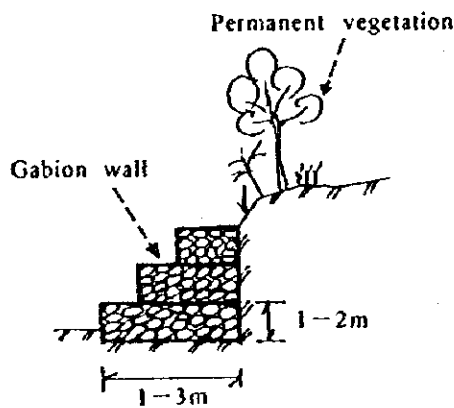
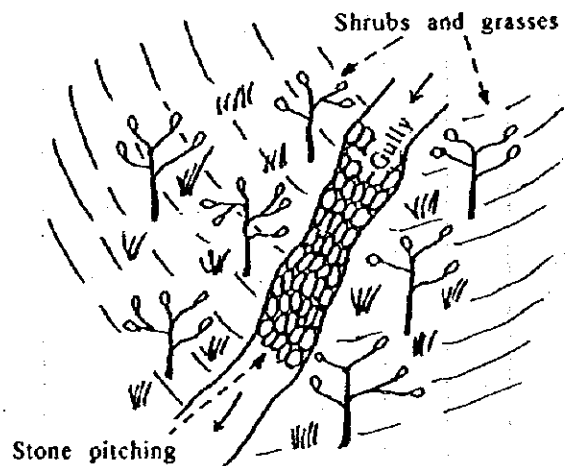


(b) Small gabion check dam for gully control

(a) Bamboo gully plug fence



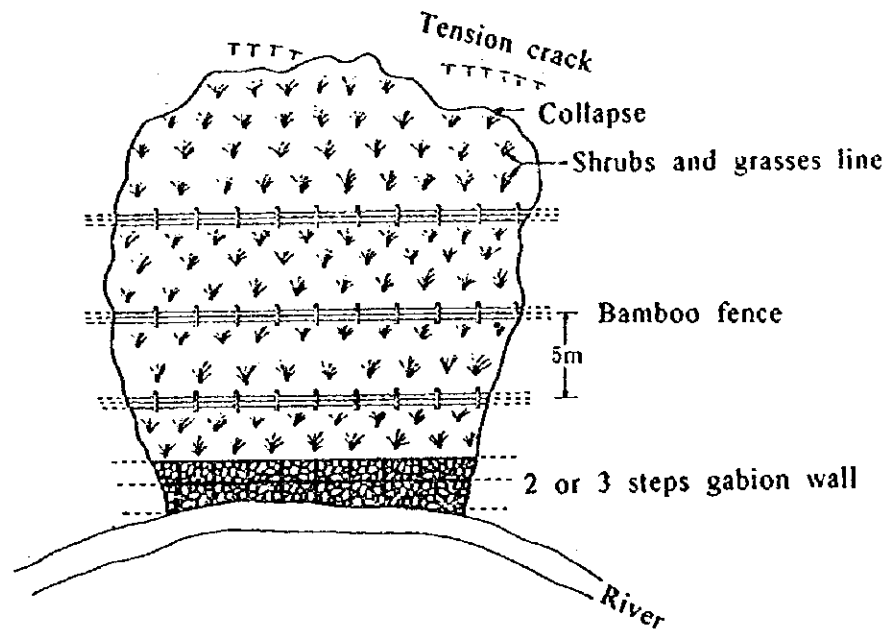
(d) Gabion wall and permanent vegetation



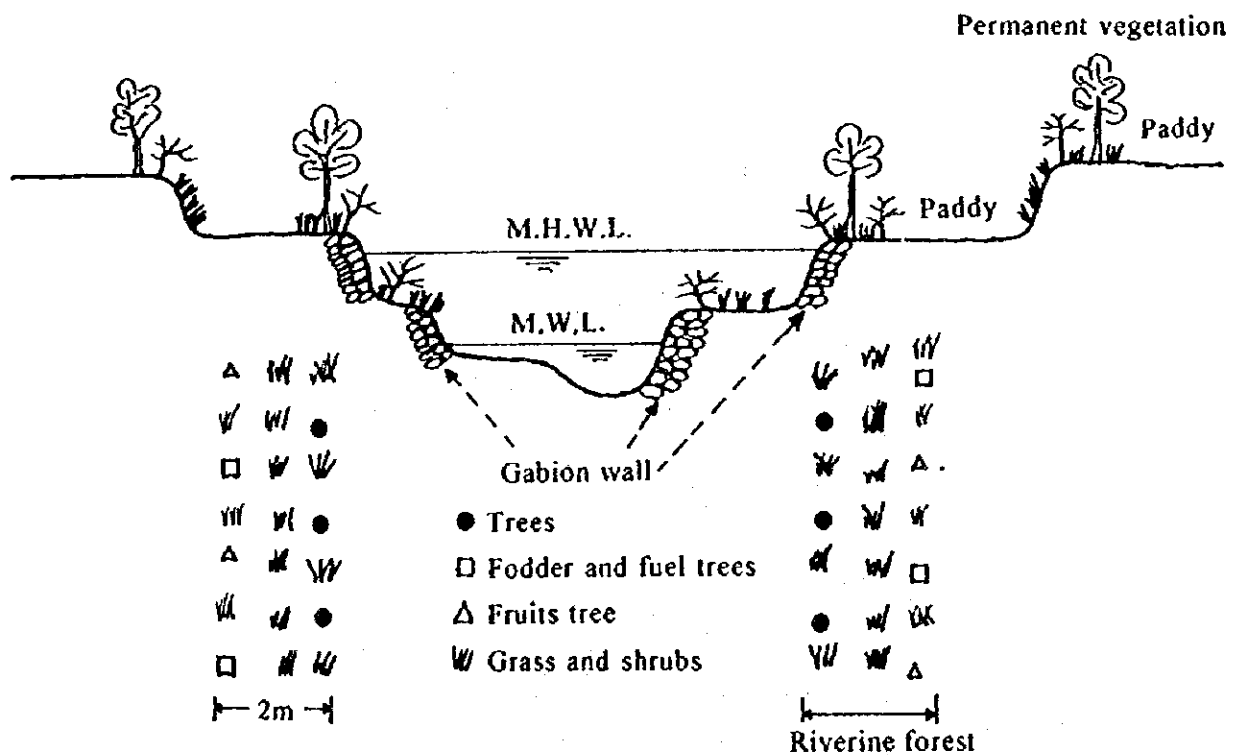
(c) Stone pitching gully control with shrubs and grasses

EROSION CONTROL MEASURES IN WATERSHED AREA

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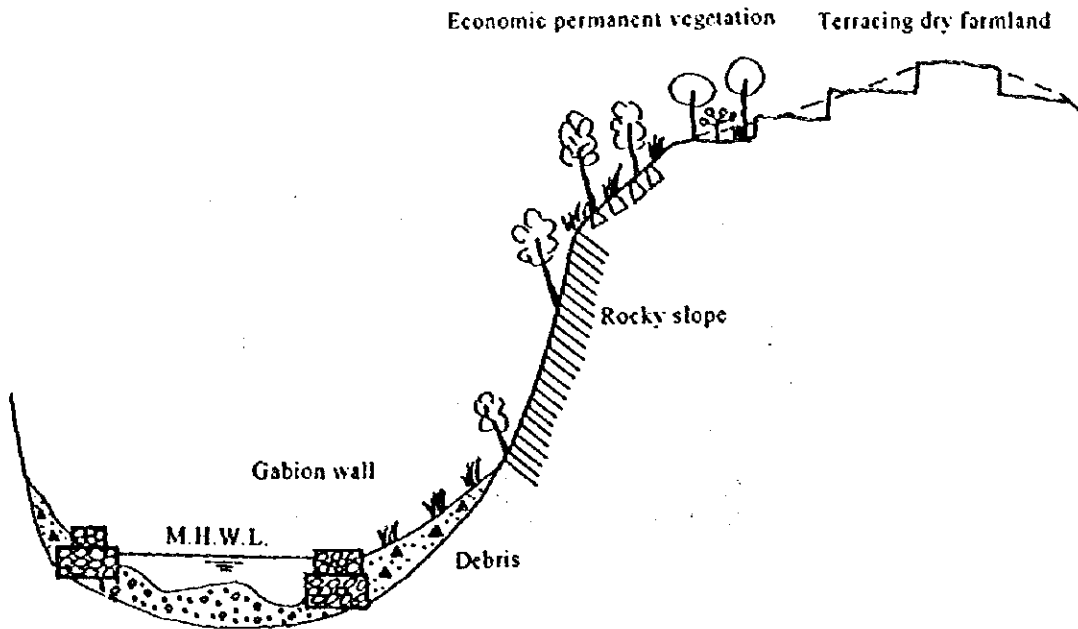
(e) Repair works of small collapse



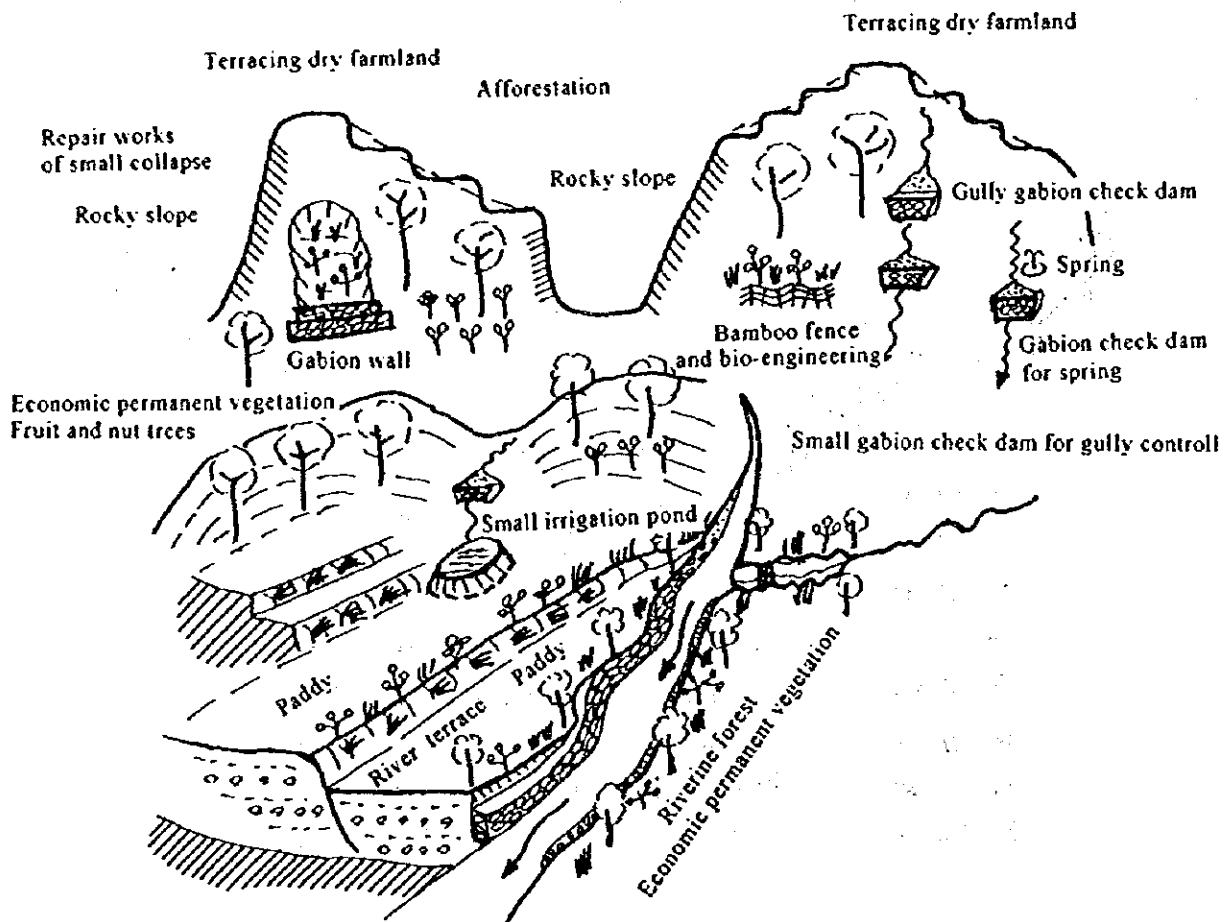
(f) Bank erosion control of mountain stream terraces by gabion works and riverine forest

