



Advances in Development, Management and Conservation of Water Resources

WATER RESOURCES DEPARTMENT
GOVERNMENT OF GUJARAT



Chief Minister
Gujarat State



सत्यमेव जयते

Message

Development thrust in Gujarat State has been high during the last two decades. What defines us is our continued effort to help people live better lives, in which water has a vital role to play. Gujarat is a State which doesn't believe in grieving on challenging situations like flood, droughts, salinity ingress, shortage of potable water in the state, Gujarat would rather be inspired by these situation as an opportunity to roll up the sleeves and find solutions that will definitely optimize the water resources utilization with the underling thrust of development, management and its conservation.

The book '**Advances in Development, Management, and Conservation of Water Resources**' depicts the journey of the State, moving up the value chain to stay ahead of the game in the Water Resource Sector, which has been made to happen by a dynamic and dedicated team of Water Resource Professionals. I congratulate the **Water Resources Department** for bringing out this publication at the occasion of **Vibrant Gujarat Summit - 2015** and I am sure the Book will be informative and useful to all its readers.

Anandiben Patel

(Anandiben Patel)



सत्यमेव जयते

Message



Water Resources Minister
Gujarat State

The people of Gujarat has evolved as an aspirational society yearning for growth. Water is the most powerful resource for growth, of which the State is not bountifully blessed. Instead of being deterred, the state has embarked upon the agricultural development trajectory with unmatched achievement, which could not have been possible but for water.

The State's Water Resources Department has over years worked tenaciously to build a strong water resources base through the themes of development, management and conservation. Their defining features are dams and their safety, conjunctive and micro irrigation management, people participatory water conservation, interlinking of rivers and inter-basin transfer of water and salinity ingress prevention. It is to the credit of the Water Resources Department to have achieved success with excellence through the harmonious balance of passionate vision and realistic initiatives.

The book '**Advances in Development Management and Conservation of Water Resources**' highlights the narrative of water resource based social well being by enabling fair redistribution of water as well as fair freedom from floods and droughts.

I compliment the Water Resources Department for bringing out this book at the occasion of **Vibrant Gujarat Summit - 2015**.

(Babubhai Bokharia)



सत्यमेव जयते

Message

Water Resources Minister of State
Gujarat State



Gujarat water resource is a most valuable asset, deserving development, management and conservation to sustain our life and living now and for ever. Conscious of this imperative, the State's Water Resources Department has played a highly commandable role to accomplish the desired outcomes through the projects that are path breaking in respect of planning, execution and performance. To name some notables, Sujalam Sufalam Project, SAUNI Yojana (Saurashtra Narmada Avtaran Yojana) and Sardar Patel Participatory Water Conservation Scheme are land mark that optimize professional excellence on the scale of concept, planning, execution and distribution of benefits equitably across the regions in sync with the environmental safety.

Within the themes of water resource development, management and conservation, the Water Resources Department has in recent years been focused on adoption of micro irrigation, management, participatory irrigation management, interlinking of rivers and other water bodies (reservoirs, ponds, bandharas etc.), water conservation, salinity ingress prevention and protection against sea shore erosion.

With high regard for the professional competence and commitment of the personnel's of the Water Resources Department, I have a special word of praise for bringing out the publication 'Advances in Development, Management and Conservation of Water Resources' at the occasion of Vibrant Gujarat Summit - 2015.

(Nanubhai Vanani)

January 2015

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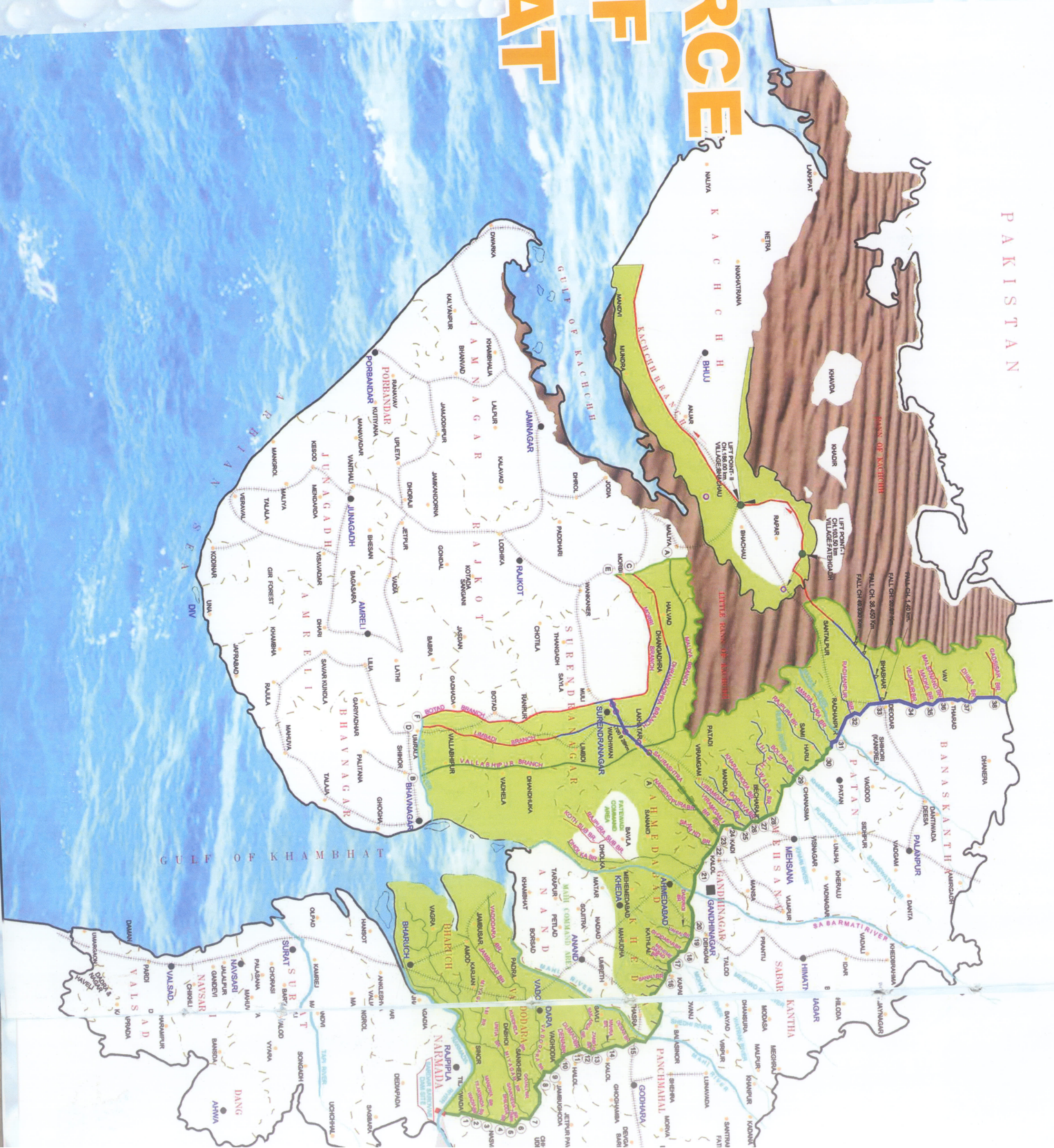
ADVANCES IN DEVELOPMENT, MANAGEMENT AND CONSERVATION OF WATER RESOURCES

GOAL: HARNESSING WATER RESOURCES FOR PEOPLE'S WELL-BEING

THEMES:- DEVELOPMENT, MANAGEMENT AND CONSERVATION OF WATER RESOURCES

THRUSTS	ACTION AGENDA
Development of water resource infrastructures for creating risk- free irrigation facilities	Construction of dams and provisions for their safety
Enabling fair distribution of water among different regions of the State to overcome the stresses incidental to excess water and deficit water situations	Interlinking of rivers and water bodies (Reservoirs, Ponds, Bandharas)
Efficient and equitable irrigation water distribution	Participatory Irrigation Management (PIM)
Efficient use of irrigation water	Adoption of Micro Irrigation Technology.
Localized water conservation	- Construction of - Check dams - Recharge wells - Spreading channels - Deepening of ponds
Salinity ingress prevention	Construction of Tidal regulators, Bandharas

WATER RESOURCE BASE OF GUJARAT



Per Capita Water Availability of Gujarat



Regional Rainfall of Gujarat



• River Basins :

- (a) Gujarat Region : 17
- (b) Saurashtra region : 71
- (c) Kachchh region : 97

• Water Availability

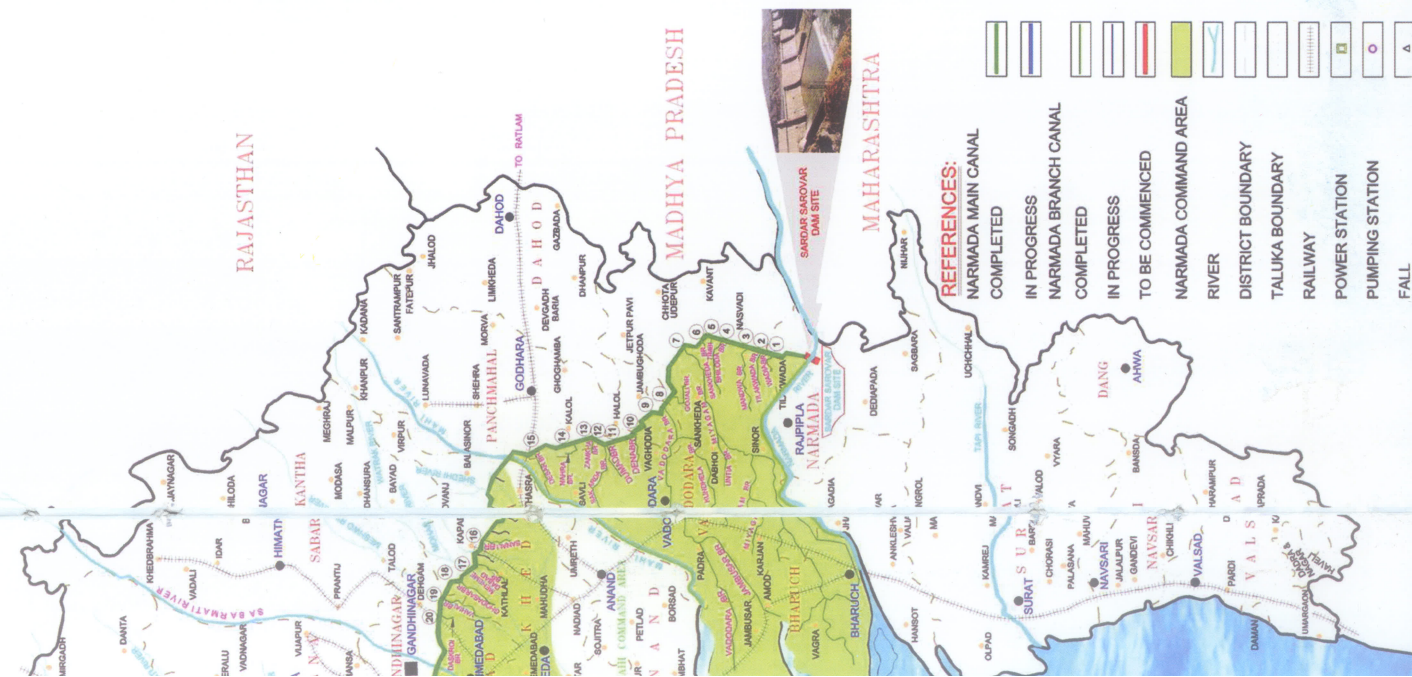
Surface Water : 38100 MCM
Ground Water : 17500 MCM
Total : 55600 MCM

• Irrigation Potential:

- (1) Total Geographic area :
- (2) Cultivable area
- (3) Surface Irrigation Potential
 - Sardar Sarovar
 - Major and Medium projects
 - Minor Irrigation and Water Conversation
- (4) Ground Water
- (5) Unirrigated-Rain fed area

In lac Ha.

