumere de mayor a menor.  
  
( 2 ) Reuniones taller para formular el plan de getión de riesgo  
  
( 1 ) Zonificación de Riesgo  
  
( 5 ) Gestión de Riesgo  
  
( 6 ) Gestión de Recurso  
  
( 3 ) Formulación de Proyectos  
  
( 7 ) Manejo de estaciones Meteorológicas  
  
( 4 ) Manejo de estaciones Hidrológicas  
  
( ) Otros: \_\_\_\_\_

4. Del medio fundamental, superficie acciones en manejo de laderas para evitar la colmatación de ríos, cual le parece más importante enumere de mayor a menor.

( 4 ) Días de campo en ejecución de técnicas de conservación de laderas

( 3 ) Producción de plantones forestales

( 2 ) Instalaciones de plantones forestales

( 1 ) Manejo y conservación de recursos forestales

( 5 ) Difusión de afiches y tripticos

( 6 ) Difusión de spot publicitario en programas radiales

( 7 ) Otros: \_\_\_\_\_

5. Del medio fundamental, se cuenta con información e instrumentos de gestión de riego, que actividad le parece más importante enumere de mayor a menor.

( 2 ) Curso sobre gestión y riesgo y utilidades de alerta temprana

( 1 ) Reuniones taller con autoridades locales

( ) Otros: \_\_\_\_\_

## **QUESTIONNAIRE ANSWERED IN CAMANA**

1. Que medios fundamentales le parece importante. Enumere de mayor si le parece mas importante a menor si le parece menos importante .  
  
( 1 ) Conocimiento de acciones de protección de las márgene de los rios  
  
( 3 ) Buena capacidad organizativa para implementar medidas de prevención y atención de desastres.  
  
( 2 ) Suficiente acciones en manejo de laderas para evitar la colmatación de ríos  
  
( 4 ) Se cuenta con información e instrumentos de gestión  
  
( ) Otros: \_\_
2. Del medio fundamental, conocimiento de acciones de pritección de las margenes de los rios , cual actividad le parece mas importante enumere de mayor a menor.  
  
( 1 ) Programa sobre operación y mantenimiento de obras  
  
( 3 ) Programa de manejo de plante ribereñas  
  
( 2 ) Prevención y mitigación de tipos de erosión  
  
( 4 ) Manejo de recursos naturales  
  
( ) Otros: \_\_
3. Del medio fundamental , buena capacidad organizativa para implementar medidas de prevención y atención de desastres , cual acitvidad le parece mas importante enumere de mayor a menor.  
  
( 5 ) Reuniones taller para formular el plan de getión de riesgo  
  
( 3 ) Zonificación de Riesgo  
  
( 2 ) Gestión de Riesgo  
  
( 4 ) Gestión de Recurso  
  
( 1 ) Formulación de Proyectos  
  
( 7 ) Manejo de estaciones Meteorológicas  
  
( 6 ) Manejo de estaciones Hidrológicas  
  
( ) Otros: \_\_\_\_\_

4. Del medio fundamental, superficie acciones en manejo de laderas para evitar la colmatación de ríos, cual le parece más importante enumere de mayor a menor.

( 4 ) Días de campo en ejecución de técnicas de conservación de laderas

( 6 ) Producción de plantones forestales

( 2 ) Instalaciones de plantones forestales

( 1 ) Manejo y conservación de recursos forestales

( 5 ) Difusión de afiches y tripticos

( 7 ) Difusión de spot publicitario en programas radiales

( ) Otros: \_\_\_\_\_

5. Del medio fundamental, se cuenta con información e instrumentos de gestión de riego, que actividad le parece más importante enumere de mayor a menor.

( 1 ) Curso sobre gestión y riesgo y utilidades de alerta temprana

( 2 ) Reuniones taller con autoridades locales

( ) Otros: \_\_\_\_\_

**Attachment-4:**  
***Contents of Activities***



**Knowledge on River Bank Protection Actions in consideration of Agriculture and  
Natural Environment:**

River Bank Operation and Maintenance

I. **OBJECTIVES:**

In this project, local populations learn suitable technology to operate and give maintenance to constructions and works from prior projects.

II. **TARGET PARTICIPANTS:**

- Engineers and / or technicians from local Governments
- Engineers and / or technicians from Water Users Associations

III. **VENUES AND TIMES:**

- Water Users Association headquarters and / or public facilities.
- 12 times in all (every six (6) hours)

IV. **MATERIALS:**

- Existing materials (those prepared by PERPEC, audio-visual materials, etc.)
- Manuals for constructions and works from prior projects
- Manuals for constructions and works relevant to this project
- Materials handed out by the speakers

V. **TOPICS:**

- Suitable operation and maintenance technology for constructions and works from prior projects
- Suitable operation and maintenance technology for constructions and works in this project

VI. **SPEAKERS:**

- Contractors of constructions and works from prior projects
- Contractors of constructions and works in this project
- Engineers from MINAG and / or the Regional Government

**Knowledge on River Bank Protection Actions in consideration of Agriculture and  
Natural Environment:**

River Bank Plant Management

I. **OBJECTIVES**

Local populations learn suitable technology on river bank plants and vegetation for flooding control purposes.