EROSION CONTROL MEASURES IN WATERSHED AREA

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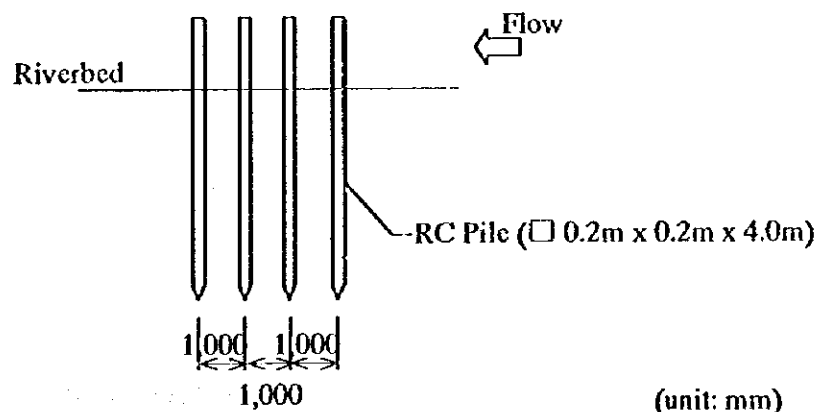
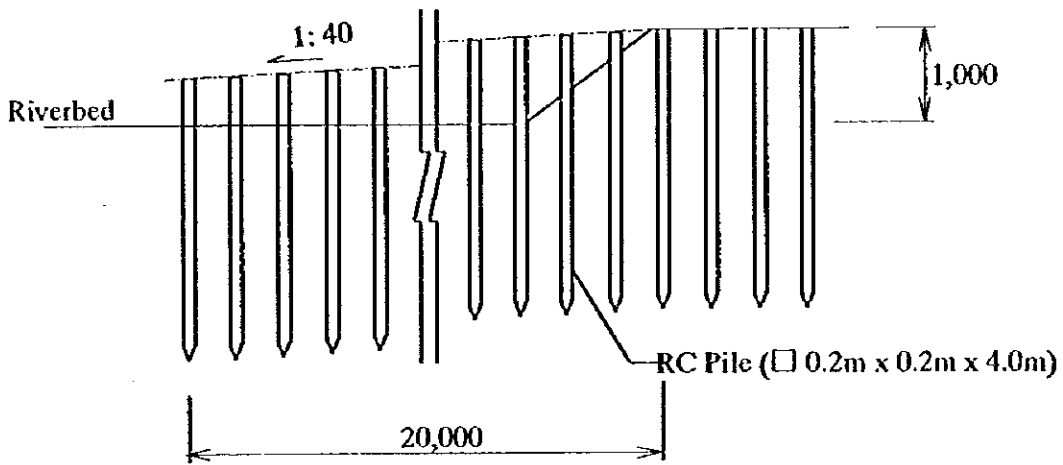
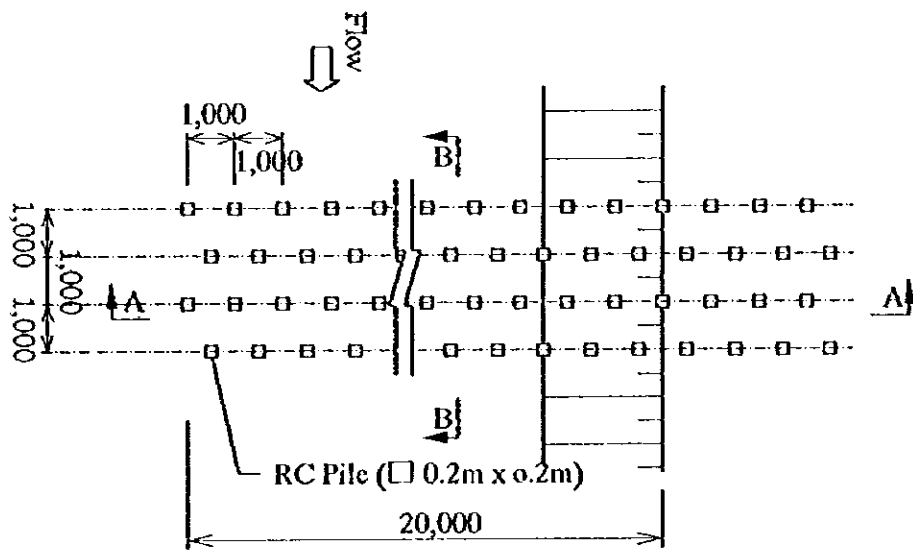
(g) A schematic cross-section of a slope showing different segments.



(h) A schematic panorama view of total watershed maintenance showing different segments.

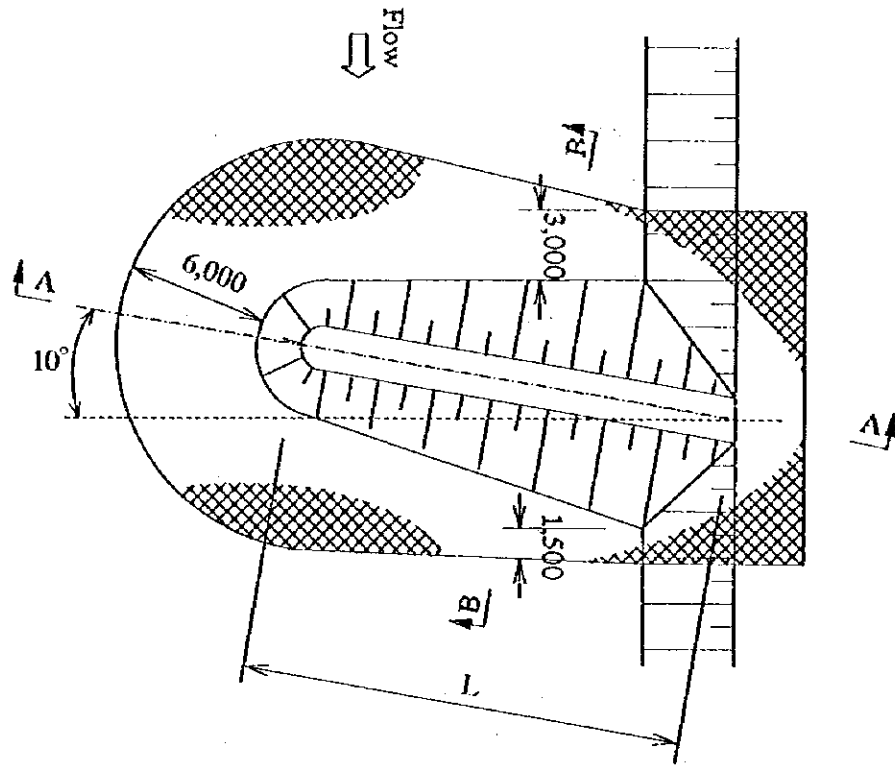
EROSION CONTROL MEASURES IN WATERSHED AREA

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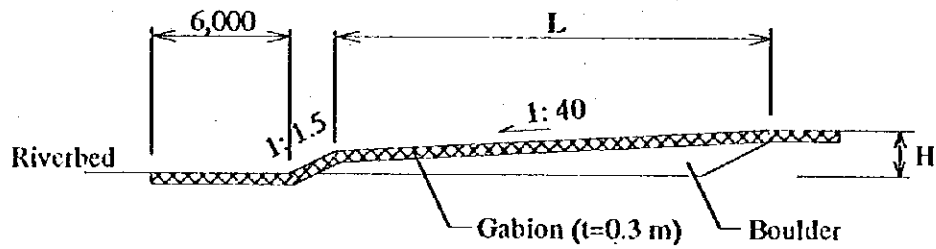


TYPICAL DESIGN OF PILE SPUR
(Type-Pa)

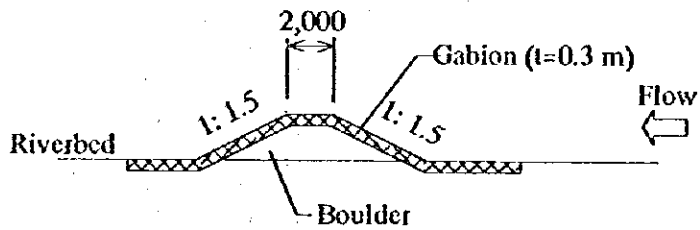
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PLAN



SECTION A-A



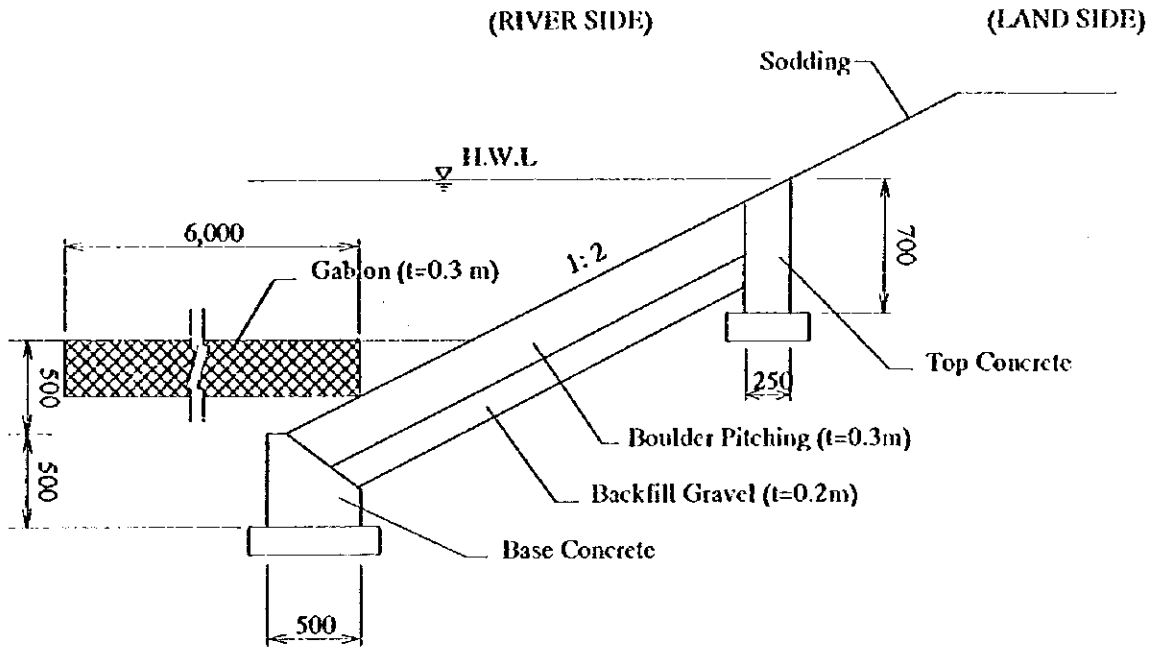
SECTION B-B

Type	L (m)	H (m)
Type-Ia	20.0	1.5
Type-Ib	20.0	3.0

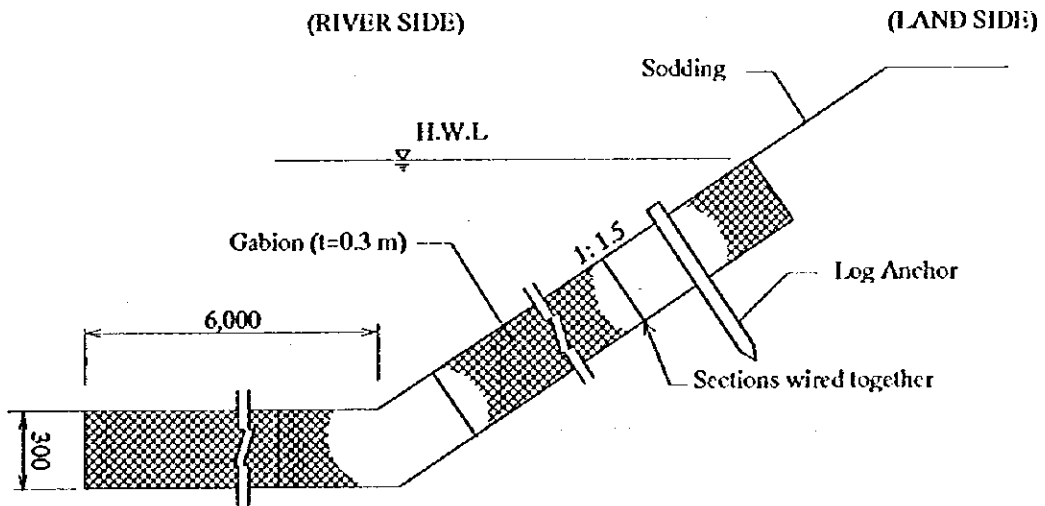
(unit: mm)

TYPICAL DESIGN OF GABION SPUR

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REVETMENT (TYPE -Ra)



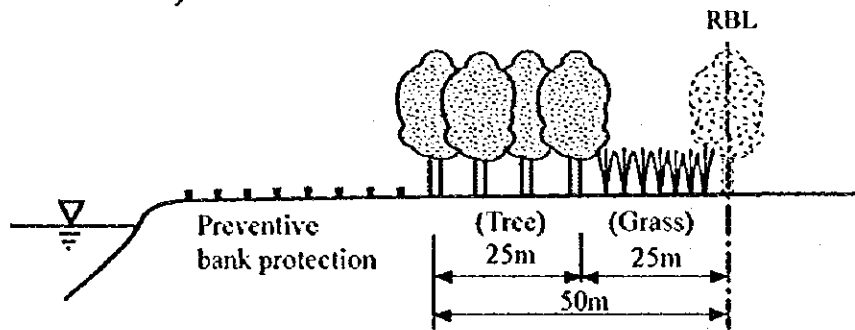
REVETMENT (TYPE -Rb)

(unit: mm)

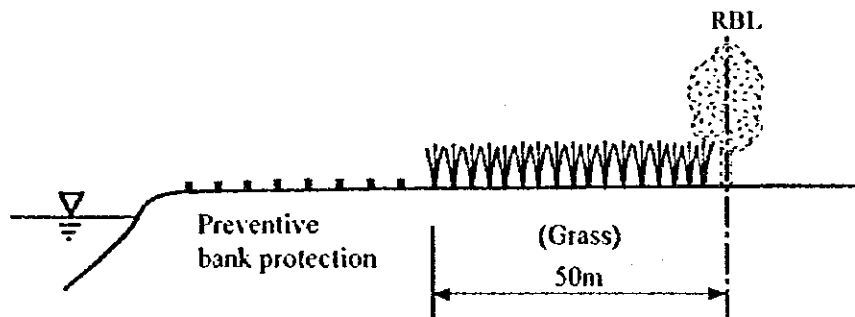
TYPICAL SECTION OF REVETMENT

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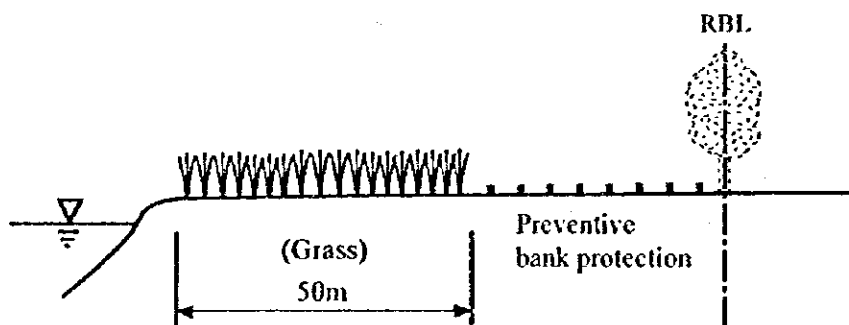
**Forest Belt
(Tree and Grass)**



Grass Belt



Grass Belt along Low Water Channel (Seg.2-2 of Lakhadei R.)