196
124
47
18
18
11
20
57

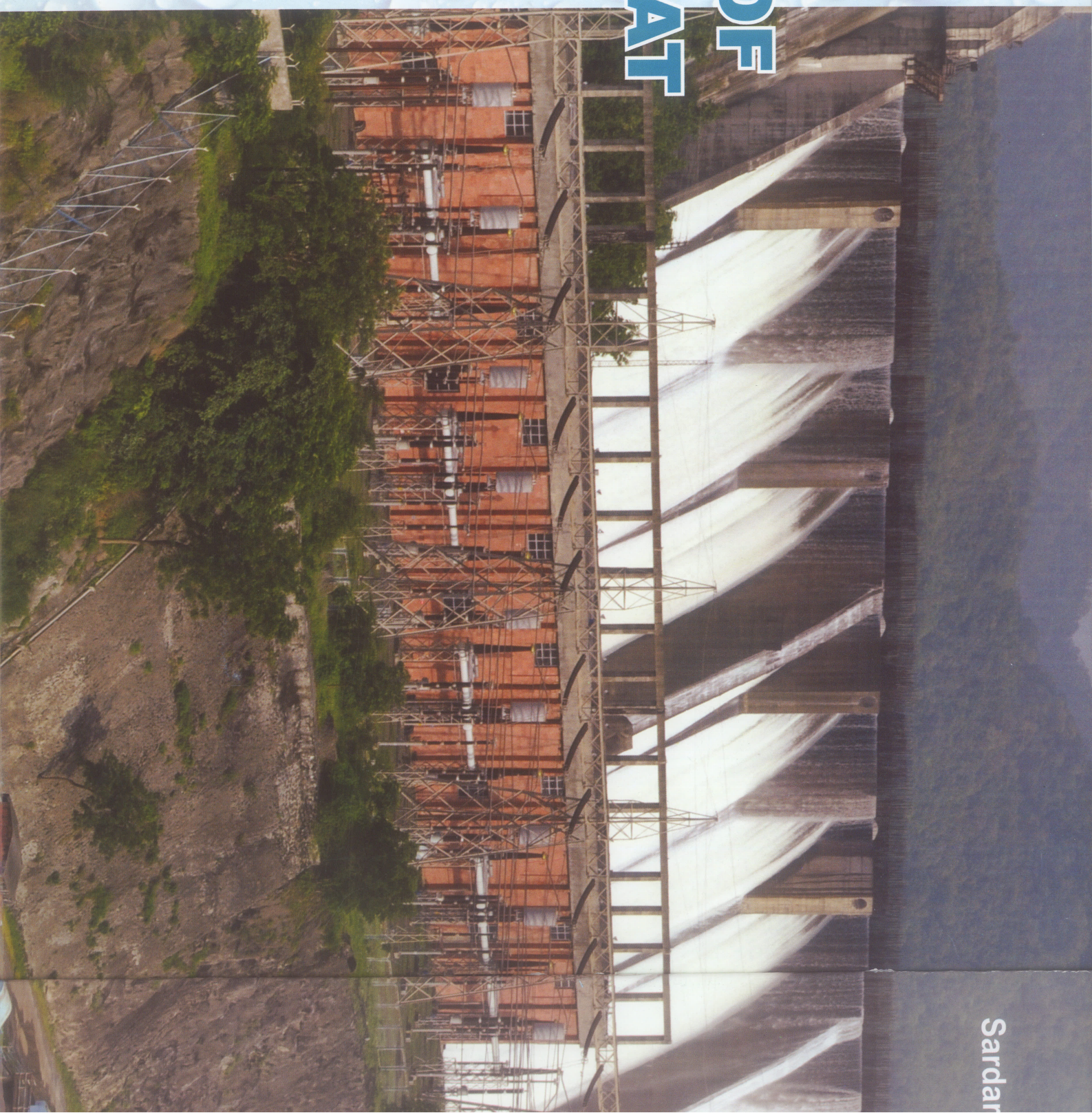


2

MAJOR DAMS OF GUJARAT



8



Sardar

SARDAR SAROVAR DAM

Sardar Sarovar Dam on River Narmada, Dist : Narmada. Design Storage : 9460 MCM

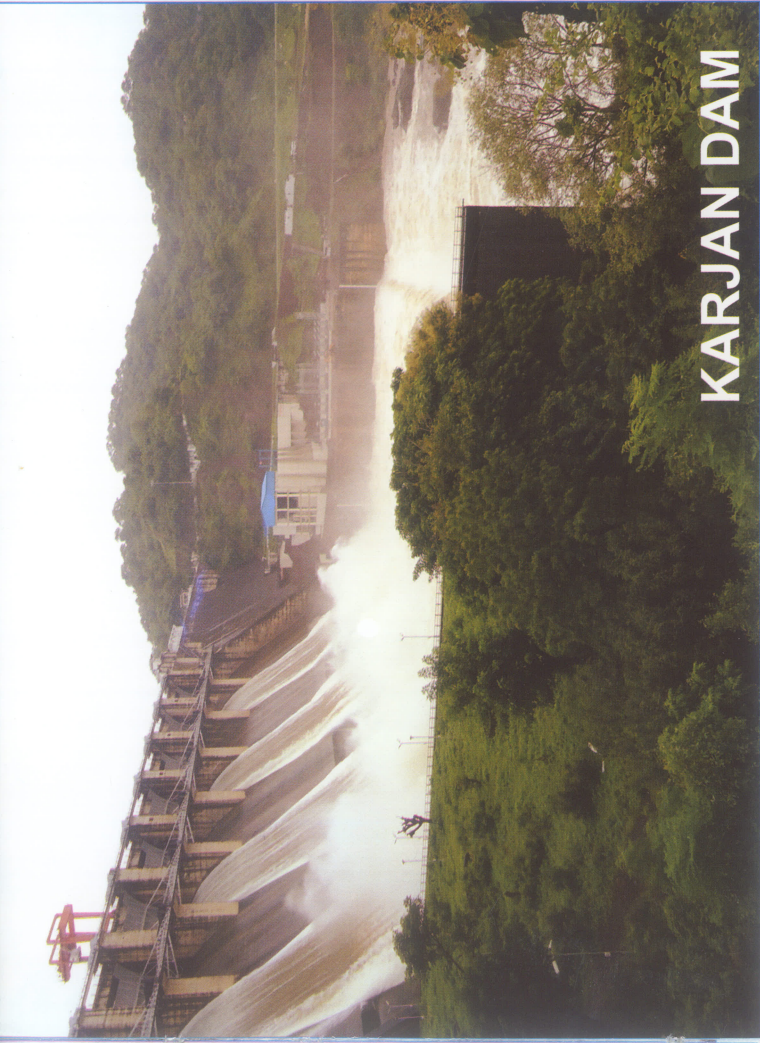


UKAI DAM

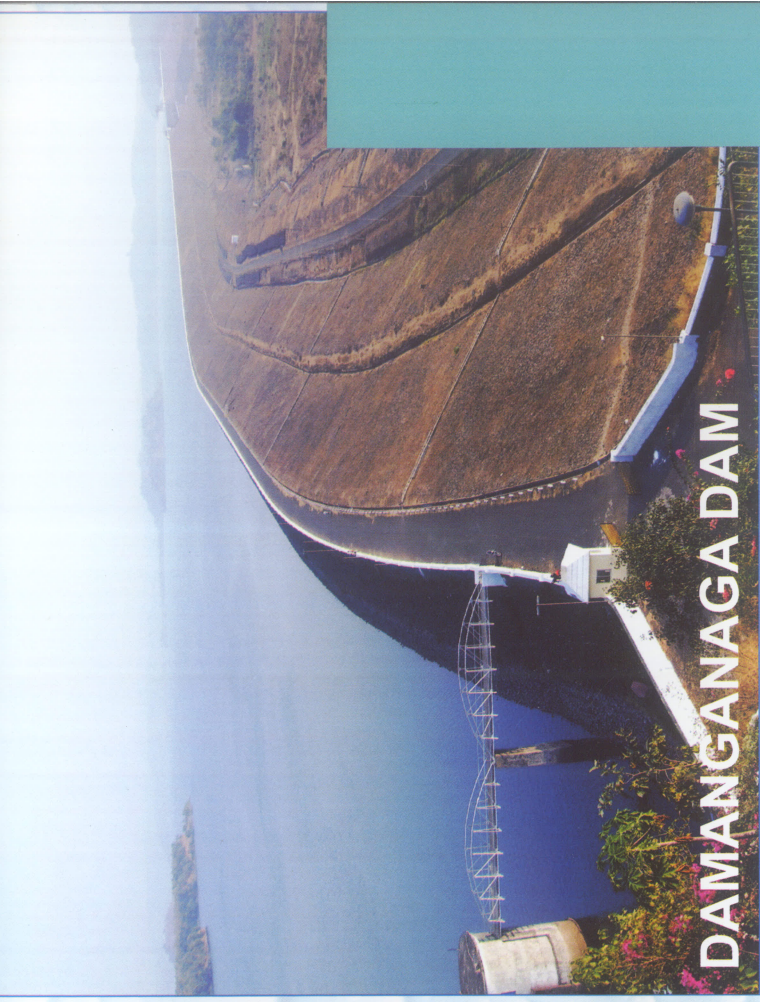
Ukai Dam on River Tapi, Dist : Tapi. Design Storage : 7414 MCM

Benefits		
Drinking Water	Irrigation	Industries
Villages : 416	Villages : 1110	Industries : 88
Major Cities : 4	Area : 3,31,557 (Hectares)	Qty of Water : 2.55 (MCM)
Population Served : 60,03,248		