II. **TARGET PARTICIPANTS**

- Engineers and / or technicians from local Governments
- Engineers and / or technicians from Water Users Associations
- Community representatives

III. **VENUES AND TIME:**

- Water Users Association headquarters and / or public facilities.
- 12 times in all (every five (5) hours)

IV. **MATERIALS:**

- Existing materials (those prepared by PERPEC, audio-visual materials, etc.)
- Materials handed out by the speakers

V. **TOPICS:**

- River bank protection with the use of plants
- The importance of river bank vegetation in flooding control
- Types of river bank plants and their characteristics

VI. **SPEAKERS:**

- Engineers from MINAG and / or the Regional Government
- College professors (From universities, institutes, NGOs, etc.)



**Knowledge on River Bank Protection Actions in consideration of Agriculture and  
Natural Environment:**

Erosion Prevention and Mitigation Natural Resource Management

I. *OBJECTIVES:*

Local populations learn suitable technology on erosion and natural resources for flooding control purposes.

II. *TARGET PARTICIPANTS:*

- Engineers and / or technicians from local Governments
- Engineers and / or technicians from Water Users Associations
- Community representatives

III. *VENUES AND TIME:*

- Water Users Association headquarters and / or public facilities.
- 26 times in all (every three (3) hours)

IV. *MATERIALS:*

- Existing materials (those prepared by PERPEC, audio-visual materials, etc.)
- Materials handed out by the speakers

V. *TOPICS:*

- Evaluation of the erosion conditions
- Evaluation of natural resource conditions
- Erosion approach for flooding control
- Natural resource approach for flooding control
- Environmental consideration approach
- Use of water resources
- Alternatives for suitable farming crops

VI. *SPEAKERS:*

- Engineers from MINAG and / or the Regional Government
- College professors (From universities, institutes, NGOs, etc.)

**Preparation of Community Disaster Management Plan for Flood Control:**

Risk management Plan Formulation

I. *OBJECTIVES:*

Local populations gain knowledge and learn technology to prepare a flooding control plan.

II. *TARGET PARTICIPANTS*

- Engineers and / or technicians from local Governments
- Engineers and / or technicians from Water Users Associations
- Community representatives

III. *VENUES AND TIME:*

- Water Users Association headquarters and / or public facilities.
- 19 times in all (every four (4) hours)

IV. *MATERIALS:*

- Existing materials (those prepared by PERPEC, audio-visual materials, etc.)
- Materials handed out by the speakers

V. *TOPICS:*

- Flooding control plan preparation manuals
- Current condition analyses for flooding control
- Community development alternatives by means of local participation
- Workshop for flooding control plan preparation

VI. *SPEAKERS:*

- Engineers from MINAG and / or the Regional Government
- Community Development Expert
- Facilitator (local participation )

## **Preparation of Community Disaster Management Plan for Flood Control**

### Detailed Risk management Plan Formulation

#### I. **OBJECTIVES:**

Local populations gain knowledge and learn technology to prepare a flooding control plan

#### II. **TARGET PARTICIPANTS**

- Engineers and / or technicians from local Governments
- Engineers and / or technicians from Water Users Associations
- Community representatives

#### III. **VENUES AND TIME:**

- Water Users Association headquarters and / or public facilities.
- 34 times in all (every five (5) hours)

#### IV. **MATERIALS:**

- Existing materials (those prepared by PERPEC, audio-visual materials, etc.)
- Materials handed out by the speakers

#### V. **TOPICS:**

- Ecological zoning
- Risk management
- Resource management
- Project formulation
- Meteorological station management
- Hydrological station management

#### VI. **SPEAKERS:**

- Engineers from MINAG and / or the Regional Government
- Community Development Expert
- Facilitator (local participation )

## **Preparation of Community Disaster Management Plan for Flood Control**

### Early Warning System for Flood Control

#### I. *OBJECTIVES:*

Local populations learn suitable technology on early warning system for flooding control purposes.

#### II. *TARGET PARTICIPANTS*

- Engineers and / or technicians from local Governments
- Engineers and / or technicians from Water Users Associations
- Community representatives
- Local people

#### III. *VENUES AND TIME:*

- Water Users Association headquarters and / or public facilities.
- 24 times in all (every five (5) hours)

#### IV. *MATERIALS:*

- Existing materials (those prepared by PERPEC, audio-visual materials, etc.)  
Materials handed out by the speakers

#### V. *THEMES:*

- Early warning system for flooding control
- Joint training using the early warning system with participation of local governments, water users union and local people

#### VI. *SPEAKERS:*

- Engineers from MINAG and / or the Regional Government
- Community development expert
- Facilitators (community participation)

## **Hillside Management for River silting up Prevention**

### Hillside Conservation Techniques

I. **OBJECTIVES:**

Local populations learn suitable technology on forest seedling production.