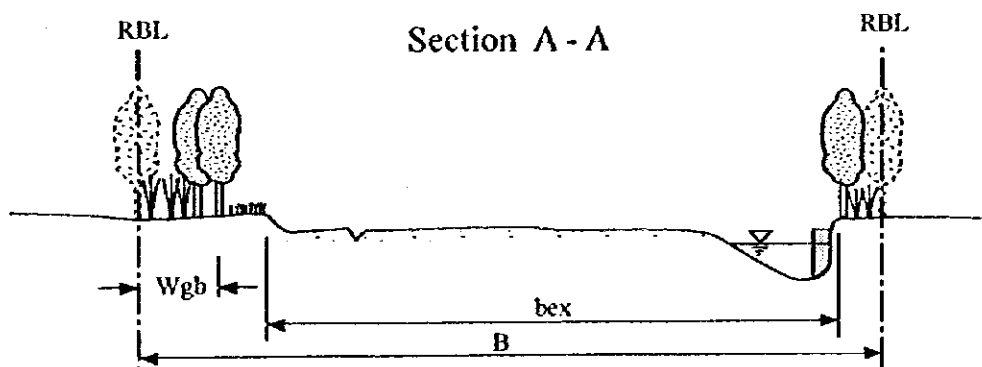
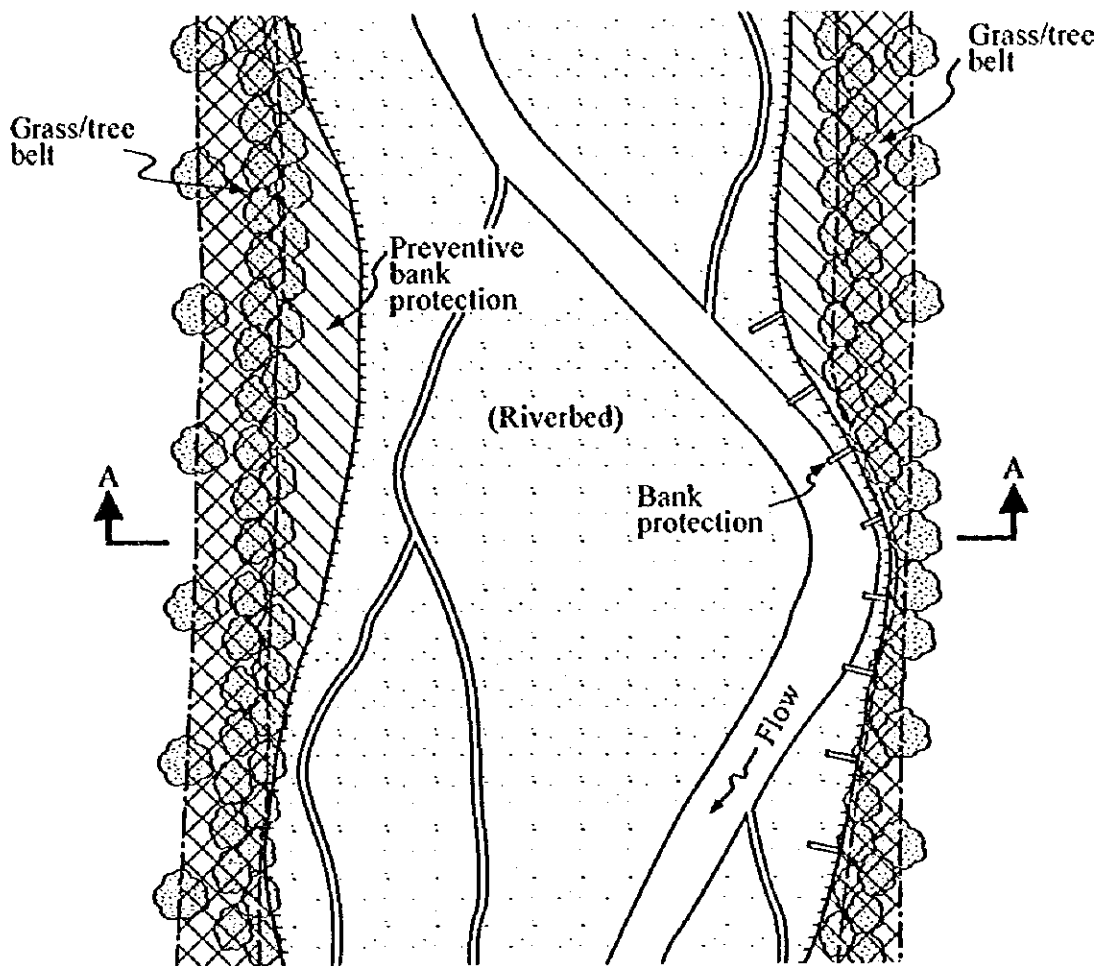


- RBL shall be marked clearly in field by tree-row or stacker.
- If there are forests more than 50m-wide on river side of RBL, tree/grass belt is not necessary.
- If the river side bank area of RBL is less than 50m in width, width of grass belt should be reduced.

**FOREST/GRASS BELT
AND RIVER BOUNDARY LINE**

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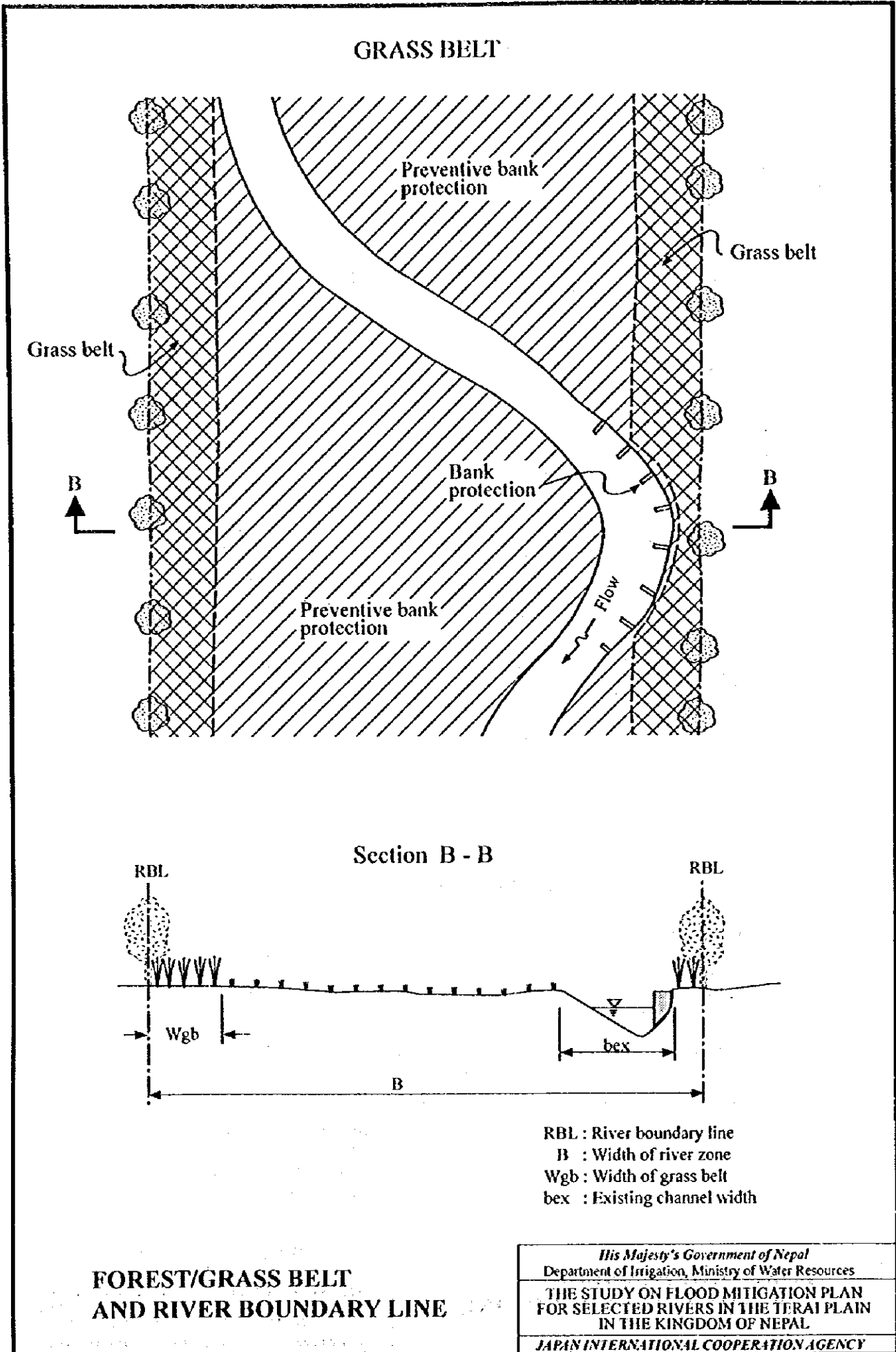
FOREST BELT



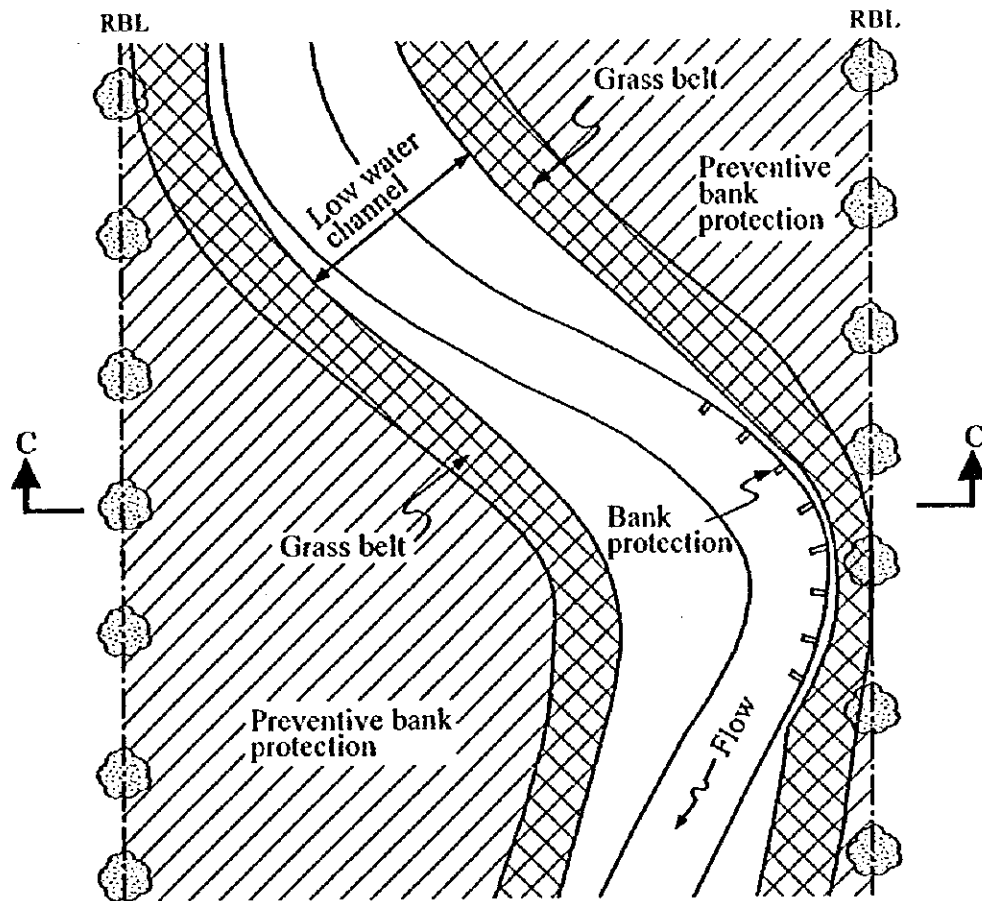
RBL : River boundary line
 B : Width of river zone
 Wgb : Width of grass/tree belt
 bex : Existing channel width

**FOREST/GRASS BELT
 AND RIVER BOUNDARY LINE**

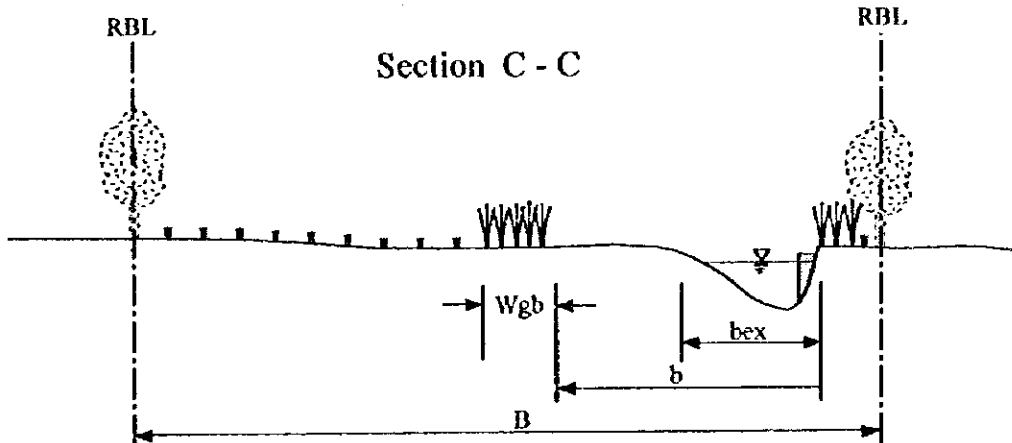
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GRASS BELT ALONG LOW WATER CHANNEL