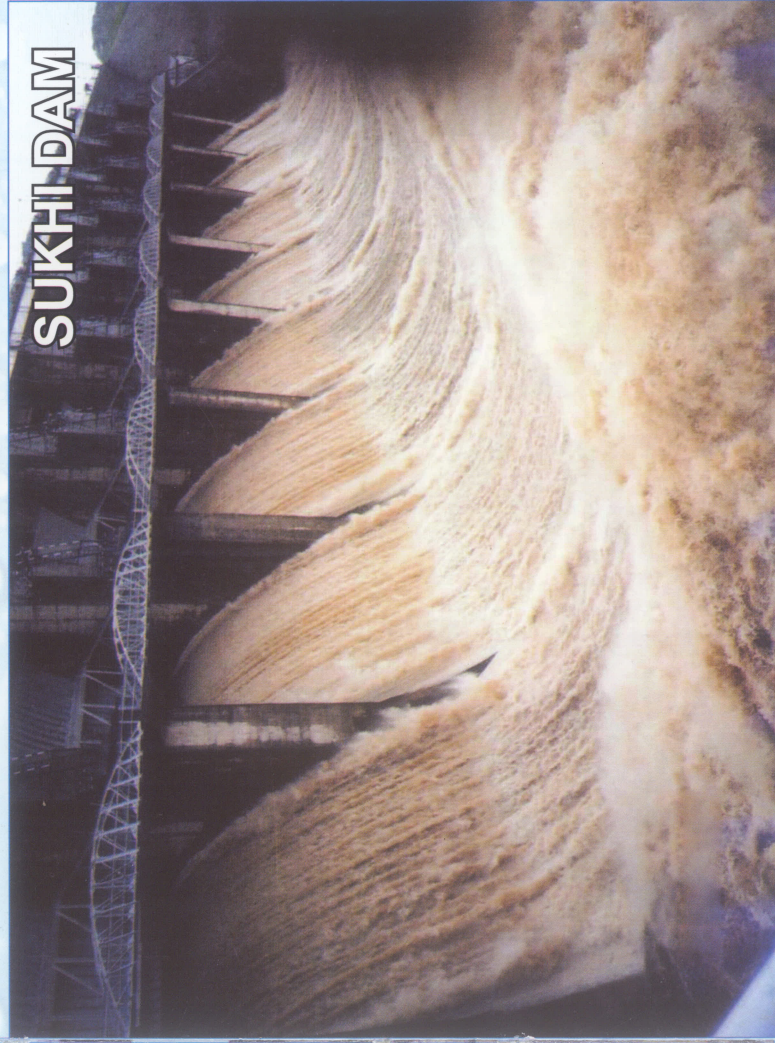




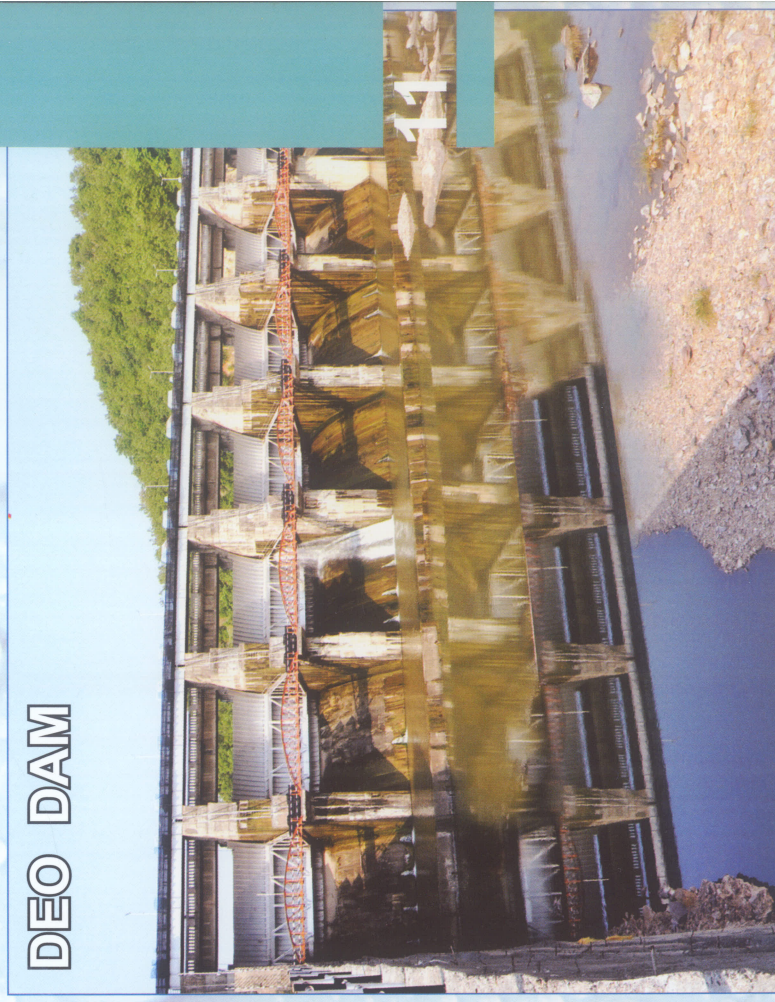
KARJAN DAM



DAMANGANAGA DAM



SUKHI DAM

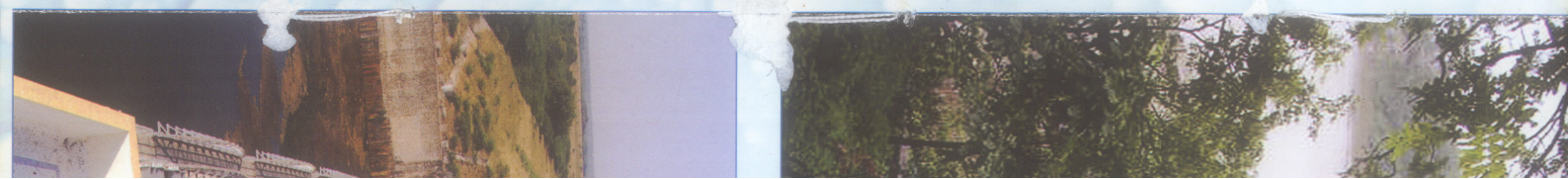
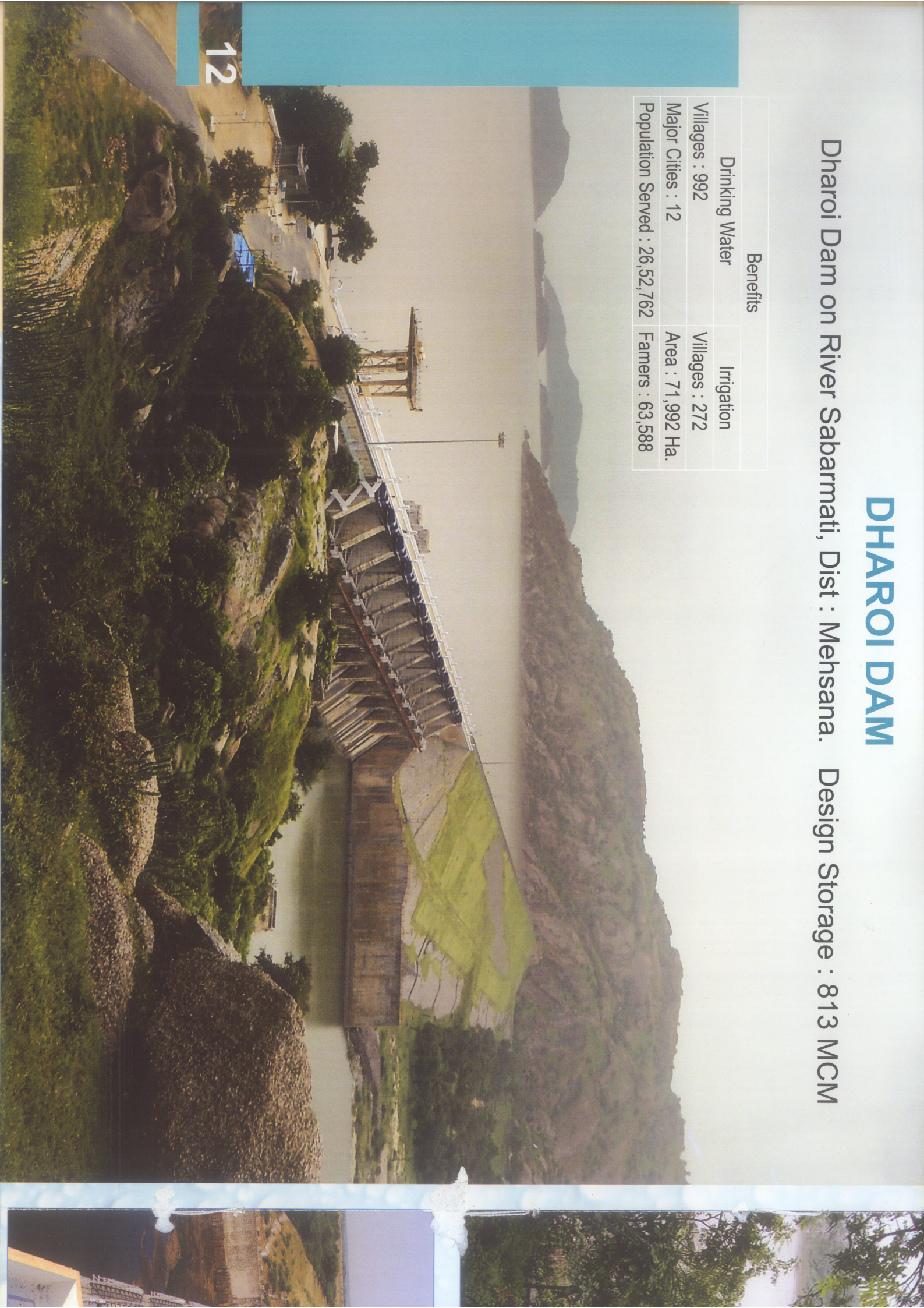


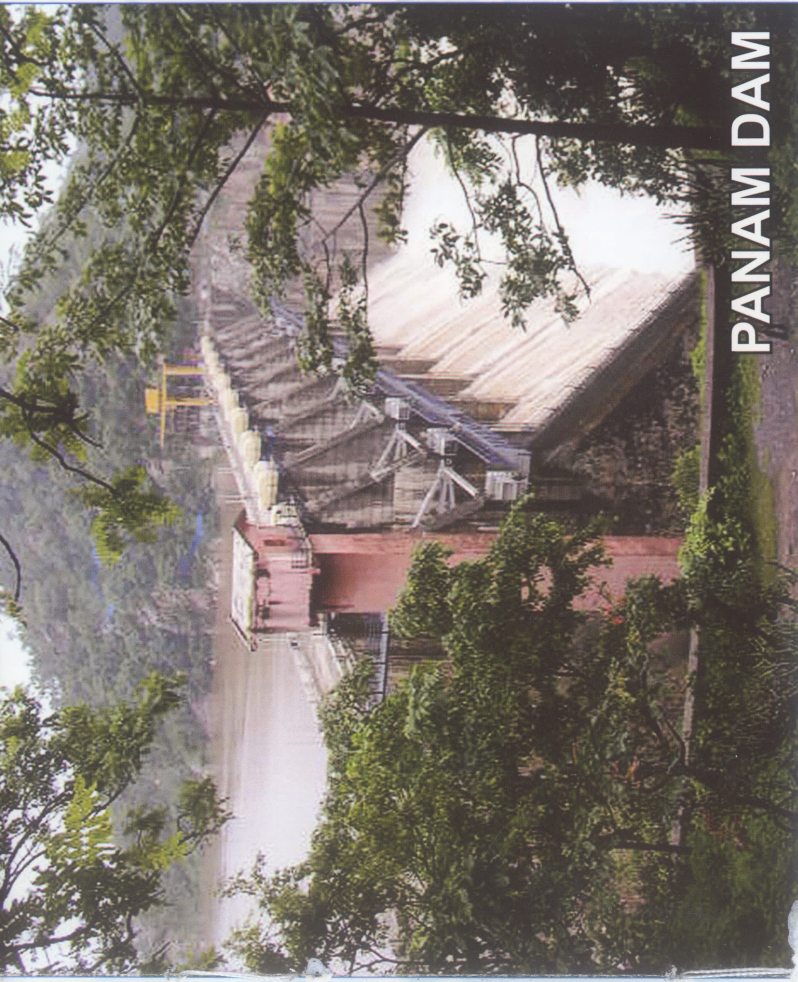
DEO DAM

DHAROI DAM

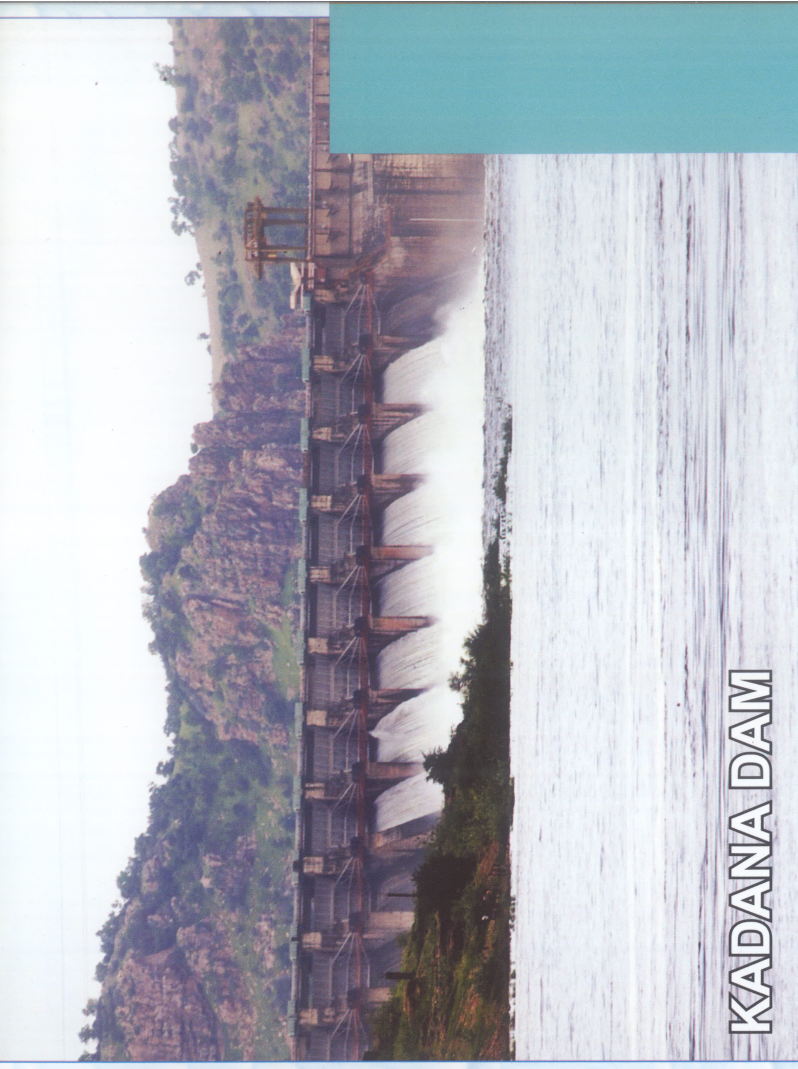
Dharoi Dam on River Sabarmati, Dist : Mehsana. Design Storage : 813 MCM