II. **TARGET PARTICIPANTS**

- Engineers and / or technicians from local Governments
- Engineers and / or technicians from Water Users Associations
- Community representatives

III. **VENUES AND TIME:**

- Water Users Association headquarters and / or forest area offices
- 40 times in all for three (3) “Courses on Basin Management for Anti - River Sedimentation Measures” (every five (5) hours)

IV. **MATERIALS:**

- Existing materials (those prepared by PERPEC, audio-visual materials, etc.)
- Materials handed out by the speakers
- Materials on forest seedlings

V. **THEMES:**

- A selection of plants that are suitable to the local characteristics
- Forest seedling production technology
- Control carried out by the local population's involvement

VI. **SPEAKERS:**

- Engineers from MINAG and / or the Regional Government
- College professors (From universities, institutes, NGOs, etc.)

## **Hillside Management for River silting up Prevention**

### Forest Seedling Production

#### I. *OBJECTIVES:*

Local populations learn suitable technology on forest seedling planting.

#### II. *TARGET PARTICIPANTS*

- Engineers and / or technicians from local Governments
- Engineers and / or technicians from Water Users Associations
- Community representatives

#### III. *VENUES AND TIME:*

- Water Users Association headquarters and / or forest area offices
- 40 times in all for three (3) “Courses on Basin Management for Anti - River Sedimentation Measures” (every five (5) hours)

#### IV. *MATERIALS:*

- Existing materials (those prepared by PERPEC, audio-visual materials, etc.)
- Materials handed out by the speakers
- Materials on forest seedlings

#### V. *THEMES:*

- Candidate areas for forestation
- Forest plantation control technology
- Forest plantation soil technology
- Control carried out by the local population's involvement

#### VI. *SPEAKERS:*

- Engineers from MINAG and / or the Regional Government
- College professors (From universities, institutes, NGOs, etc.)

## **Hillside Management for River silting up Prevention**

### Forest Seedling Planting

#### I. *OBJECTIVES:*

Local populations learn suitable technology on forest resource management and conservation.

#### II. *TARGET PARTICIPANTS*

- Engineers and / or technicians from local Governments
- Engineers and / or technicians from Water Users Associations
- Community representatives

#### III. *VENUES AND TIME:*

- Water Users Association headquarters and / or forest area offices
- 40 times in all for three (3) “Courses on Basin Management for Anti - River Sedimentation Measures” (every five (5) hours)

#### IV. *MATERIALS:*

- Existing materials (those prepared by PERPEC, audio-visual materials, etc.)
- Materials handed out by the speakers

#### V. *TOPICS:*

- Forestation for flooding control purposes
- Forest plantation control technology
- Forest plantation output technology
- Control carried out by the local population's involvement

#### VI. *SPEAKERS:*

- Engineers from MINAG and / or the Regional Government
- College professors (From universities, institutes, NGOs, etc.)

## **Hillside Management for River silting up Prevention**

### Forest Resource Management and Conservation

I. ***OBJECTIVES:***

Local populations learn suitable technology on forest resource management and conservation.

II. ***TARGET PARTICIPANTS***

- Engineers and / or technicians from local Governments
- Engineers and / or technicians from Water Users Associations
- Community representatives

III. ***VENUES AND TIME:***

- Water Users Association headquarters and / or forest area offices
- 40 times in all for three (3) “Courses on Basin Management for Anti - River Sedimentation Measures” (every five (5) hours)

IV. ***MATERIALS:***

- Existing materials (those prepared by PERPEC, audio-visual materials, etc.)
- Materials handed out by the speakers

V. ***TOPICS:***

- Forestation for flooding control purposes
- Forest plantation control technology
- Forest plantation output technology
- Control carried out by the local population's involvement

VI. ***SPEAKERS:***

- Engineers from MINAG and / or the Regional Government
- College professors (From universities, institutes, NGOs, etc.)



**Course to Information Networks on Flooding Risk management**  
**Risk management and Forecasting and Warning Usefulness**

Risk management and Forecasting and Warning Usefulness  
(using existing system)

I. **OBJECTIVES:**

Local populations learn suitable technology on risk management and forecasting and warning usefulness.

II. **TARGET PARTICIPANTS**

- Engineers and / or technicians from local Governments
- Engineers and / or technicians from Water Users Associations
- Community representatives

III. **VENUES AND TIME:**

- Las oficinas de Junta de Usuarios y/o facilidades publicas en Chira
- 12 veces en total (cada 5 horas)

IV. **MATERIALS:**

- Existing materials (those prepared by PERPEC, audio-visual materials, etc.)
- Materials handed out by the speakers

V. **THEMES:**

- Disaster risk conditions and forecasting and warning usefulness
- Comprehensive risk management technology for flooding control
- Forecasting and warning usefulness technology
- Forecasting and warning usefulness control carried out by the local population's involvement

VI. **SPEAKERS:**

- Engineers from MINAG and / or the Regional Government
- Forecasting and warning usefulness contractors
- College professors (From universities, institutes, NGOs, etc.)