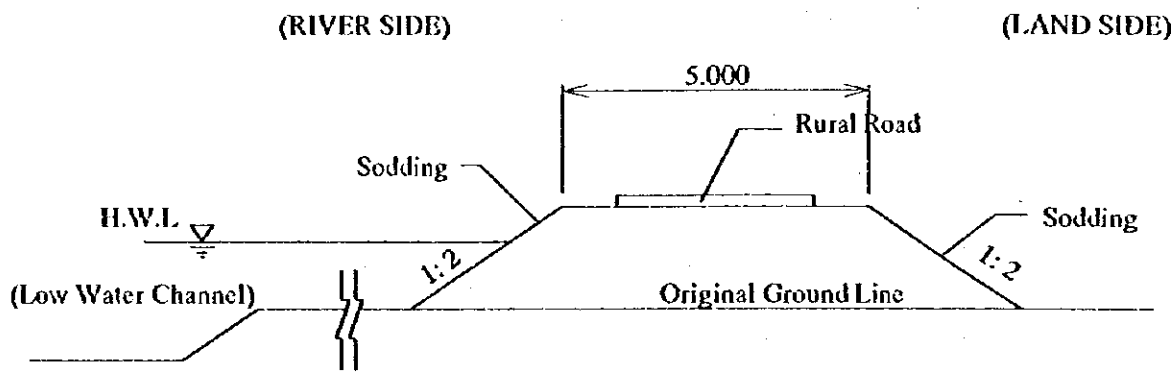
Section C - C



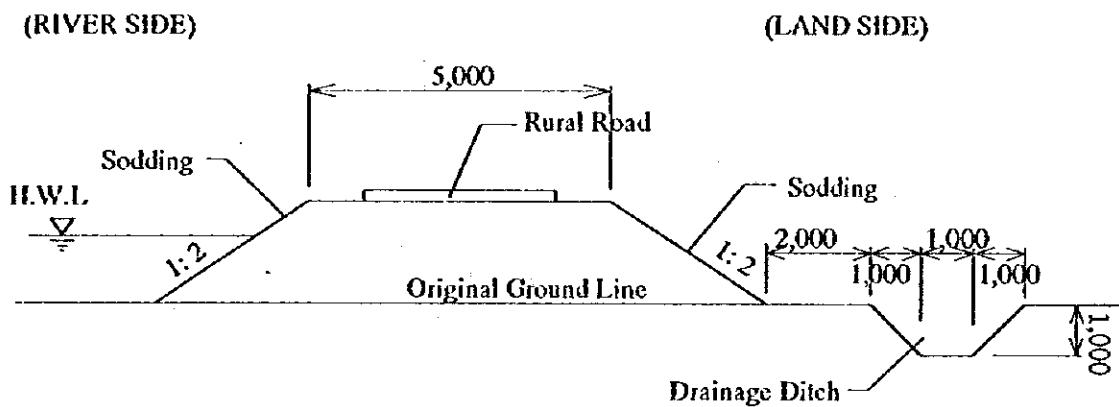
- RBL : River boundary line
- B : Width of river zone
- Wgb : Width of grass belt
- b : Width of low water channel
- bex : Existing channel width

**FOREST/GRASS BELT
AND RIVER BOUNDARY LINE**

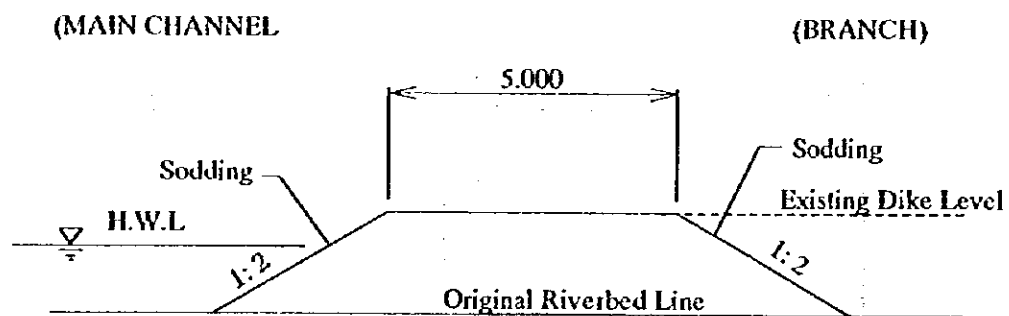
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TYPICAL SECTION OF DIKE ROAD



TYPICAL SECTION OF RING DIKE



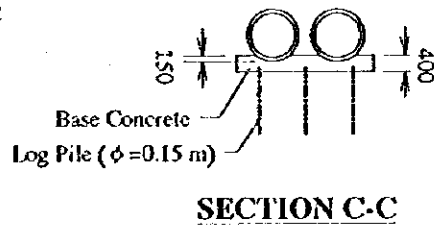
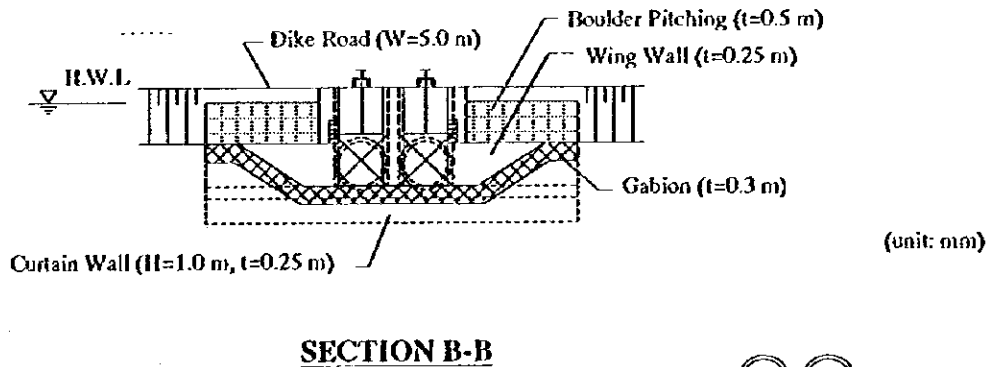
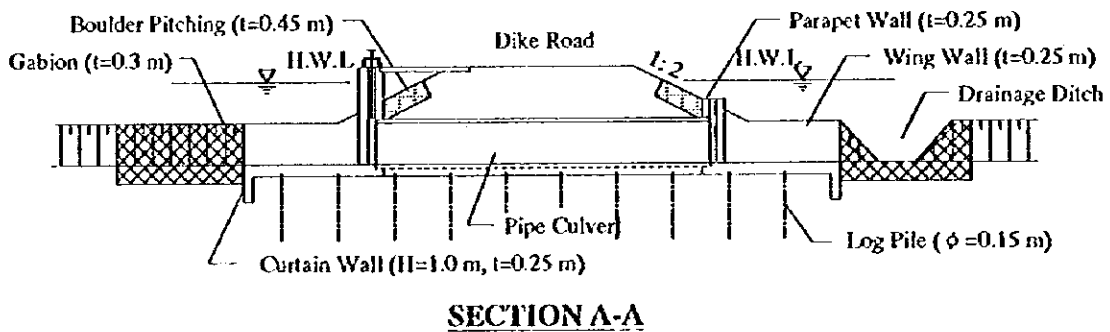
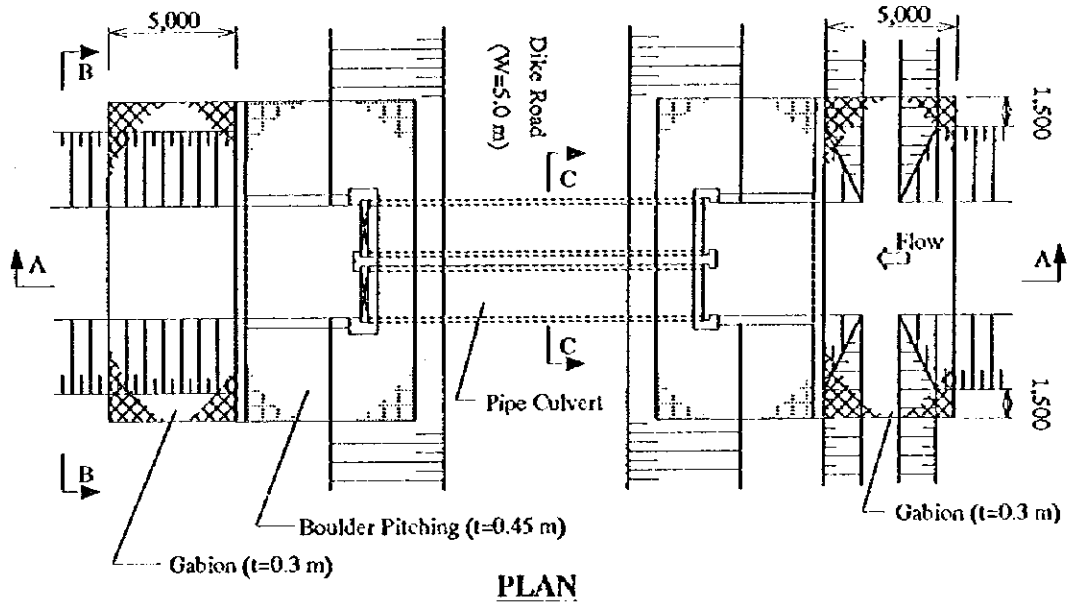
TYPICAL SECTION OF CLOSING DIKE

(unit:mm)

TYPICAL EARTH DIKE SECTIONS

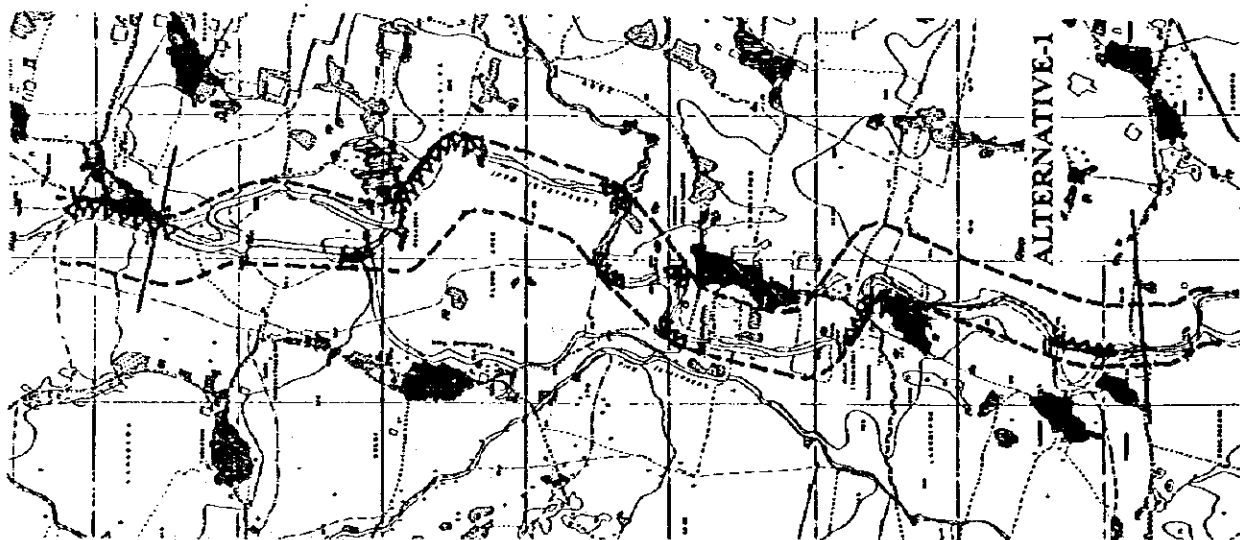
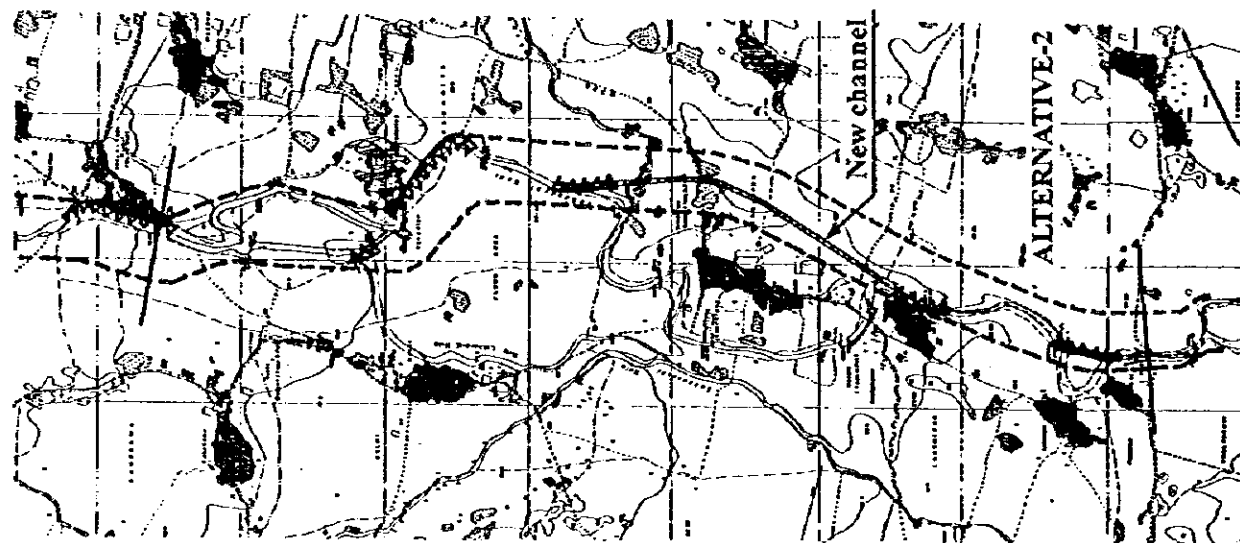
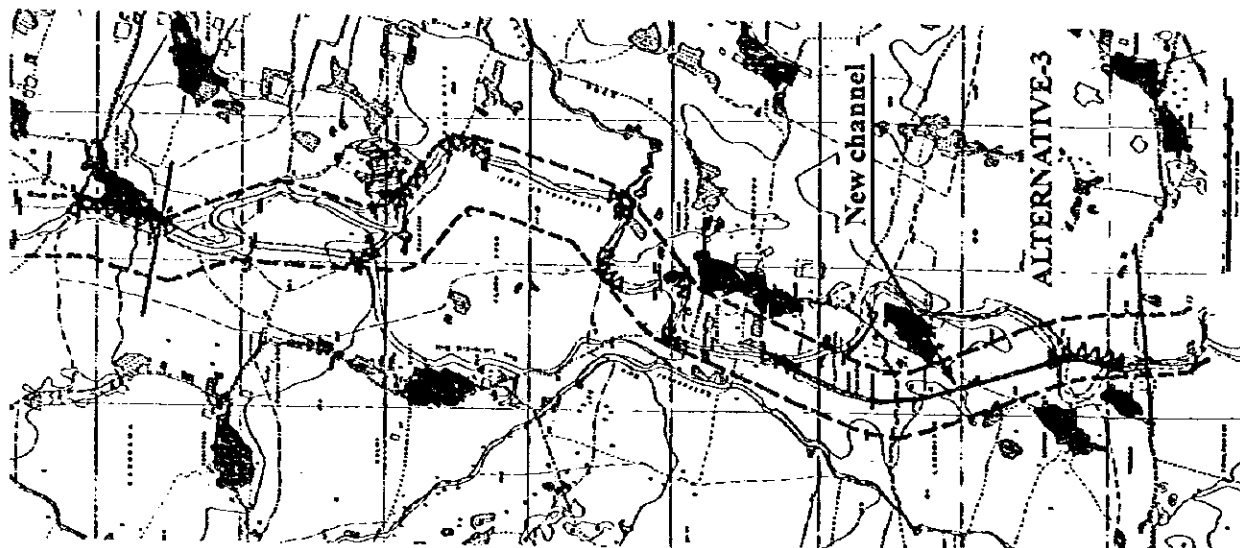
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Fig. A6.7