Benefits	
Drinking Water	Irrigation
Villages : 992	Villages : 272
Major Cities : 12	Area : 71,992 Ha.
Population Served : 26,52,762	Farmers : 63,588

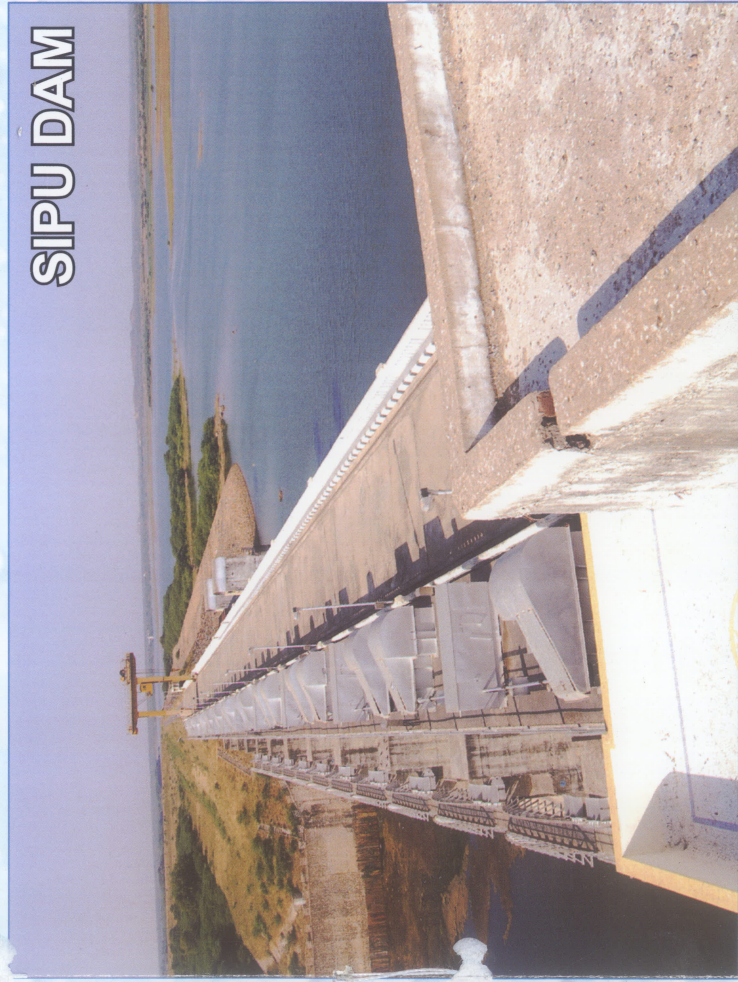




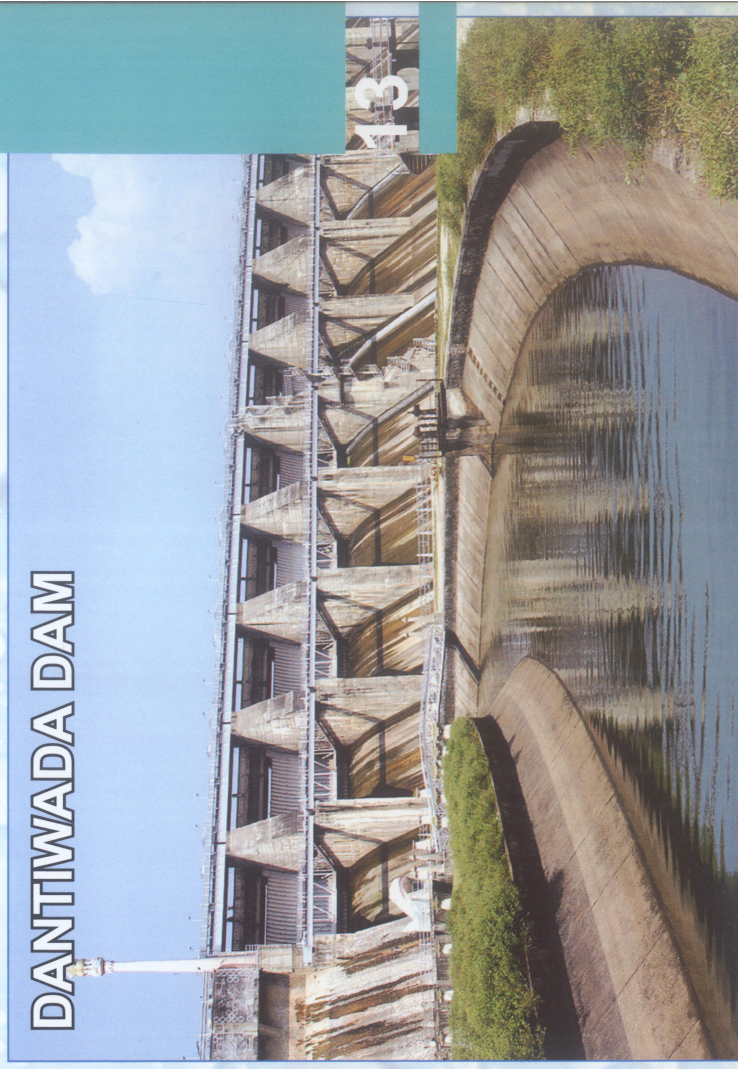
PANAM DAM



KADANIA DAM



SIPU DAM

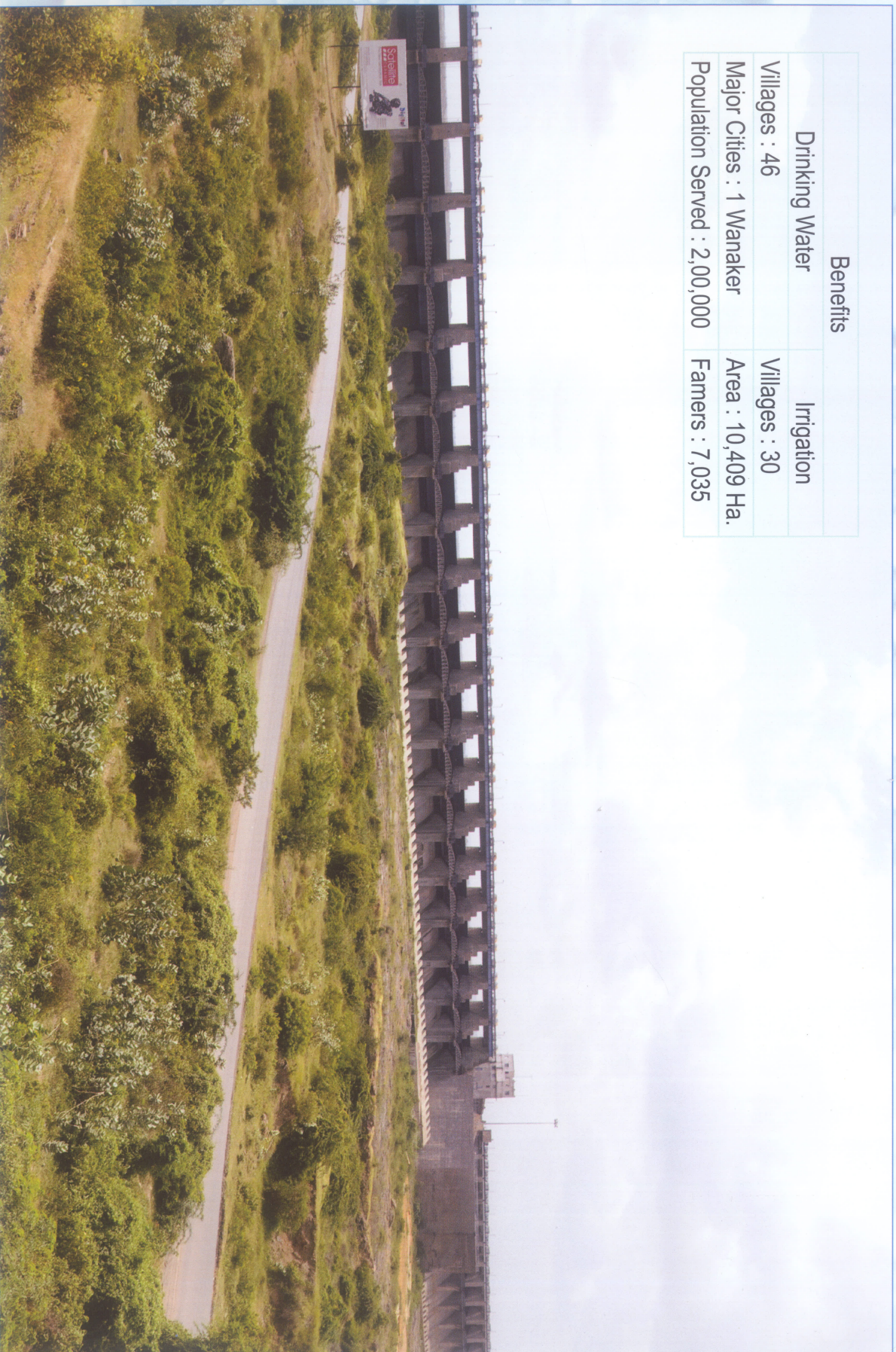


DANTIWADA DAM

MACHHU - II DAM

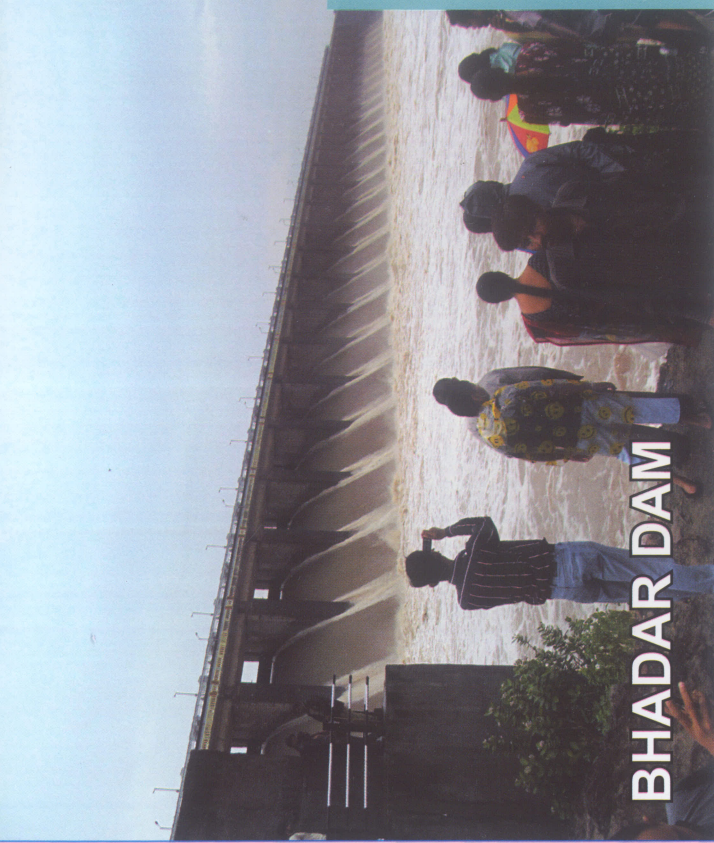
Machhu-II Dam on River Machhu, Dist : Morbi. Design Storage : 88 MCM