**Course to Information Networks on Flooding Risk management Workshop – Meeting  
with Local Authorities**

Workshop – Meeting with Local Authorities (using existing system)

**I. *OBJECTIVES:***

Cooperation preparedness between local Governments, Water Users Associations, communities, and local populations for flooding control purposes.

**II. *TARGET PARTICIPANTS***

- Engineers and / or technicians from local Governments
- Engineers and / or technicians from Water Users Associations
- Community representatives

**III. *VENUES AND TIME:***

- Water Users Association headquarters and / or public facilities in Chira.
- 12 times in all (every five (5) hours)

**IV. *MATERIALS:***

- Existing materials (those prepared by PERPEC, audio-visual materials, etc.)
- Materials handed out by the speakers

**V. *THEMES:***

- Setting up an information network for Disaster risk conditions and forecasting and warning usefulness
- Local cooperation set up for forecasting and warning usefulness
- Preparation of a disaster risk plan that includes Forecasting and warning usefulness

**VI. *SPEAKERS:***

- Engineers from MINAG and / or the Regional Government
- Forecasting and warning usefulness contractors
- College professors (From universities, institutes, NGOs, etc.)

**Attachment-5:**  
***Costs***



CAPACITACION VALLE CHIRA							
Item	ACTIVIDADES ALTERNATIVA 1	Unidad medida	No de Valles	No de repeticiones	Total eventos	PRECIO UNITARIO (Privado)	TOTAL (Privado)
1.00	<b>Conocimiento de acciones de protección de las márgenes de los ríos</b>						
1.1.	Curso Taller: Operación y mantenimiento de Obras	Evento	1	2	2	4,650	9,300.00
1.2.	Cursos Taller de Manejo de plantas ribereñas	Evento	1	2	2	4,650	9,300.00
	Prevención y mitigación de tipos de erosión	Evento	1	2	2	4,650	9,300.00
	Manejo de recursos naturales	Evento	1	2	2	4,650	9,300.00
2.00							
2.1	Reuniones Taller para formular el Plan de Gestión de Riesgo	Evento	1	3	3	2,790	8,370.00
2.2							
	Zonificación Ecológica	Evento	1	1	1	12,200	12,200.00
	Gestión de Riesgos	Evento	1	1	1	12,200	12,200.00
	Gestión de Recursos	Evento	1	1	1	12,200	12,200.00
	Formulación de Proyectos	Evento	1	1	1	12,200	12,200.00
	Manejo de estaciones Meteorológicas	Evento	1	5	5	4,145	20,725.00
	Manejo de estaciones Hidrológicas	Evento	1	5	5	4,100	20,500.00
2.3							
	Utilidades de alerta temprana	Evento	1	2	2	4,650	9,300.00
	Reuniones Taller con Autoridades locales	Evento	1	2	2	2,790	5,580.00
3.00	<b>Suficientes acciones en manejo de laderas para evitar la colmatación de ríos</b>						
3.1	Días de Campo en ejecución de técnicas de conservación de laderas	Evento	1	2	2	3,750	7,500.00
	Producción de Plantones Forestales	Evento	1	2	2	3,950	7,900.00
	Instalación de Plantaciones Forestales	Evento	1	2	2	3,950	7,900.00
	Manejo y Conservación de Recursos Forestales	Evento	1	2	2	3,950	7,900.00
3.2	Difusión de afiches y trípticos	Millar	1	2	2	1,800	3,600.00
4.00	<b>Se cuenta con información e instrumentos de Gestión de riesgo</b>						
4.1	Curso sobre Gestión de Riesgo y utilidades de alerta temprana	Evento	1	2	2	4,650	9,300.00
4.2	Reuniones Taller con Autoridades locales	Evento	1	2	2	2,790	5,580.00
<b>TOTAL</b>							<b>200,155.00</b>
GASTOS ADMINISTRATIVOS (10% del CD)							20,015.50
<b>TOTAL</b>							<b>220,170.50</b>