TYPICAL DESIGN OF SLUICE

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**ROUTE OF LAKHANDEI RIVER
between Laksmipur and Belhi Villages**

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Item	97/98	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07
1. Preparatory Works						█				
2. Bank Protection										
2-1 Pile Spur						█	█			
2-2 Gabion Spur						█	█			
3. Dike Embankment										
3-1 Forest and Grass Belt						█	█			
3-2 Dike Road						█	█			
3-3 Ring Dike						█	█			
3-4 Closing Dike						█	█			
4. Channel Excavation						█	█			
5. Miscellaneous Works						█	█			

CONSTRUCTION SCHEDULE FOR LAKHANDEI RIVER
IN FEASIBILITY STUDY

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Fig.A6.10

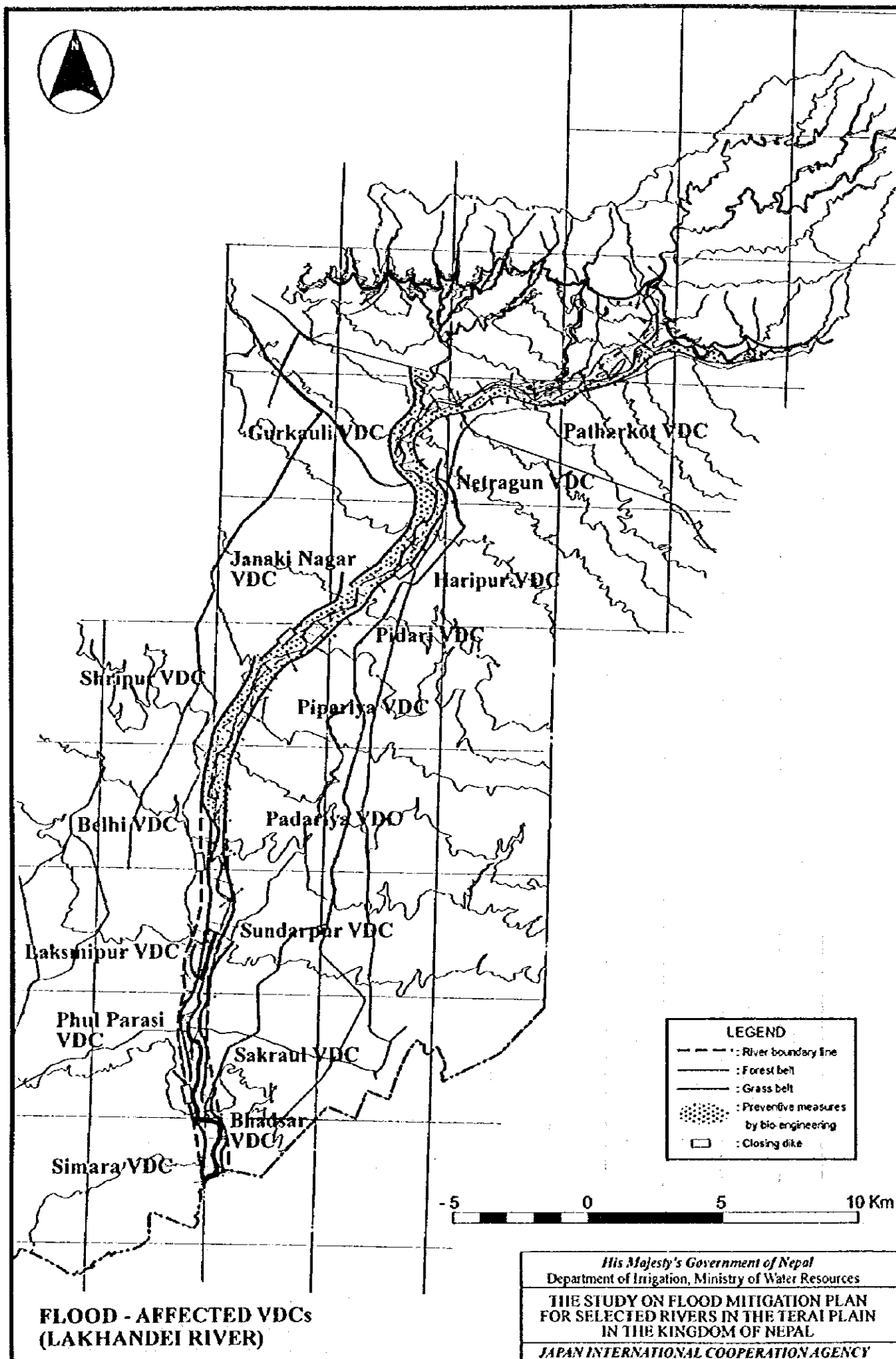
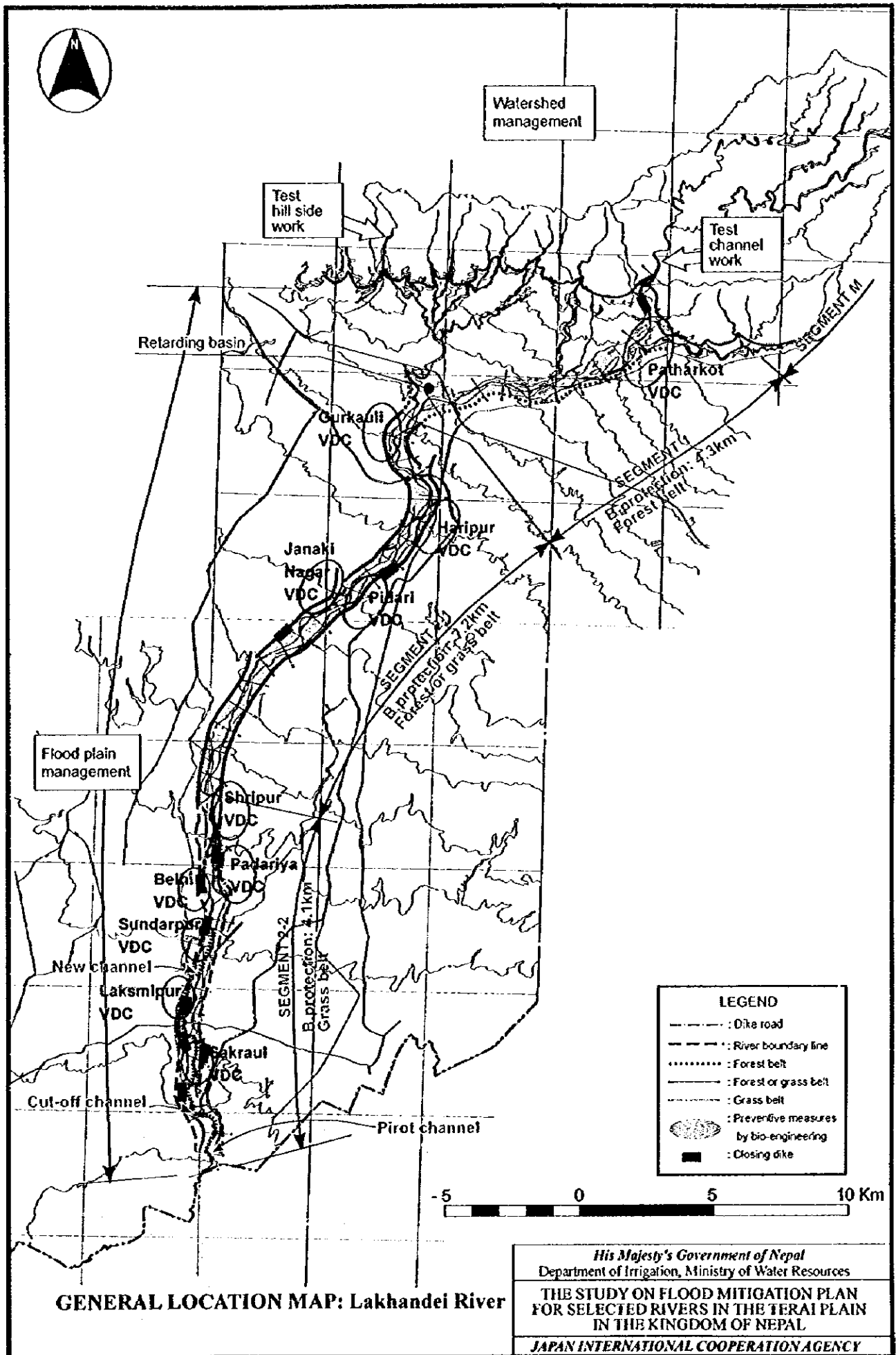
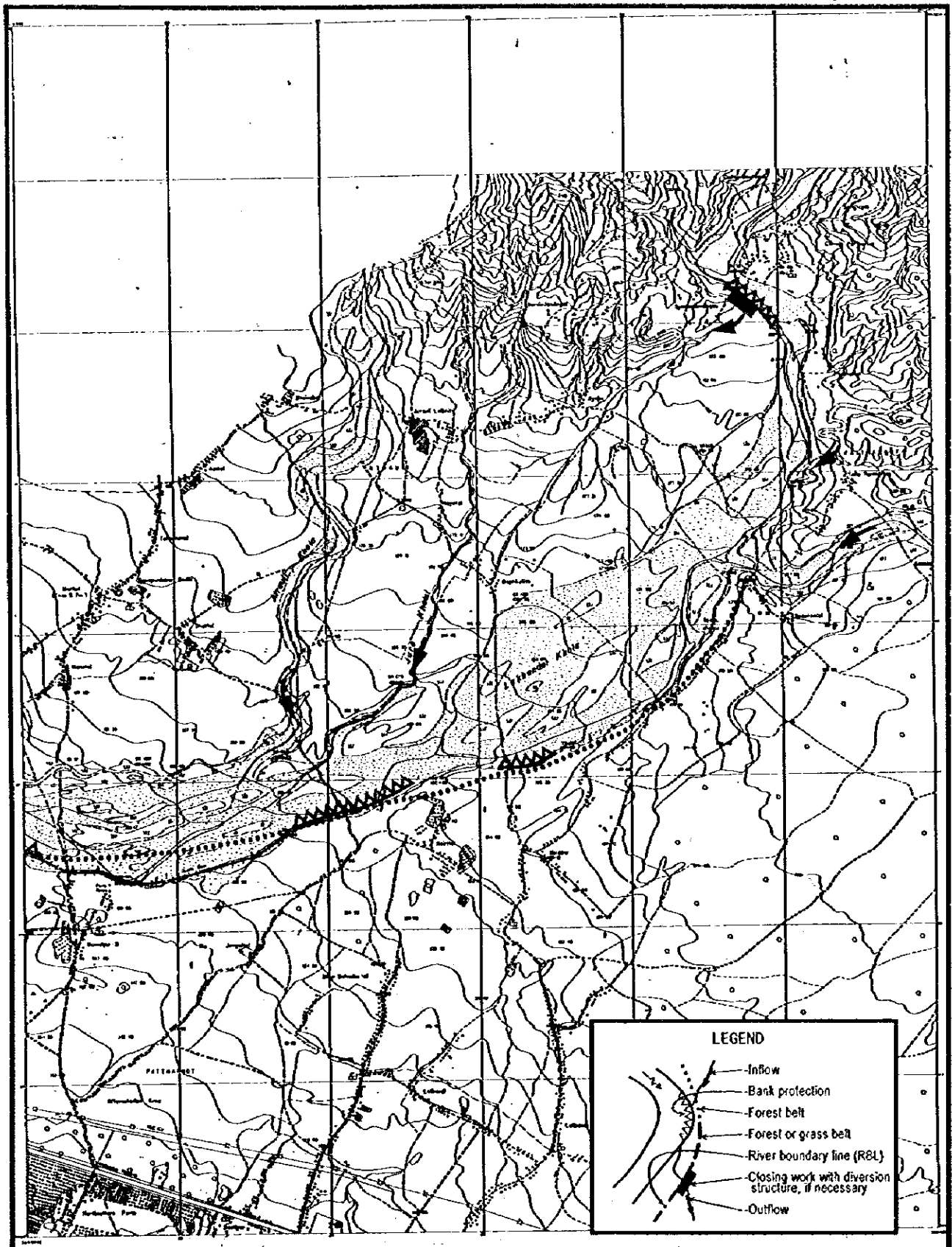