Benefits	
Drinking Water	Irrigation
Villages : 46	Villages : 30
Major Cities : 1 Wanaker	Area : 10,409 Ha.
Population Served : 2,00,000	Famers : 7,035





SHETRUNJI DAM



BHADAR DAM

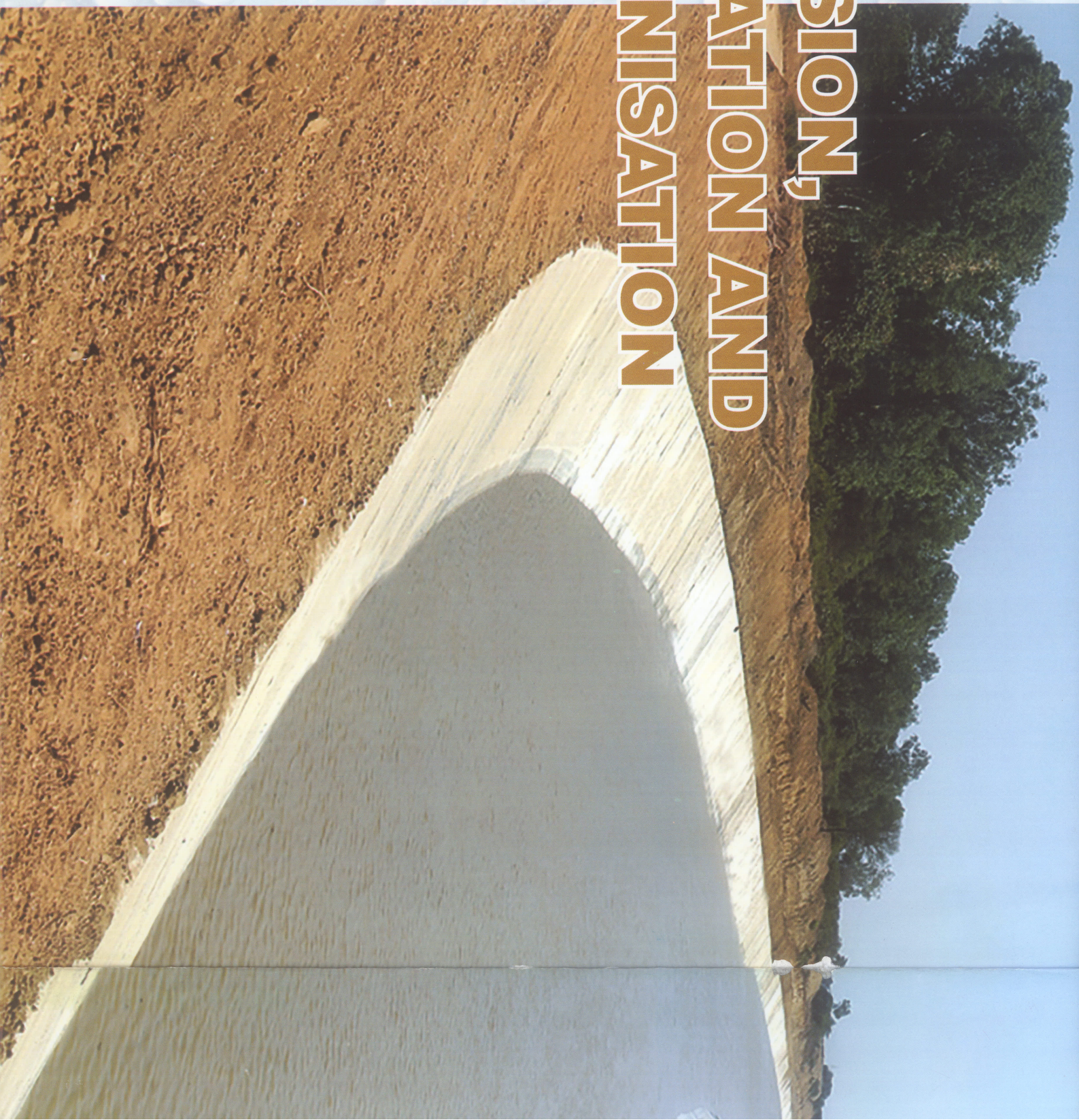


UNDHI DAM



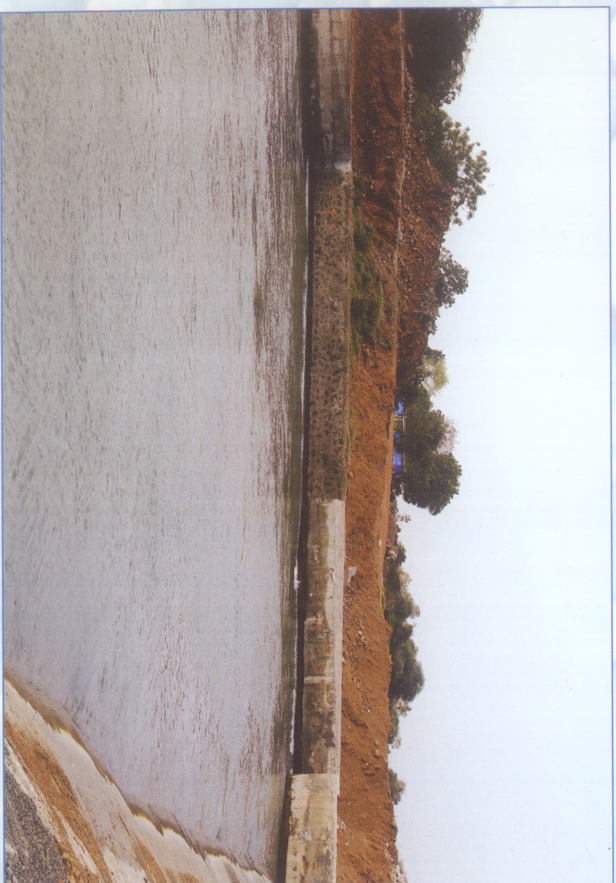
MACHHU - I DAM

EXTENSION, RENOVATION AND MODERNISATION (ERM)





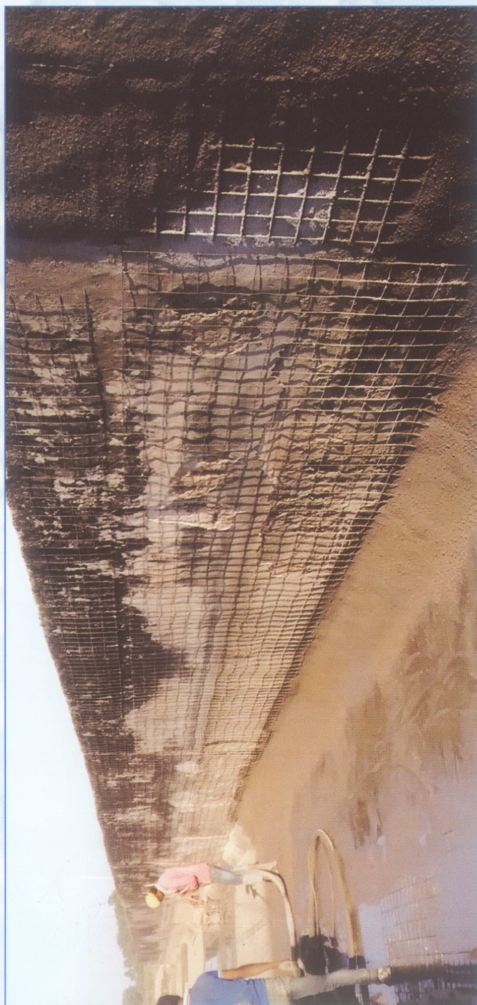
ERM WORKS



AFTER

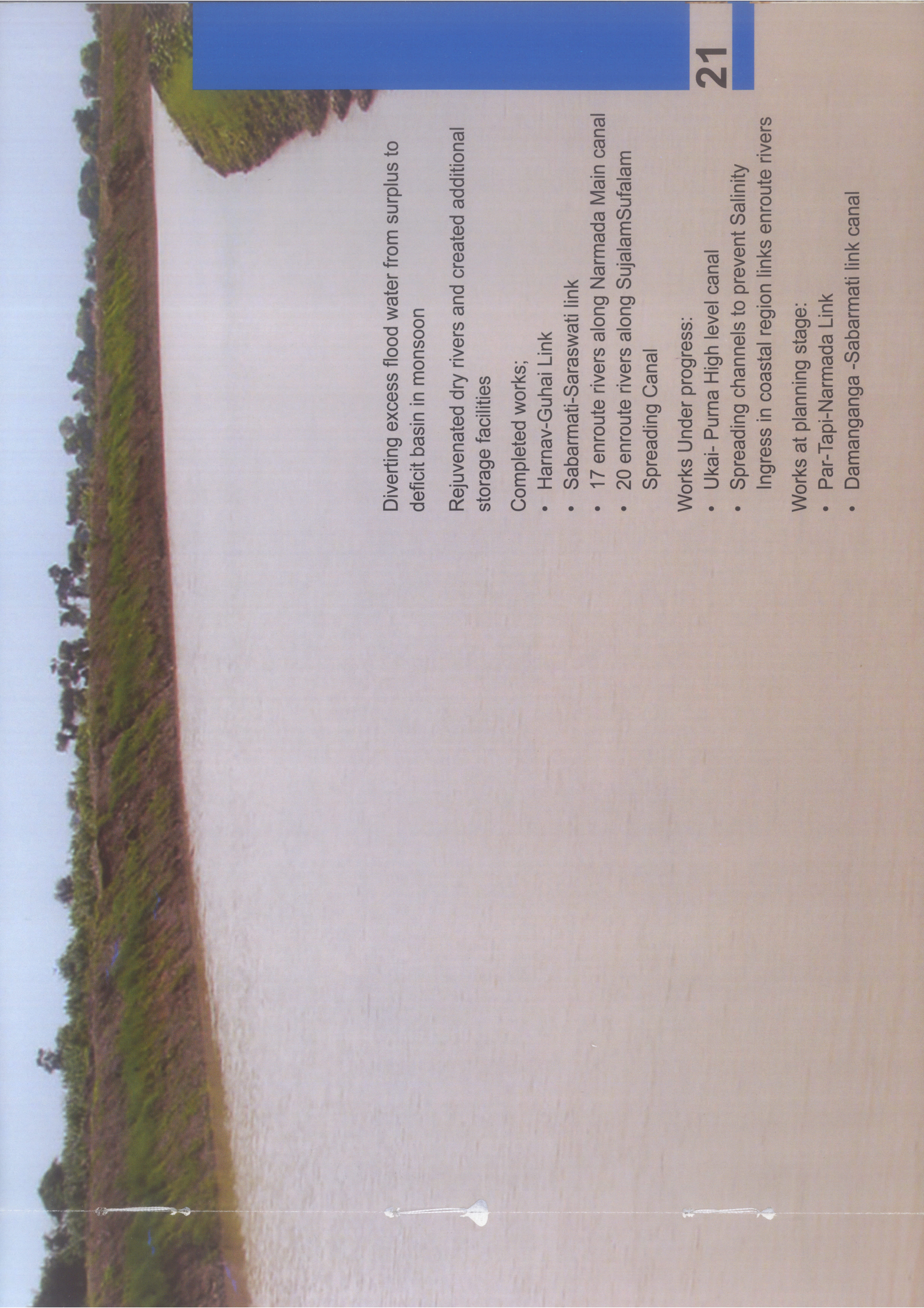


BEFORE



INTERLINKING OF RIVERS AND WATER BODIES





Diverting excess flood water from surplus to deficit basin in monsoon

Rejuvenated dry rivers and created additional storage facilities

Completed works;

- Harnav-Guhai Link
- Sabarmati-Saraswati link
- 17 enroute rivers along Narmada Main canal
- 20 enroute rivers along SujalamSufalam Spreading Canal

Works Under progress:

- Ukai- Purna High level canal
- Spreading channels to prevent Salinity Ingress in coastal region links enroute rivers

Works at planning stage:

- Par-Tapi-Narmada Link
- Damanganga -Sabarmati link canal

SUJALAM SUFALAM YOJANA





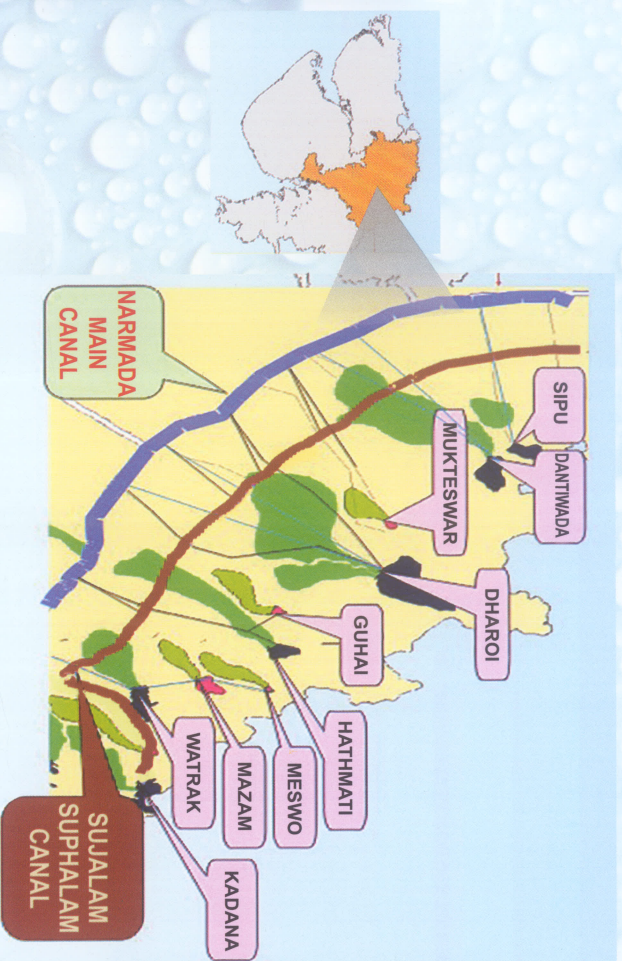
An integrated approach to

augment resources in water

deficit and over exploited areas

- Interbasin transfer from surplus to deficit basin through pipe channels, lift irrigation through pipe lines, high-level canals, chekdams, salinity prevention measures etc.

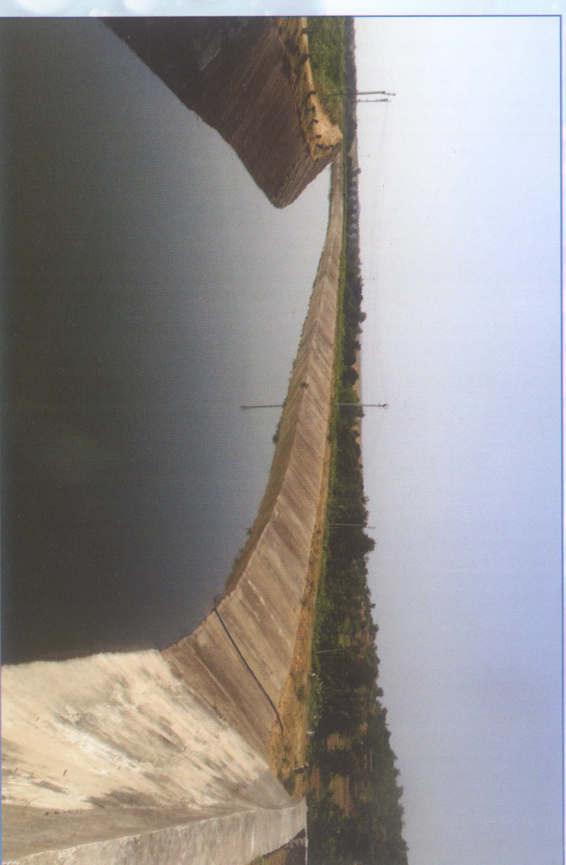
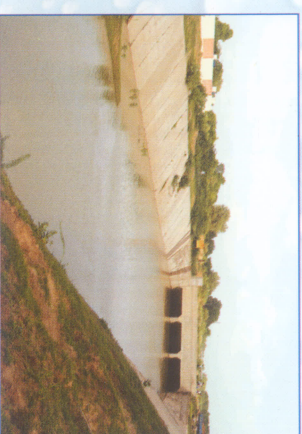
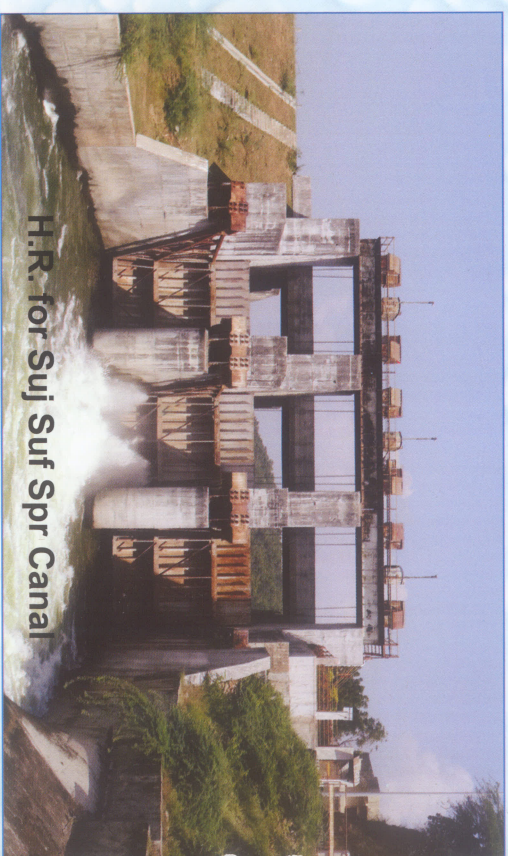
SUJALAM SUFALAM SPREADING CANAL



24

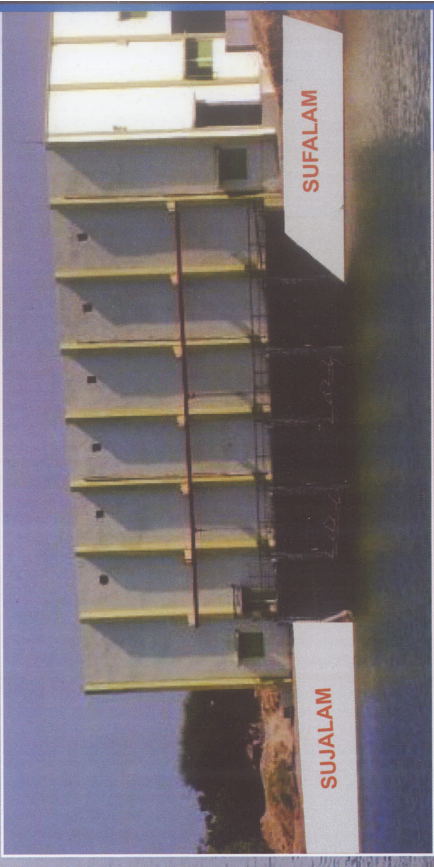
SujalamSufalam Spreading Canal

- 332 km long unlined canal passing through 7 districts from Kadana reservoir to Rah Village in Banaskantha district
- Enhanced irrigation facilities and ground water recharge in 70,000 ha. of over exploited areas



- 14 lift Irr water
- 10 p
- 1 pif
- 3 pi
- 261
- 3 to
- 8 to

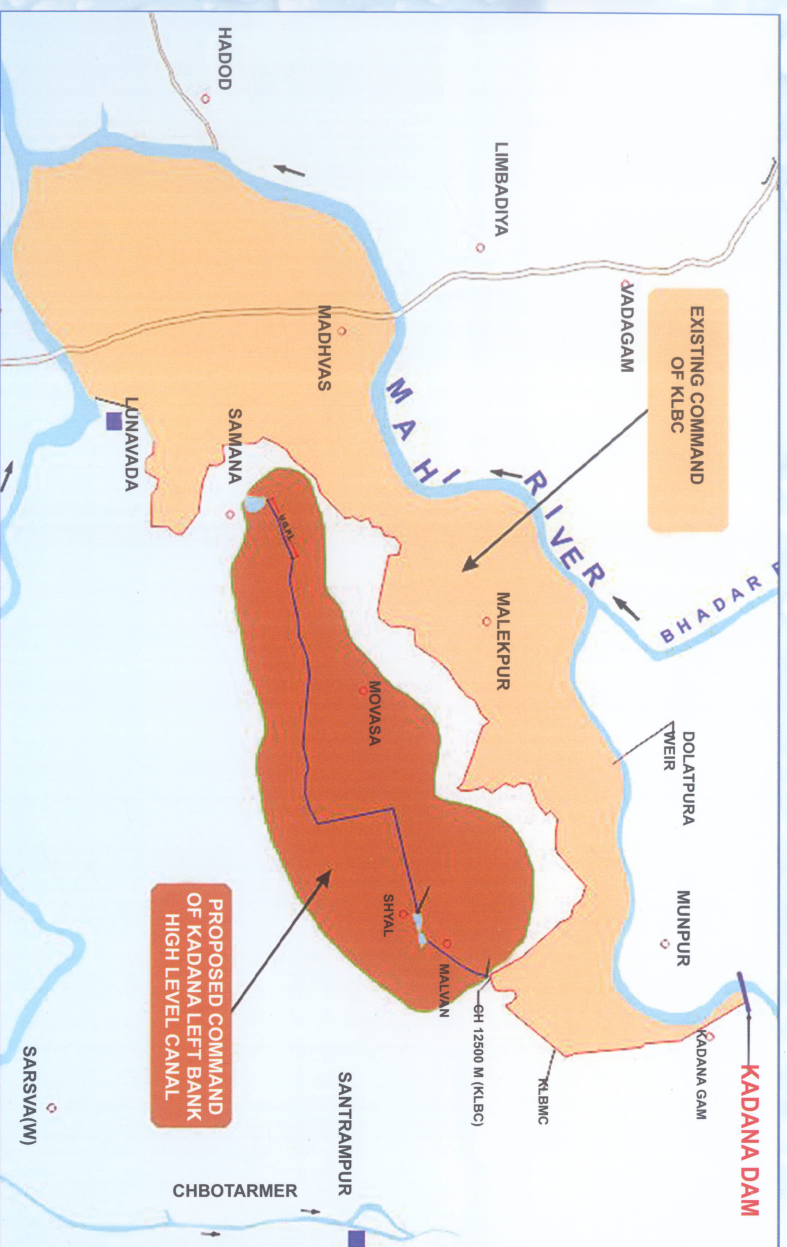
14 LIFT IRIIGATION SCHEMES



Lift Irrigation Schemes

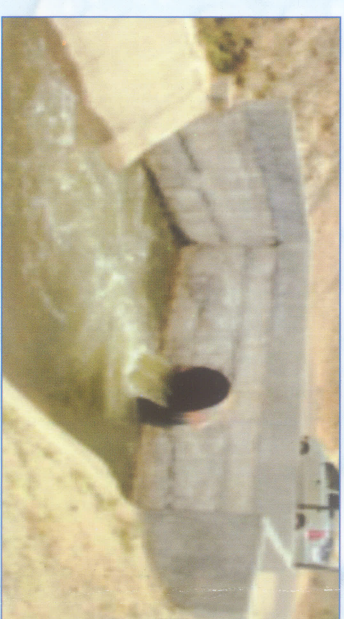
- 14 lift irrigation schemes for to utilise excess flood water of Narmada for North Gujarat region
- 10 pipelines completed
- 1 pipelines near to completion
- 3 pipelines at planning stage
- 261 enroute village pond filled
- 3 to 5 m. rise in water table in surrounding area.
- 8 towns and 679 villages served