CAPACITACION VALLE CANETE							
Item	ACTIVIDADES ALTERNATIVA 1	Unidad medida	No de Valles	No de repeticiones	Total eventos	PRECIO UNITARIO (Privado)	TOTAL (Privado)
1.00	<b>Conocimiento de acciones de protección de las márgenes de los ríos</b>						
1.1.	Curso Taller: Operación y mantenimiento de Obras	Evento	1	2	2	4,650	9,300.00
1.2.	Cursos Taller de Manejo de plantas ribereñas	Evento	1	2	2	4,650	9,300.00
	Prevención y mitigación de tipos de erosión	Evento	1	2	2	4,650	9,300.00
	Manejo de recursos naturales	Evento	1	2	2	4,650	9,300.00
2.00	<b>Buena capacidad organizativa para implementar medidas de prevención y atención de desastres</b>						
2.1	Reuniones Taller para formular el Plan de Gestión de Riesgo	Evento	1	3	3	2,790	8,370.00
2.2							
	Zonificación Ecológica	Evento	1	1	1	12,200	12,200.00
	Gestión de Riesgos	Evento	1	1	1	12,200	12,200.00
	Gestión de Recursos	Evento	1	1	1	12,200	12,200.00
	Formulación de Proyectos	Evento	1	1	1	12,200	12,200.00
2.3							
	Utilidades de alerta temprana	Evento	1	2	2	4,650	9,300.00
	Reuniones Taller con Autoridades locales	Evento	1	2	2	2,790	5,580.00
3.00	<b>Suficientes acciones en manejo de laderas para evitar la colmatación de ríos</b>						
3.1	Días de Campo en ejecución de técnicas de conservación de laderas	Evento	1	2	2	3,750	7,500.00
	Producción de Plantones Forestales	Evento	1	2	2	3,950	7,900.00
	Instalación de Plantaciones Forestales	Evento	1	2	2	3,950	7,900.00
	Manejo y Conservación de Recursos Forestales	Evento	1	2	2	3,950	7,900.00
3.2	Difusión de afiches y trípticos	Millar	1	2	2	1,800	3,600.00
	<b>TOTAL</b>						<b>144,050.00</b>
	GASTOS ADMINISTRATIVOS (10% del CD)						14,405.00
	<b>TOTAL</b>						<b>158,455.00</b>

CAPACITACION VALLE CHINCHA							
Item	ACTIVIDADES ALTERNATIVA 1	Unidad medida	No de Valles	No de repeticiones	Total eventos	PRECIO UNITARIO (Privado)	TOTAL (Privado)
1.00	<b>Conocimiento de acciones de protección de las márgenes de los ríos</b>						
1.1.	Curso Taller: Operación y mantenimiento de Obras	Evento	1	2	2	4,650	9,300.00
1.2.	Cursos Taller de Manejo de plantas ribereñas	Evento	1	2	2	4,650	9,300.00
	Prevención y mitigación de tipos de erosión	Evento	1	2	2	4,650	9,300.00
	Manejo de recursos naturales	Evento	1	2	2	4,650	9,300.00
2.00	<b>Buena capacidad organizativa para implementar medidas de prevención y atención de desastres</b>						
2.1	Reuniones Taller para formular el Plan de Gestión de Riesgo	Evento	1	3	3	2,790	8,370.00
2.2							
	Zonificación Ecológica	Evento	1	1	1	12,200	12,200.00
	Gestión de Riesgos	Evento	1	1	1	12,200	12,200.00
	Gestión de Recursos	Evento	1	1	1	12,200	12,200.00
	Formulación de Proyectos	Evento	1	1	1	12,200	12,200.00
2.3							
	Utilidades de alerta temprana	Evento	1	2	2	4,650	9,300.00
	Reuniones Taller con Autoridades locales	Evento	1	2	2	2,790	5,580.00
3.00	<b>Suficientes acciones en manejo de laderas para evitar la colmatación de ríos</b>						
3.1	Días de Campo en ejecución de técnicas de conservación de laderas	Evento	1	2	2	3,750	7,500.00
	Producción de Plantones Forestales	Evento	1	2	2	3,950	7,900.00
	Instalación de Plantaciones Forestales	Evento	1	2	2	3,950	7,900.00
	Manejo y Conservación de Recursos Forestales	Evento	1	2	2	3,950	7,900.00
3.2	Difusión de afiches y trípticos	Millar	1	2	2	1,800	3,600.00
	<b>TOTAL</b>						<b>144,050.00</b>
	GASTOS ADMINISTRATIVOS (10% del CD)						14,405.00
	<b>TOTAL</b>						<b>158,455.00</b>

CAPACITACION VALLE PISCO							
Item	ACTIVIDADES ALTERNATIVA 1	Unidad medida	No de Valles	No de repeticiones	Total eventos	PRECIO UNITARIO (Privado)	TOTAL (Privado)
1.00	<b>Conocimiento de acciones de protección de las márgenes de los ríos</b>						
1.1.	Curso Taller: Operación y mantenimiento de Obras	Evento	1	2	2	4,650	9,300.00
1.2.	Cursos Taller de Manejo de plantas ribereñas	Evento	1	2	2	4,650	9,300.00
	Prevención y mitigación de tipos de erosión	Evento	1	2	2	4,650	9,300.00
	Manejo de recursos naturales	Evento	1	2	2	4,650	9,300.00
2.00	<b>Buena capacidad organizativa para implementar medidas de prevención y atención de desastres</b>						
2.1	Reuniones Taller para formular el Plan de Gestión de Riesgo	Evento	1	3	3	2,790	8,370.00
2.2							
	Zonificación Ecológica	Evento	1	1	1	12,200	12,200.00
	Gestión de Riesgos	Evento	1	1	1	12,200	12,200.00
	Gestión de Recursos	Evento	1	1	1	12,200	12,200.00
	Formulación de Proyectos	Evento	1	1	1	12,200	12,200.00
2.3							
	Utilidades de alerta temprana	Evento	1	2	2	4,650	9,300.00
	Reuniones Taller con Autoridades locales	Evento	1	2	2	2,790	5,580.00
3.00	<b>Suficientes acciones en manejo de laderas para evitar la colmatación de ríos</b>						
3.1	Días de Campo en ejecución de técnicas de conservación de laderas	Evento	1	2	2	3,750	7,500.00
	Producción de Plantones Forestales	Evento	1	2	2	3,950	7,900.00
	Instalación de Plantaciones Forestales	Evento	1	2	2	3,950	7,900.00
	Manejo y Conservación de Recursos Forestales	Evento	1	2	2	3,950	7,900.00
3.2	Difusión de afiches y trípticos	Millar	1	2	2	1,800	3,600.00
	<b>TOTAL</b>						<b>144,050.00</b>
	GASTOS ADMINISTRATIVOS (10% del CD)						14,405.00
	<b>TOTAL</b>						<b>158,455.00</b>