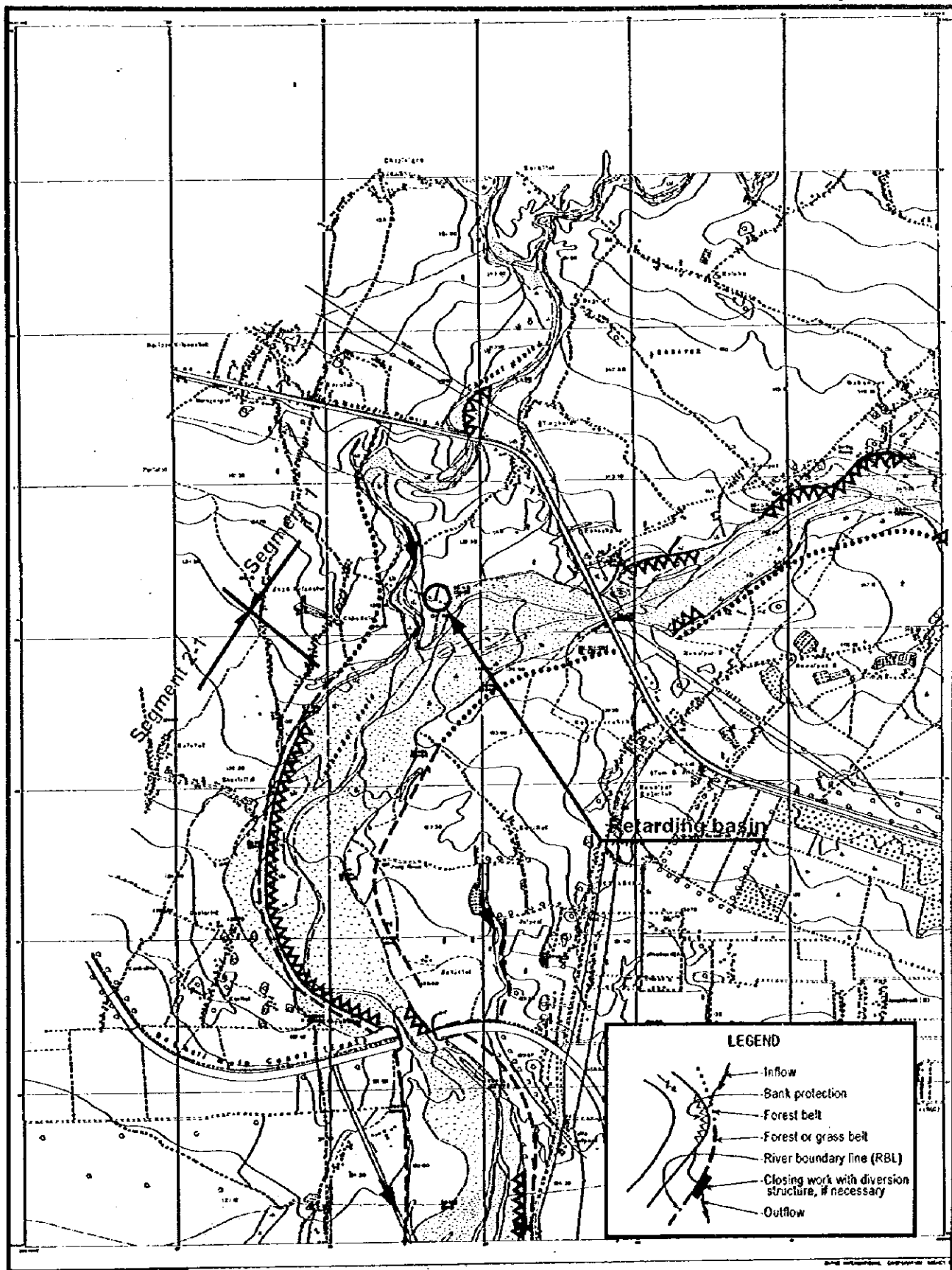
Fig. A6.11





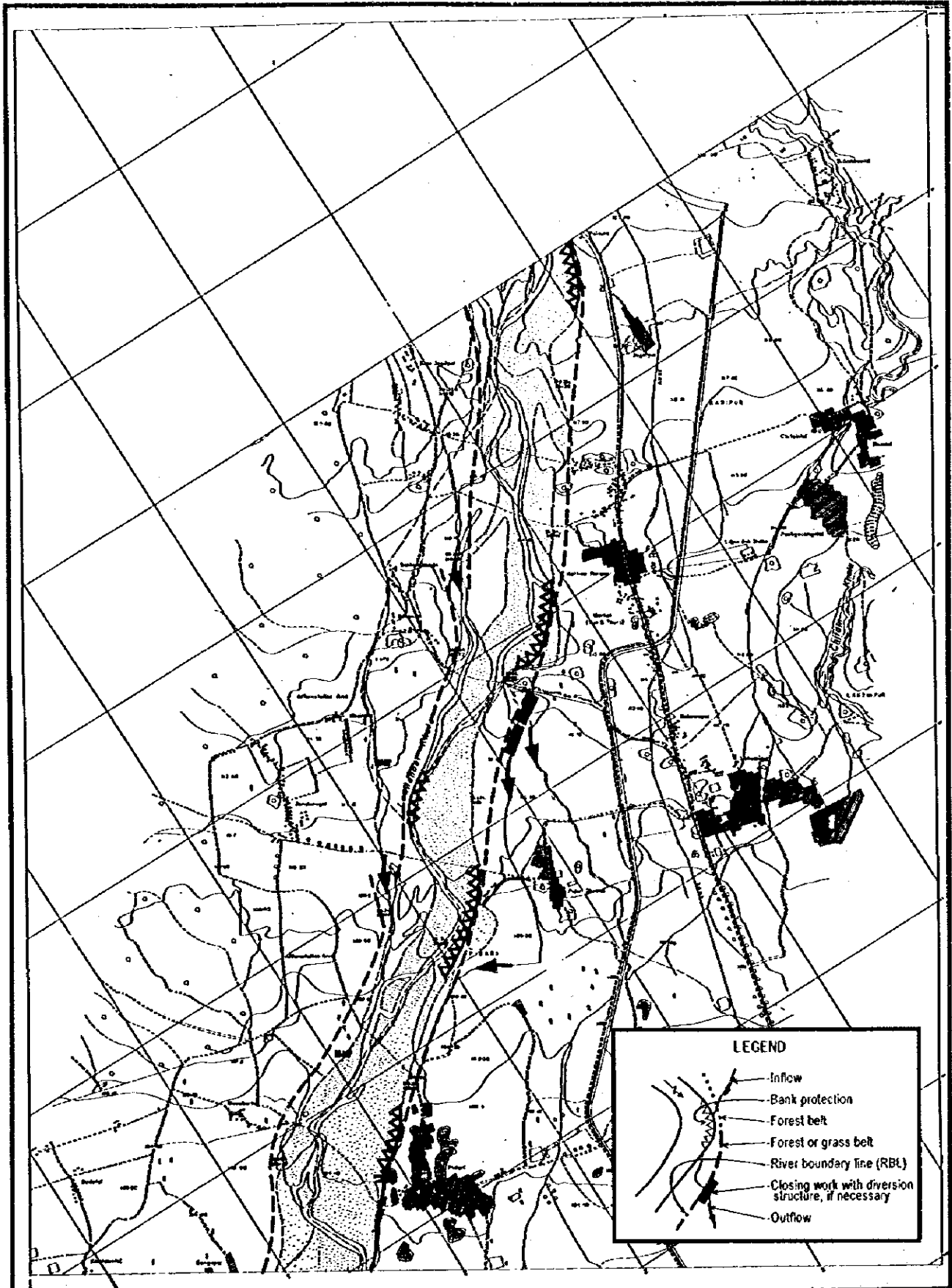
**LAYOUT PLAN FOR FLOOD MITIGATION
Lakhandei River (1/6)**

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**LAYOUT PLAN FOR FLOOD MITIGATION
Lakhandehi River (2/6)**

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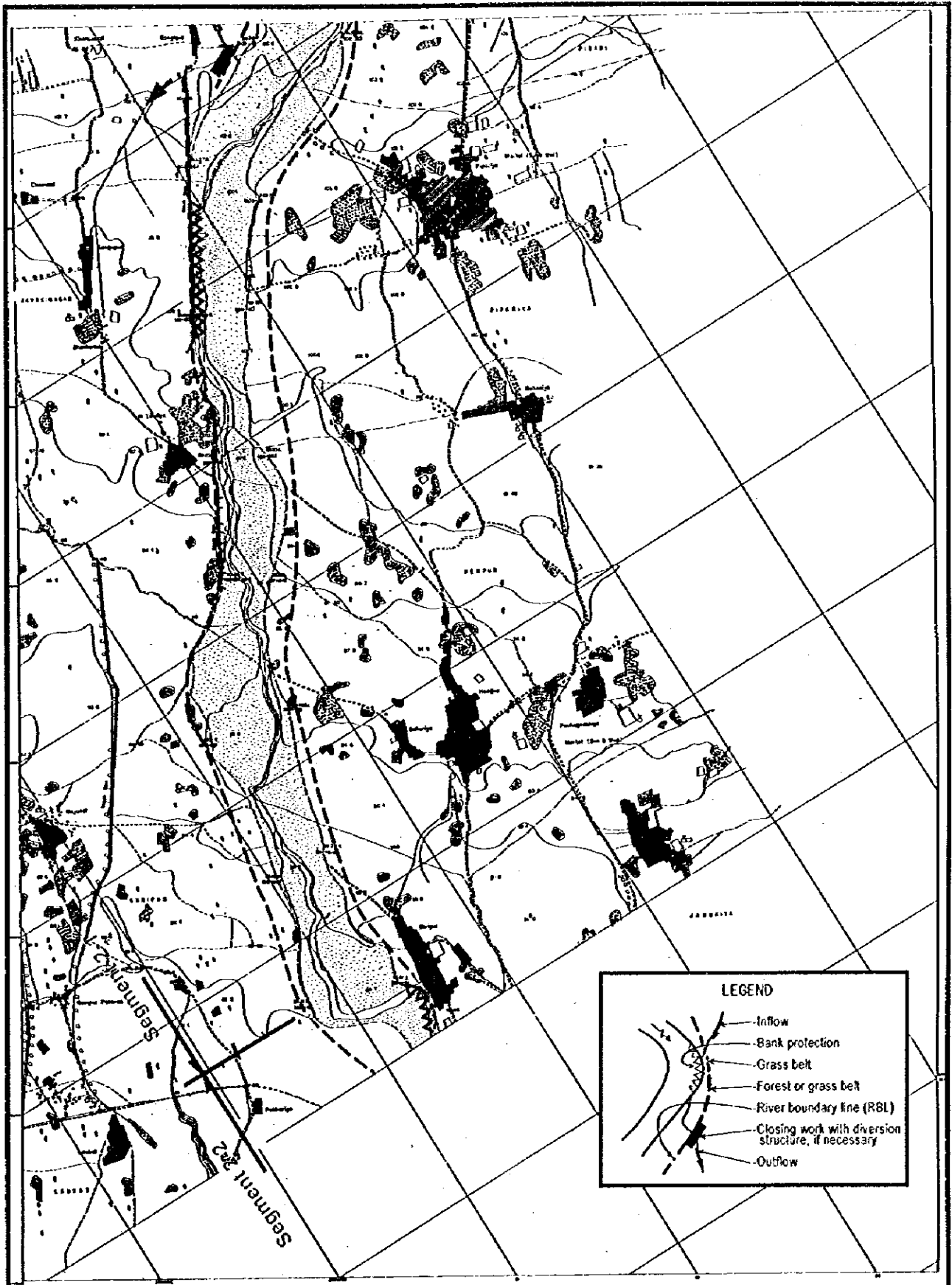