KADANA HIGH LEVEL CANAL

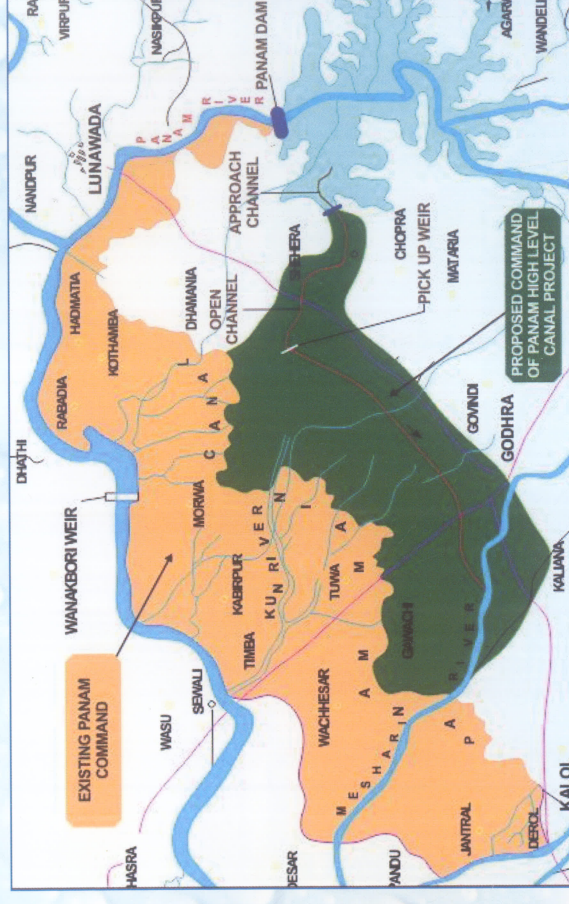


Kadana left Bank high level canal

- 44 Tribal area villages Benefitted
- Modernization of 42 km canal for assured irrigation
- Provide Irrigation facilities to 10700 ha.
- 5000 ha. Additional area covered under irrigation



PANAM HIGH LEVEL CANAL

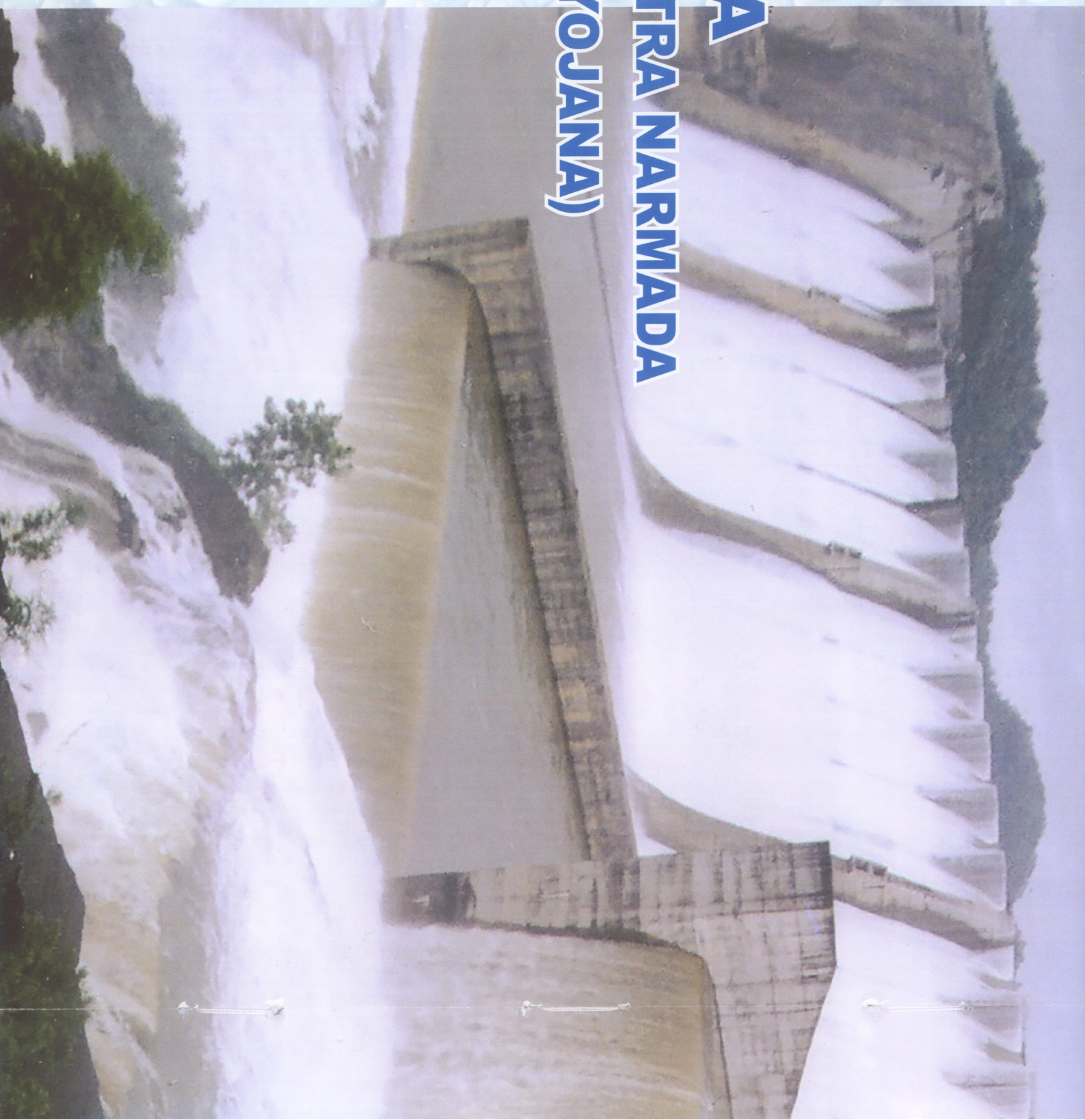


Panam High Level Canal

- 3.27 km long Irrigation tunnel
- 75 Tribal area villages Benefitted
- Irrigation facilities to 18000 ha.



SAUNI YOJANA (SAURASHTRA NARMADA AVATTRAN YOJANA)



LINK - 1 Machhu - II to Sani
 LINK - 2 Limbdi Bhogavo - II to Raydi
 LINK - 3 Dholidhaja to Venu-I
 LINK - 4 Limbdi Bhogavo - II to Hiran - II

Saurashtra Narmada Avtaranyojana (SAUNI)

Total Link canals : 4

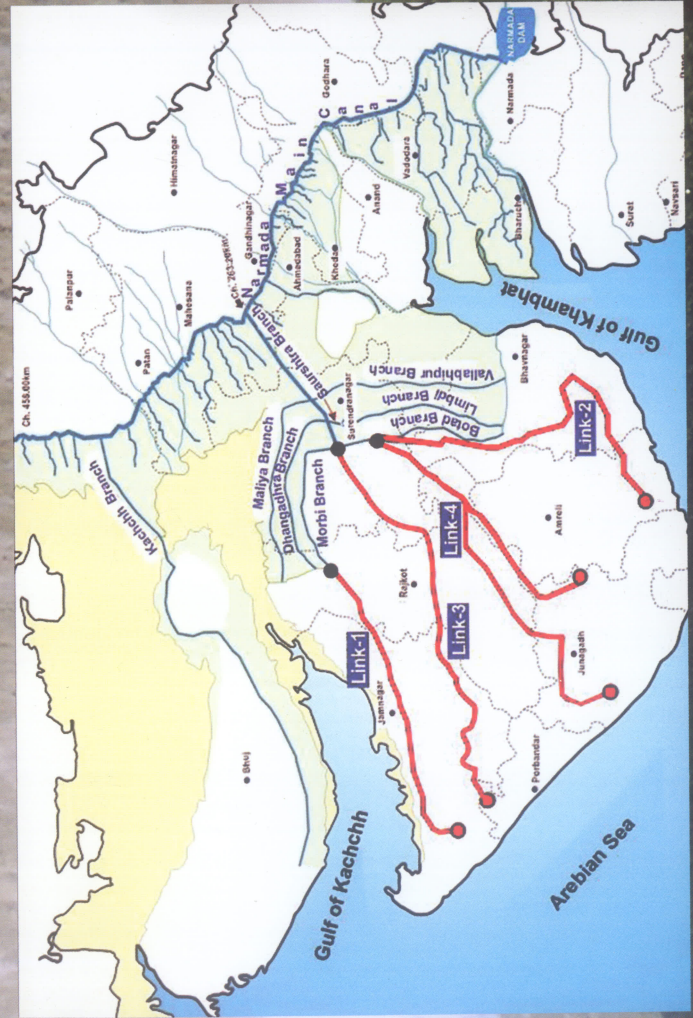
Total length of Link canals : 1126 km

Estimated cost : 12,166 Crore.