CAPACITACION VALLE YAUCA							
Item	ACTIVIDADES ALTERNATIVA 1	Unidad medida	No de Valles	No de repeticiones	Total eventos	PRECIO UNITARIO (Privado)	TOTAL (Privado)
1.00	<b>Conocimiento de acciones de protección de las márgenes de los ríos</b>						
1.1.	Curso Taller: Operación y mantenimiento de Obras	Evento	1	2	2	4,650	9,300.00
1.2.	Cursos Taller de Manejo de plantas ribereñas	Evento	1	2	2	4,650	9,300.00
	Prevención y mitigación de tipos de erosión	Evento	1	2	2	4,650	9,300.00
	Manejo de recursos naturales	Evento	1	2	2	4,650	9,300.00
2.00	<b>Buena capacidad organizativa para implementar medidas de prevención y atención de desastres</b>						
2.1	Reuniones Taller para formular el Plan de Gestión de Riesgo	Evento	1	3	3	2,790	8,370.00
2.2							
	Zonificación Ecológica	Evento	1	1	1	12,200	12,200.00
	Gestión de Riesgos	Evento	1	1	1	12,200	12,200.00
	Gestión de Recursos	Evento	1	1	1	12,200	12,200.00
	Formulación de Proyectos	Evento	1	1	1	12,200	12,200.00
2.3							
	Utilidades de alerta temprana	Evento	1	2	2	4,650	9,300.00
	Reuniones Taller con Autoridades locales	Evento	1	2	2	2,790	5,580.00
3.00	<b>Suficientes acciones en manejo de laderas para evitar la colmatación de ríos</b>						
3.1	Días de Campo en ejecución de técnicas de conservación de laderas	Evento	1	2	2	3,750	7,500.00
	Producción de Plantones Forestales	Evento	1	2	2	3,950	7,900.00
	Instalación de Plantaciones Forestales	Evento	1	2	2	3,950	7,900.00
	Manejo y Conservación de Recursos Forestales	Evento	1	2	2	3,950	7,900.00
3.2	Difusión de afiches y trípticos	Millar	1	2	2	1,800	3,600.00
	<b>TOTAL</b>						<b>144,050.00</b>
	GASTOS ADMINISTRATIVOS (10% del CD)						14,405.00
	<b>TOTAL</b>						<b>158,455.00</b>

CAPACITACION VALLE MAJES-CAMANA							
Item	ACTIVIDADES ALTERNATIVA 1	Unidad medida	No de Valles	No de repeticiones	Total eventos	PRECIO UNITARIO (Privado)	TOTAL (Privado)
1.00	<b>Conocimiento de acciones de protección de las márgenes de los ríos</b>						
1.1.	Curso Taller: Operación y mantenimiento de Obras	Evento	1	2	2	4,650	9,300.00
1.2.	Cursos Taller de Manejo de plantas ribereñas	Evento	1	2	2	4,650	9,300.00
	Prevención y mitigación de tipos de erosión	Evento	1	2	2	4,650	9,300.00
	Manejo de recursos naturales	Evento	1	2	2	4,650	9,300.00
2.00	<b>Buena capacidad organizativa para implementar medidas de prevención y atención de desastres</b>						
2.1	Reuniones Taller para formular el Plan de Gestión de Riesgo	Evento	1	3	3	2,790	8,370.00
2.2							
	Zonificación Ecológica	Evento	1	1	1	12,200	12,200.00
	Gestión de Riesgos	Evento	1	1	1	12,200	12,200.00
	Gestión de Recursos	Evento	1	1	1	12,200	12,200.00
	Formulación de Proyectos	Evento	1	1	1	12,200	12,200.00
2.3							
	Utilidades de alerta temprana	Evento	1	2	2	4,650	9,300.00
	Reuniones Taller con Autoridades locales	Evento	1	2	2	2,790	5,580.00
3.00	<b>Suficientes acciones en manejo de laderas para evitar la colmatación de ríos</b>						
3.1	Días de Campo en ejecución de técnicas de conservación de laderas	Evento	1	2	2	3,750	7,500.00
	Producción de Plantones Forestales	Evento	1	2	2	3,950	7,900.00
	Instalación de Plantaciones Forestales	Evento	1	2	2	3,950	7,900.00
	Manejo y Conservación de Recursos Forestales	Evento	1	2	2	3,950	7,900.00
3.2	Difusión de afiches y trípticos	Millar	1	2	2	1,800	3,600.00
	<b>TOTAL</b>						<b>144,050.00</b>
	GASTOS ADMINISTRATIVOS (10% del CD)						14,405.00
	<b>TOTAL</b>						<b>158,455.00</b>