**LAYOUT PLAN FOR FLOOD MITIGATION
Lakhandei River(3/6)**

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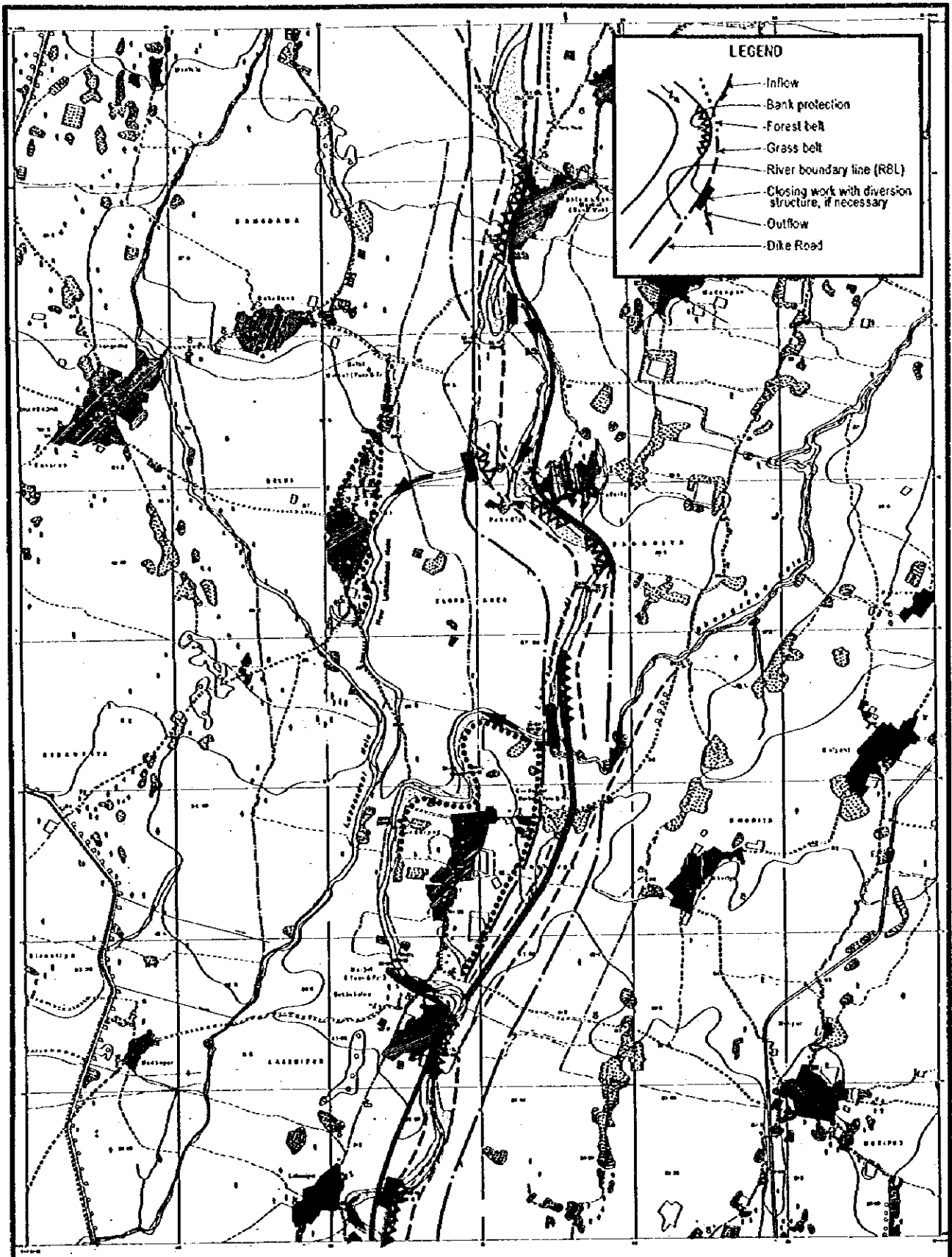
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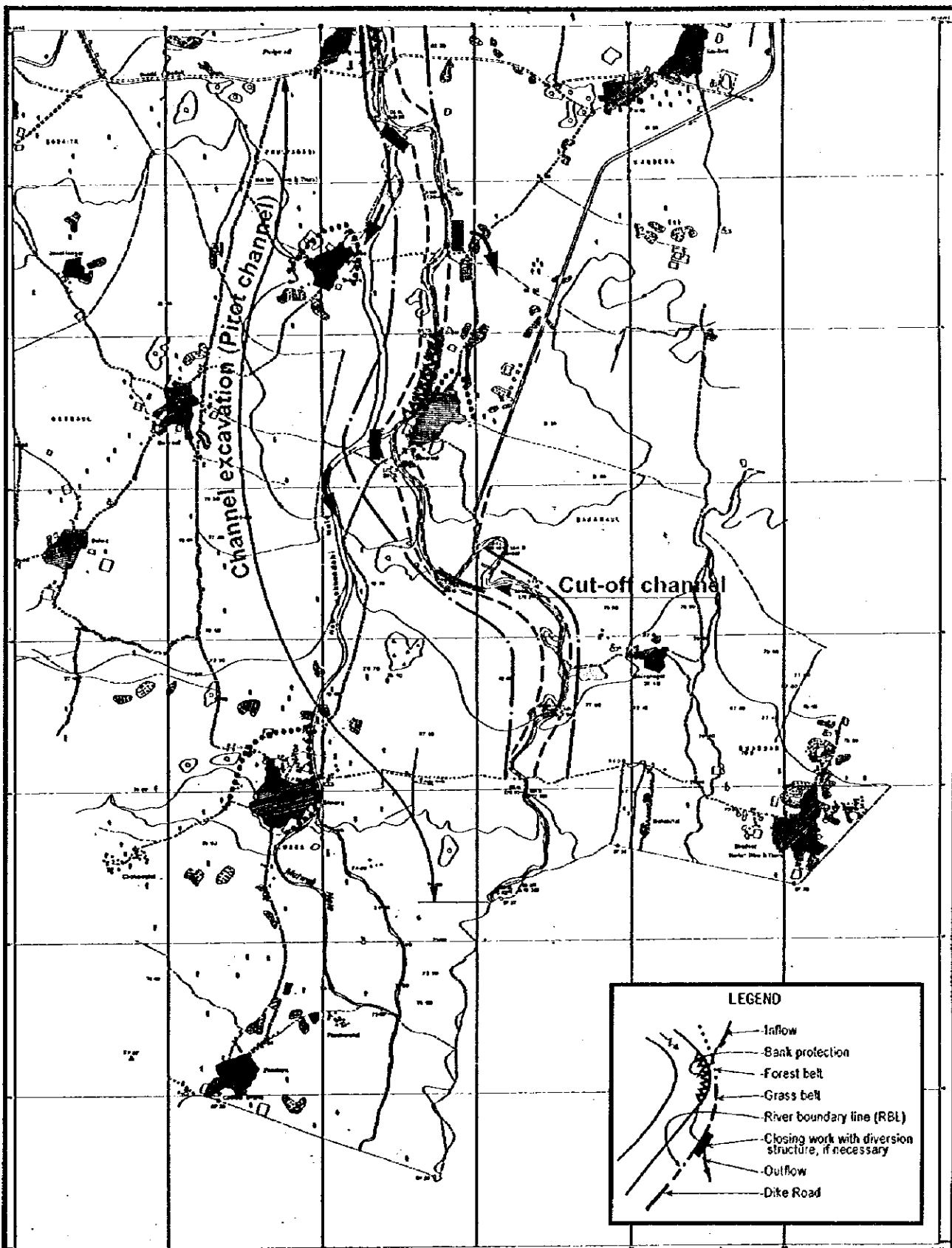
**LAYOUT PLAN FOR FLOOD MITIGATION
Lakhandehi River (4/6)**

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**LAYOUT PLAN FOR FLOOD MITIGATION
Lakhandei River (5/6)**

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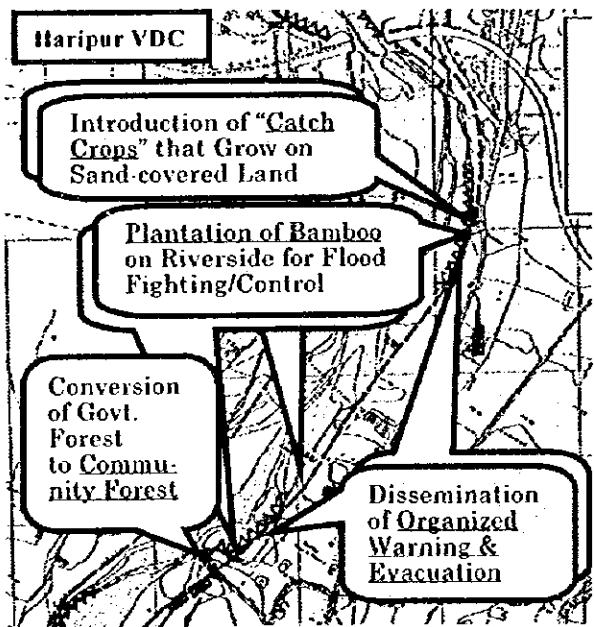
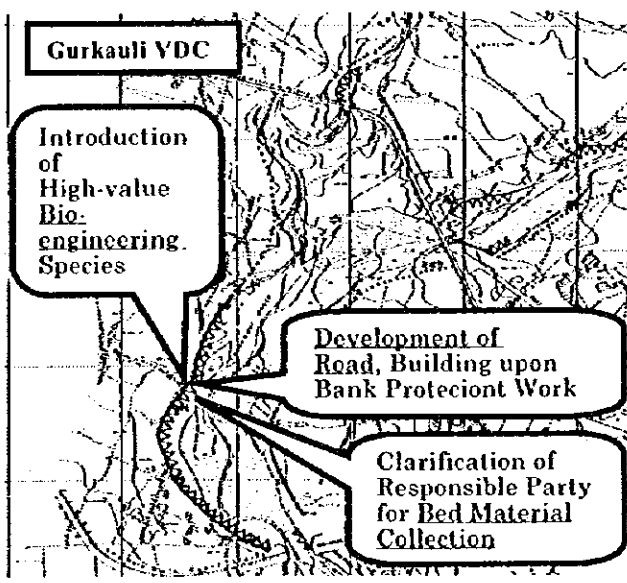
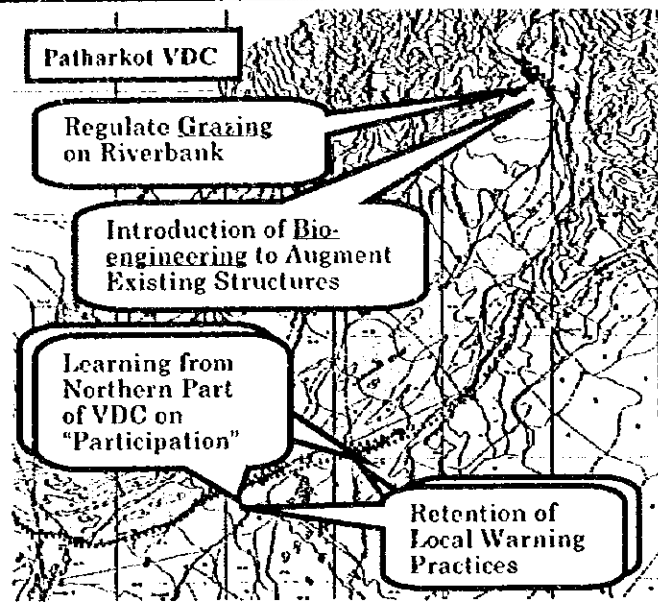


**LAYOUT PLAN FOR FLOOD MITIGATION
Lakhandei River (6/6)**

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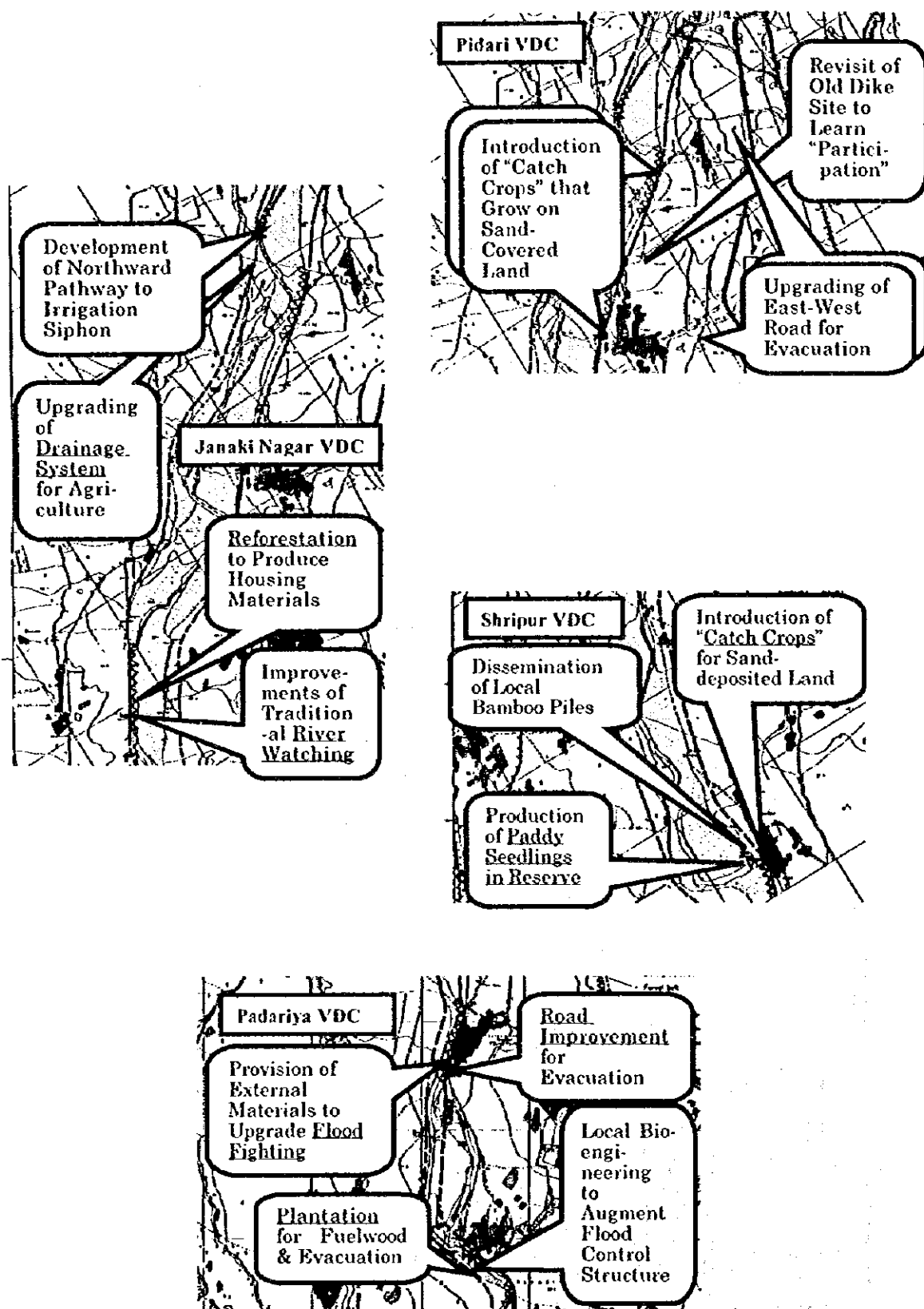