**(Reference) Unit Cost**

<b>CURSO TECNICOS</b>					
Descripción: Participantes de los Gobiernos Regionales y Locales					
DESCRIPCION	UNIDAD	CANTIDAD	P.U.	Precios Mercado	Precios Sociales
<b>Honorarios</b>					
Facilitador	día	2	1,500	3,000	2,727
<b>Materiales y equipo</b>					
Materiales de escritorio	global	1	500	500	420
Equipo multimedia	día	2	150	300	252
Material de difusión	Und	40	20	800	672
<b>Servicios</b>					
Alimentación * 2 días	Und	40	60	2,400	2,017
Hospedaje *2 días	día	40	100	4,000	3,361
Auditorio	día	2	200	400	336
Gastos administrativos	Global	1	800	800	672
<b>Total</b>				<b>12,200</b>	<b>10,458</b>

<b>TALLERES CON BENEFICIARIOS</b>					
Descripción: Talleres participativos					
DESCRIPCION	UNIDAD	CANTIDAD	P.U.	Precios Mercado	Precios Sociales
<b>Honorarios</b>					
Facilitador	día	1	1,500	1,500	1,364
<b>Materiales y equipo</b>					
Materiales de escritorio	global	1	500	500	420
Equipo multimedia	día	1	150	150	126
Material de difusión	Und	50	20	1,000	840
<b>Servicios</b>					
Alimentación * 1 días	Und	50	6	300	252
Auditorio	día	1	200	200	168
Gastos administrativos	Global	1	1,000	1,000	840
<b>Total</b>				<b>4,650</b>	<b>4,011</b>

<b>DIAS DE CAMPO</b>					
Descripción: Trabajo guiado de campo					
DESCRIPCION	UNIDAD	CANTIDAD	P.U.	Precios Mercado	Precios Sociales
<b>Honorarios</b>					
Facilitador	día	1	1,500	1,500	1,364
<b>Materiales y equipo</b>					
Herramientas	Global	1	300	300	252
Material de difusión	Und	50	20	1,000	840
<b>Servicios</b>					
Alimentación	Und	50	6	300	252
Pasajes	pasaje	50	3	150	126
Gastos administrativos	Global	1	500	500	420
<b>Total</b>				<b>3,750</b>	<b>3,254</b>

<b>CURSOS FORESTALES</b>					
Descripción: Trabajo guiado de campo					
DESCRIPCION	UNIDAD	CANTIDAD	P.U.	Precios Mercado	Precios Sociales
<b>Honorarios</b>					
Facilitador	día	1	1,500	1,500	0
<b>Materiales y equipo</b>					
Herramientas	Global	1	300	300	252
Insumos de Capacitación	Global	1	200	200	168
Material de difusión	Und	50	20	1,000	840
<b>Servicios</b>					
Alimentación	Und	50	6	300	252
Pasajes	pasaje	50	3	150	126
Gastos administrativos	Global	1	500	500	420
<b>Total</b>				<b>3,950</b>	<b>2,059</b>

<b>REUNIONES TALLER</b>					
Descripción: Participación de Beneficiarios, autoridades Regionales y Locales					
DESCRIPCION	UNIDAD	CANTIDAD	P.U.	Precios Mercado	Precios Sociales
<b>Honorarios</b>					
Facilitador	día	1	1,000	1,000	0
<b>Materiales y equipo</b>					
Materiales de escritorio	global	1	100	100	84
Equipo multimedia	día	1	150	150	126
Material de difusión	Und	40	20	800	672
<b>Servicios</b>					
Alimentación * 1 día	Und	40	6	240	202
Auditorio	día	1	200	200	168
Gastos administrativos	Global	1	300	300	252
<b>Total</b>				<b>2,790</b>	<b>1,504</b>

<b>DIFUSION GRAFICA</b>					
Descripción: Afiches y tripticos					
DESCRIPCION	UNIDAD	CANTIDAD	P.U.	Precios Mercado	Precios Sociales
<b>Materiales y equipo</b>					
Afiches	millar	1	800	800	672
Triptico	millar	1	500	500	420
<b>Servicios</b>					
Distribución	Global	1	500	500	420
<b>Total</b>				<b>1,800</b>	<b>1,513</b>

<b>DIFUSION CON PROGRAMA RADIAL</b>					
Programa Radial por mes / frecuencia sábado y domingo					
DESCRIPCION	UNIDAD	CANTIDAD	P.U.	Precios Mercado	Precios Sociales
<b>Servicios profesionales</b>					
Comunicador	mes	1	2,000	2,000	1,818
Asistente	mes	1	800	800	727
<b>Servicios</b>					
Alquiler de espacio radio l	mes/hora	1	5,000	5,000	4,202
Gastos logísticos	Global	1	500	500	420
<b>Total</b>				<b>8,300</b>	<b>7,167</b>

<b>DIFUSION CON SPOT PUBLICITARIO</b>					
Difusion 4 pasadas por dia					
DESCRIPCION	UNIDAD	CANTIDAD	P.U.	Precios Mercado	Precios Sociales
<b>Materiales</b>					
Materiales de Grabacion	Global	1	300	300	252
<b>Servicios</b>					
Elaboracion de Spot	Unidad	1	3,000	3,000	2,521
Servicio de difusion radial	mes	1	2,000	2,000	1,681
<b>Total</b>				<b>5,300</b>	<b>4,454</b>

<b>Capacitación al personal del Gobierno Regional de Piura sobre el manejo de la red de estaciones meteorológicas y uso de la información</b>					
DESCRIPCION	UNIDAD MEDIDA	CANTIDAD	PRECIO UNITARIO S/.	PRECIO TOTAL S/.	PRECIO SOCIAL
<b>Combustible y Lubricantes</b>					
Gasolina	Gln	16	13	208.00	137.28
Lubricantes		1	33	33.00	21.78
<b>Alimentación de personas</b>					
Almuerzos	Almuerzo	20	10	200.00	168.06
Refrigerios	Refrigerio	20	4	80.00	67.22
<b>Bienes de Consumo</b>					
Papelote	Unidad	10	0.5	5.00	4.20
Plumon	Unidad	6	1.5	9.00	7.56
Produccion piloto	Unidad	1	200	200.00	168.06
Herramientas	Modulo	1	300	300.00	252.09
Insumos para produccion	Modulo	1	150	150.00	126.05
Cinta masking	Unidad	4	2.5	10.00	8.40
Cinta de embalaje	Unidad	2	3.5	7.00	5.88
Pepel lustre	Unidad	6	0.5	3.00	2.52
Pilas alcalinas	Unidad	2	2.5	5.00	4.20
Pelicula kodak	Unidad	1	12	12.00	10.08
Otros insumos	Modulo	1	430	430.00	361.33
Cartulina	Unidad	10	0.5	5.00	4.20
<b>Otros Servicios de Terceros</b>					
Fotocopiado y empastado	Unidad	6	15	90.00	81.82
Revelado de fotos	Unidad	36	0.5	18.00	16.36
Responsable de la sistema	Servicio	1	80	80.00	72.73
Facilitador	Servicio	1	2000	2000.00	1,818.20
Producción de material	Servicio	1	300	300.00	272.73
<b>TOTAL COSTO UNITARIO EN NUEVOS SOLES (S/.)</b>				<b>4145.00</b>	<b>3,610.77</b>

**Capacitación al personal del Gobierno Regional de Piura sobre el manejo de la red de estaciones hidrológicas y uso de la información**

DESCRIPCION	UNIDAD MEDIDA	CANTIDAD	PRECIO UNITARIO S/.	PRECIO TOTAL S/.	PRECIO SOCIAL
<b>Combustible y Lubricantes</b>					
Gasolina	Gln	16	13	208.00	137.28
Lubricantes		1	33	33.00	21.78
<b>Alimentación de personas</b>					
Almuerzos	Almuerzo	20	10	200.00	168.06
Refrigerios	Refrigerio	20	4	80.00	67.22
<b>Bienes de Consumo</b>					
Papelote	Unidad	10	0.5	5.00	4.20
Plumon	Unidad	6	1.5	9.00	7.56
Produccion piloto	Unidad	1	500	500.00	420.15
Herramientas	Modulo	1	300	300.00	252.09
Insumos para producció	Modulo	1	305	305.00	256.29
Cinta masking	Unidad	4	2.5	10.00	8.40
Cinta de embalaje	Unidad	2	3.5	7.00	5.88
Pepel lustre	Unidad	6	0.5	3.00	2.52
Pilas alcalinas	Unidad	2	2.5	5.00	4.20
Pelicula kodak	Unidad	1	12	12.00	10.08
Otros insumos	Modulo	1	430	430.00	361.33
Cartulina	Unidad	10	0.5	5.00	4.20
<b>Otros Servicios de Terceros</b>					
Fotocopiado y empasta	Unidad	6	15	90.00	81.82
Revelado de fotos	Unidad	36	0.5	18.00	16.36
Responsable de la siste	Servicio	1	80	80.00	72.73
Facilitador	Servicio	1	1500	1500.00	1,363.65
Producción de material	Servicio	1	300	300.00	272.73
<b>TOTAL COSTO UNITARIO EN NUEVOS SOLES (S/.)</b>				<b>4100.00</b>	<b>3,538.55</b>