1911



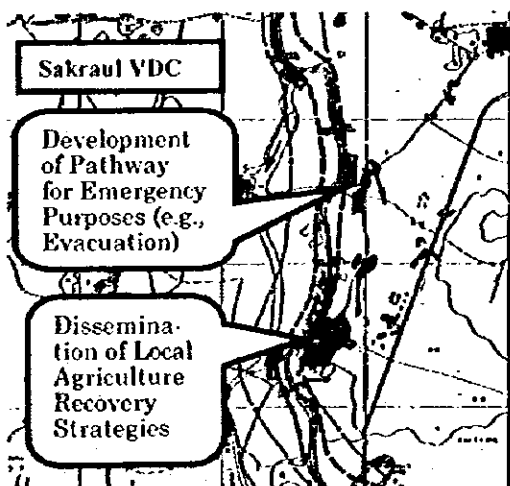
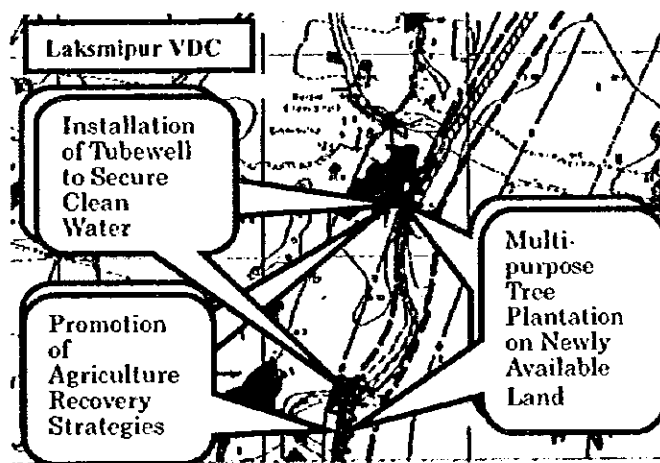
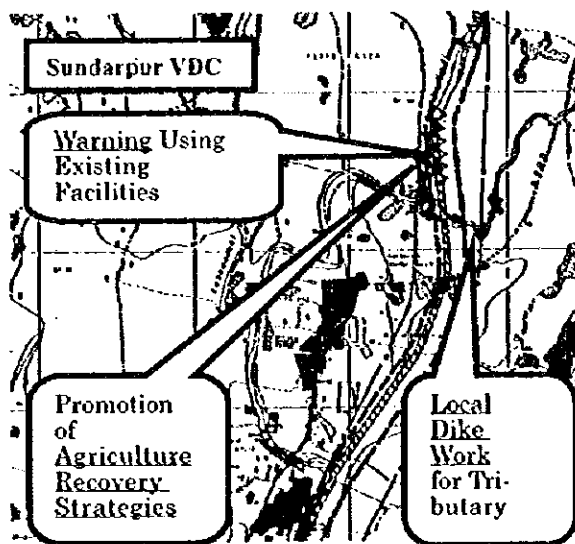
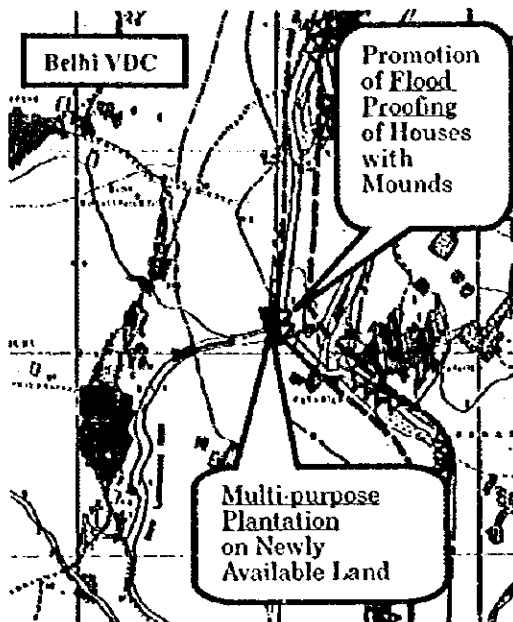
COMMUNITY DEVELOPMENT COMPONENT (LAKHANDEI R.)

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Fig. A6.14

Work Component and Items	1st.Phase(9th plan) (1997-2002)					2nd.Phase(10th plan) (2002-2007)					3rd.Phase (11-12th plan) (2007-2017)
	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	
PREPARATORY WORKS											
Master plan/ feasibility study	█										
Fund arrangement		█									
Definite plan/detailed design, etc			█		█						
Preservation of land					█	█					
Coordination among agencies/communities		█									
WATERSHED MANAGEMENT COMPONENT											
Erosion control works:											
Erosion control test works						█					█
Afforestation and Land use Regulation		█									
Publicity activities		█									
RIVER CONTROL COMPONENT											
Channel treatment works:											
Branch/anabranch works						█					
Re-alignment of river channel						█					
Bank protection works:											
Groyne/revetment works						█					
Dike works:											
Forest/grass belt pilot works						█					
Dike road works						█					
Ring dike works						█					
Channel excavation works:											
Pilot channel works						█					
Land use regulation:											
Flood hazard map				█							
Conservation of channel storage		█									
COMMUNITY DEVELOPMENT COMPONENT											
Community mobilization:											
Workshop for local government leaders				█							
Formation of COs				█							
Formation of inter-CO groups				█							
Disaster relief fund/ group saving						█					█
Promotion of public awareness						█					█
Local coping measures:											
Land use regulation						█					█
Flood proofing						█					█
Flood forecasting and warning						█					█
Evacuation						█					█
Flood fighting						█					█
Community-based sustainable measures:											
Bank protection works:											
- Preventive bank protection works						█					█
Dike works:											
- Forest/grass belt works						█					█
Channel excavation works:											
- Bed material collection						█					█
Operation & maintenance of F.M. facilities		█									
ASSOCIATE ACTIVITIES											
Research/investigation:											
Technical guidance:			█								

IMPLEMENTATION SCHEDULE: LAKHANDEI RIVER

Fig. A6.15

Work Items	Central Government				Local Government		Local community
	DO/DIO	DOSC	DPTC	Other agencies	DDC	VDC	
Preparatory works							
Feasibility study	⊙	.	.	.	○	○	○
Fund arrangement	⊙	.	.	○	⊙	⊙	⊙
Definite plan/detailed design, etc	⊙	.	.	.	○	○	○
Preservation of land	⊙	.	.	○	⊙	⊙	○
Research/investigation	⊙	⊙	⊙
Technical guidance	⊙	⊙	⊙
Organizing communities	○	○	○	.	○	○	⊙
Coordinations among organizations	⊙	○	○	○	○	○	○
Channel treatment works							
Tributary works	⊙	.	.	.	○	○	○
Branch/anabranch works	⊙	.	.	.	○	○	○
Bank protection works							
Groyne/revetment works	⊙	.	.	.	○	⊙	○
Preventive bank protection works	○	.	.	.	○	⊙	○
Dike embankment works							
Forest/grass belt works	⊙*	.	.	.	○	⊙	○
Dike road works	⊙	.	.	○	⊙	○	○
Ring dike works	○	⊙	○
Channel excavation works							
Bed material collection	○	.	.	.	⊙	⊙	.
Pilot channel works	⊙	.	.	.	○	○	.
Cut-off channel works	⊙	.	.	.	○	○	.
Retarding basin works	⊙	.	.	.	○	○	.
Sabo works	○	⊙	○	.	○	⊙	○
Forest reserve							
Forest reserve	○	⊙	○	.	○	⊙	○
Refoerstation	○	⊙	○	.	○	⊙	○
Conservation of channel storage	⊙	.	.	○	○	⊙	○
Land use regulation	○	⊙	○
Flood proofing	○	⊙	⊙
Flood forecasting/warning/evacuation							
Flood forecasting/warning facilities	⊙	.	.	.	○	○	○
Flood forecasting/warning	○	.	.	.	⊙	⊙	○
Flood fighting	○	.	.	.	○	⊙	⊙
Promotion of public awareness	⊙	⊙	⊙	.	○	⊙	○
Disaster relief fund	.	.	.	○	○	⊙	⊙
Tax adjustment	○	.	.	⊙	.	.	.

- (Remarks)
- ⊙ : In charge of implementation
 - : To cooperate and/or participate
 - ⊙* : Implementation as pilot project

IMPLEMENTATION AGENCIES AND ORGANIZATIONS

**IMPLEMENTATION ARRANGEMENT
FOR
FLOOD MITIGATION IN TERAI**

Coordinating Agency

DOI Project Management Office (PMO)

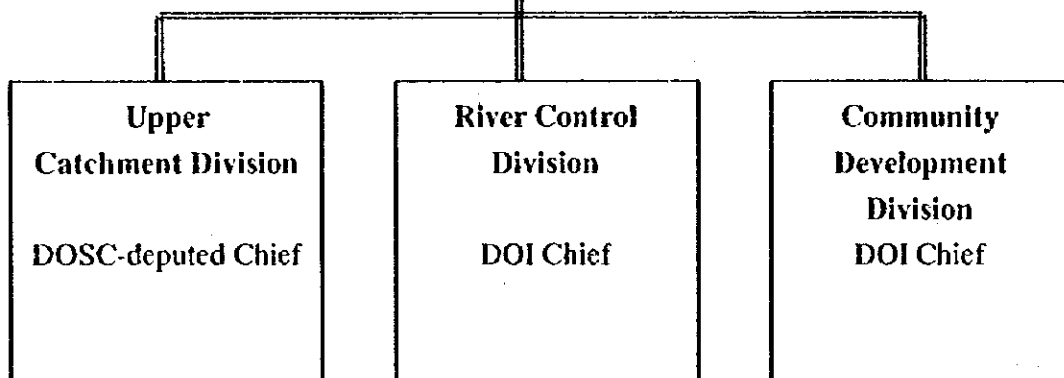
DOI Project Manager

District-level Coordination Committee (DCC)

DOI Project Manager
DDC Representative
DOSC Representative
DOA Representative
DOF Representative
DONP Representative
Chief District Officer



Implementing Division



Cooperating Agency

Line Agencies

DPTC
DOSC
DOF
DOA
DONP
etc.

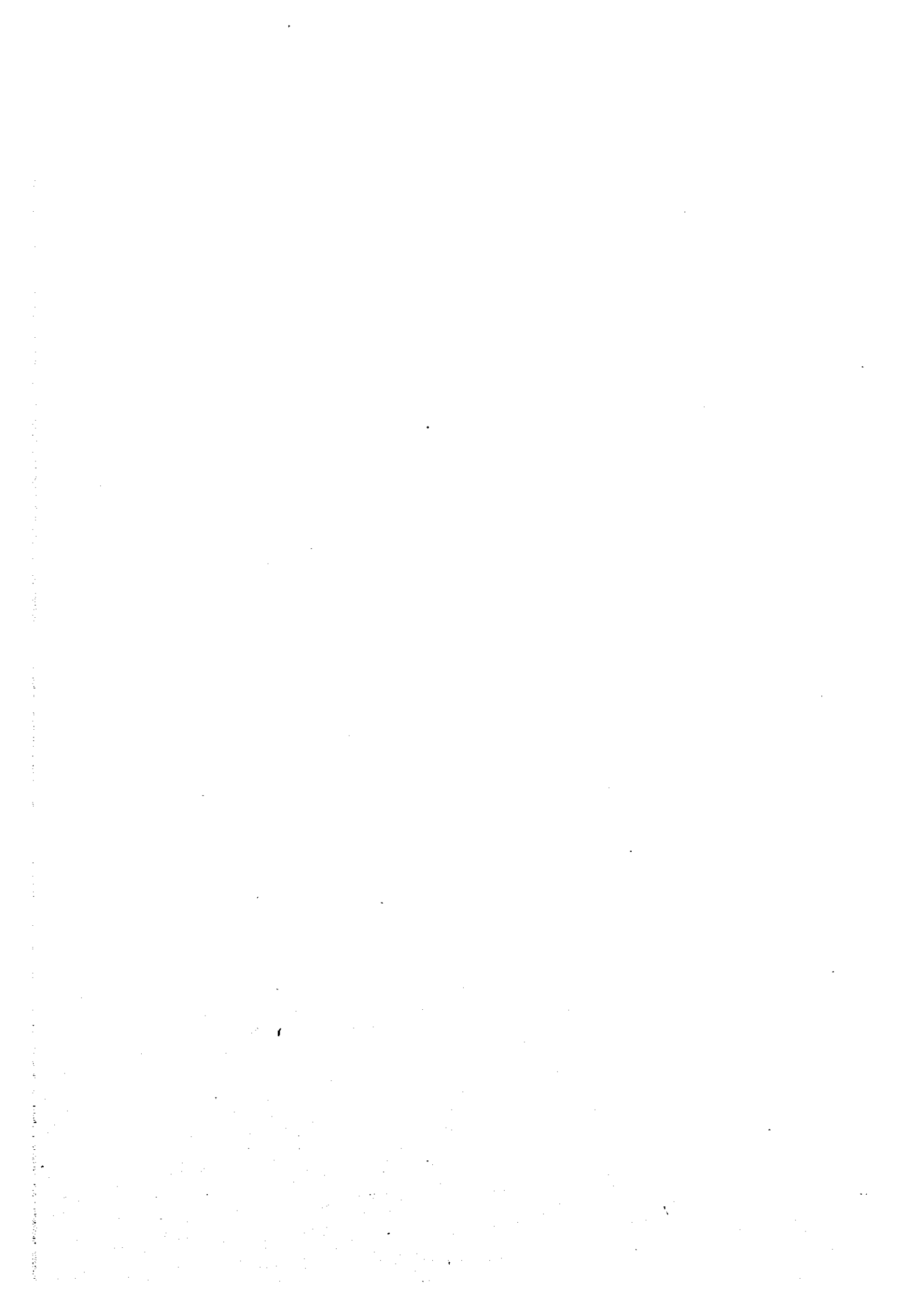
Local Governments

DDC
VDC
Municipality

His Majesty's Government of Nepal
Department of Irrigation, Ministry of Water Resources
**THE STUDY ON FLOOD MITIGATION PLAN
FOR SELECTED RIVERS IN THE TERAI PLAIN
IN THE KINGDOM OF NEPAL**
JAPAN INTERNATIONAL COOPERATION AGENCY







JICA