District benefitted : 11 of Saurashtra region

Reservoir to be filled with Narmada Water : 115

Area to be benefitted : 10.23 lac acre





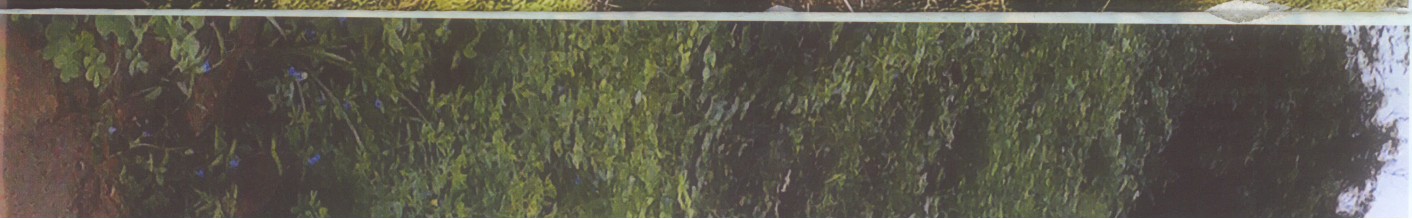


HARNAV - GUHA LINK

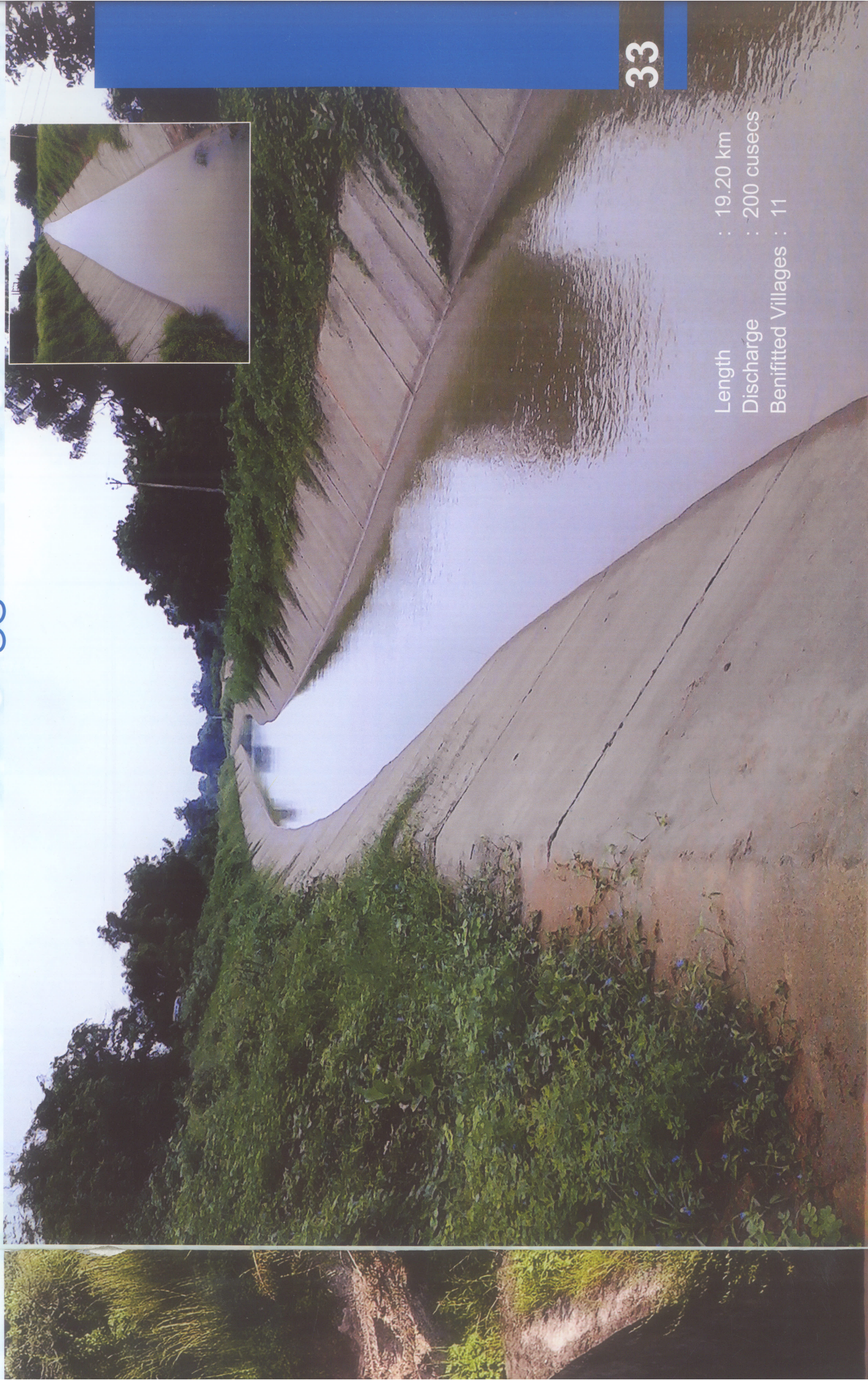


Length : 18 km
Discharge : 100 cusecs
Benifitted Area : 500 Ha

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SABARMATI-SARAWATI LINK



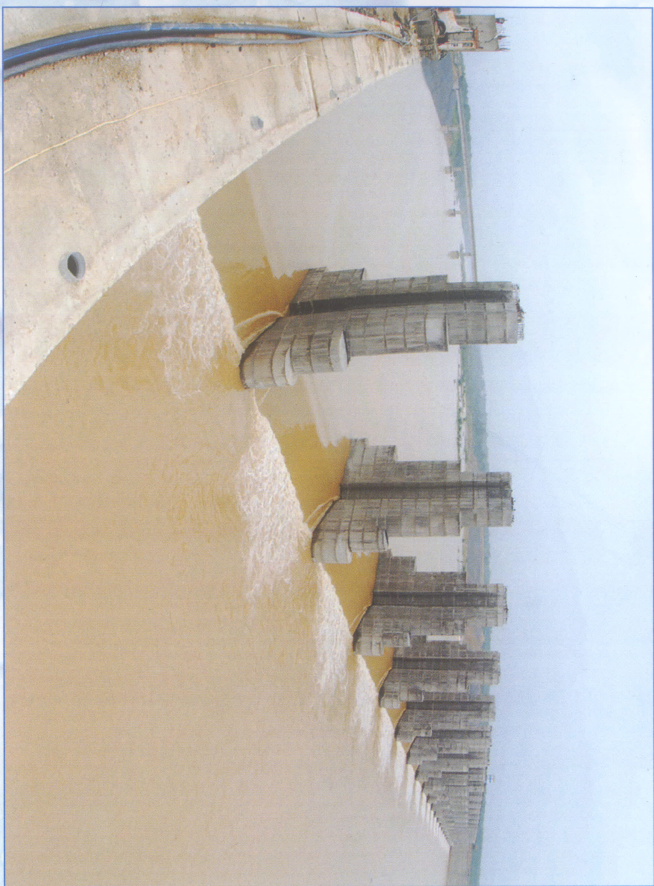
Length : 19.20 km
Discharge : 200 cusecs
Benifitted Villages : 11

SARASWATI-NARMADA MAHASANGAM

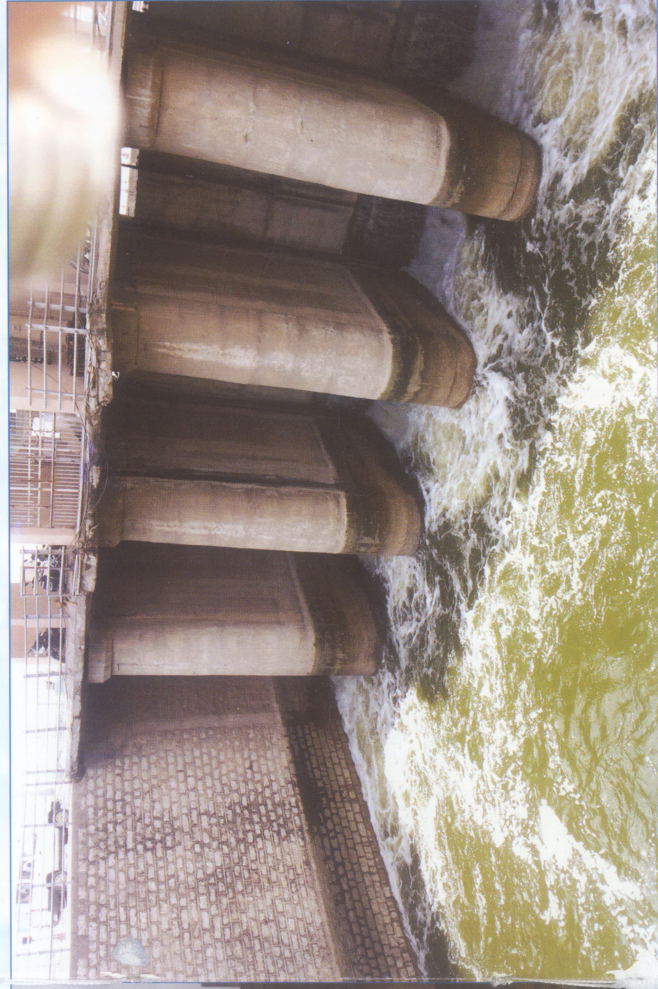




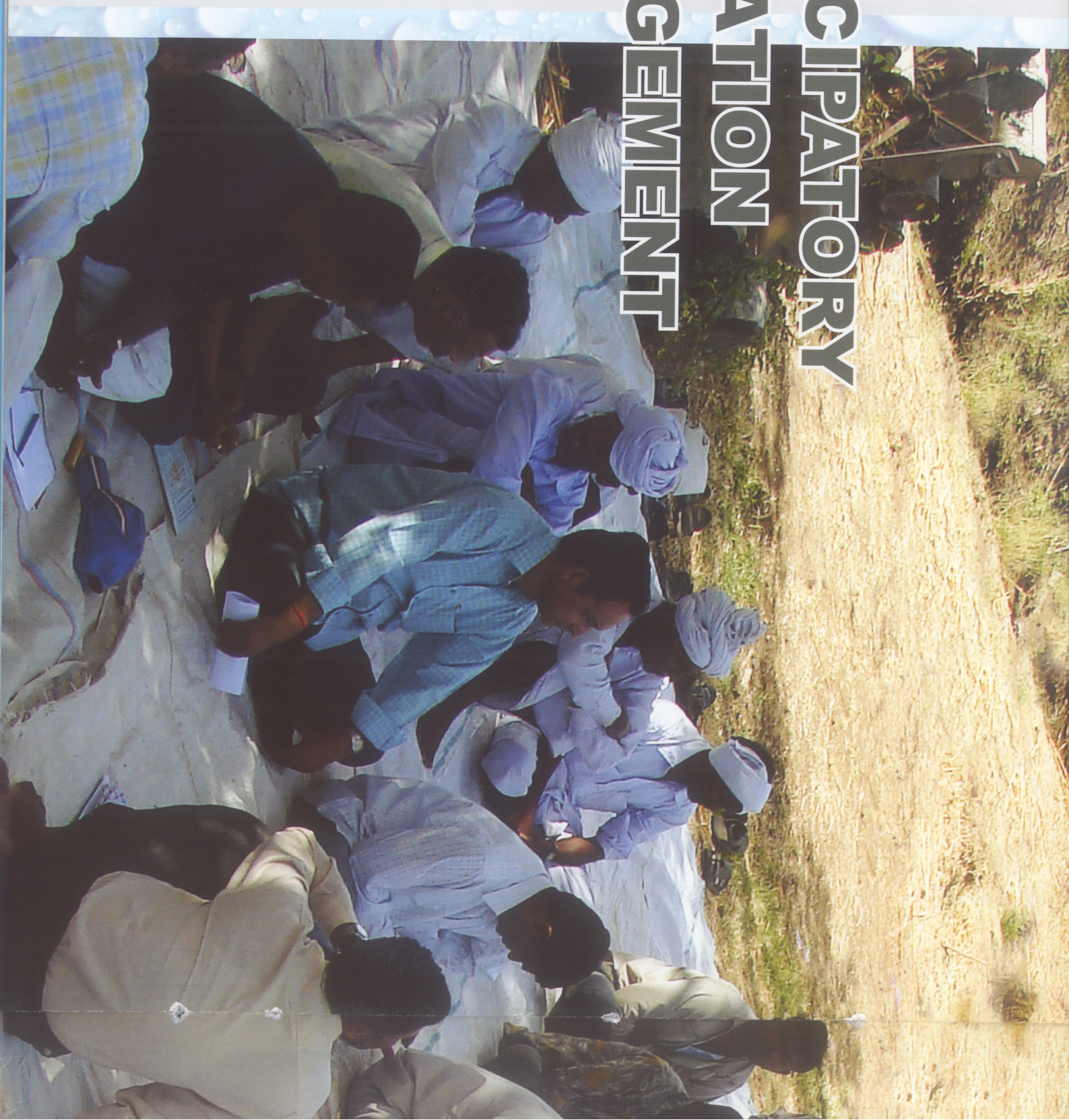
SANT SAROVAR



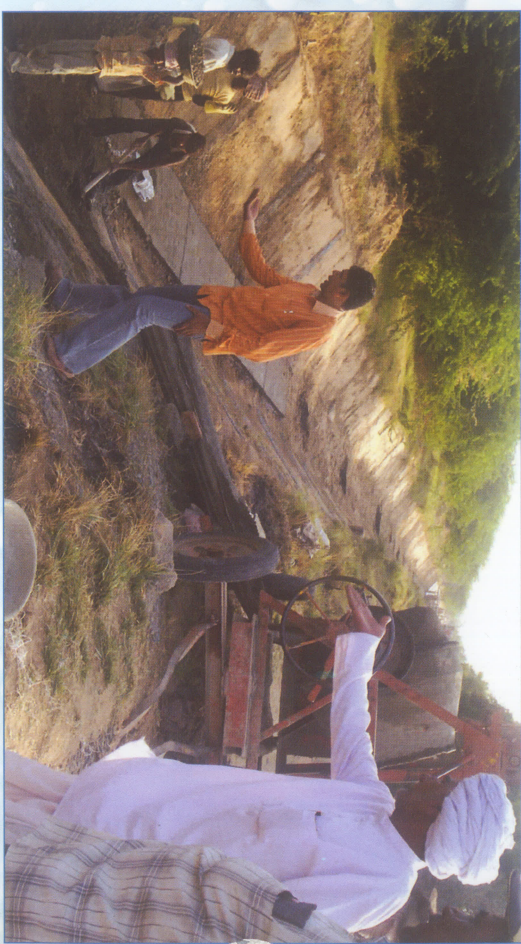
WASNA BARRAGE



PARTICIPATORY IRRIGATION MANAGEMENT (PIM)



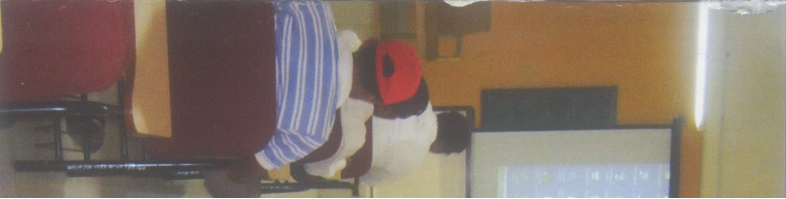


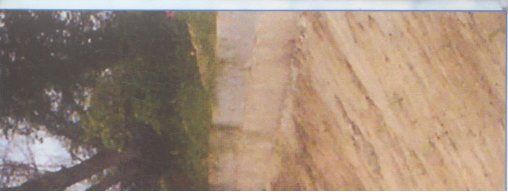


Participatory Irrigation Management (PIM)

Innovative Approach

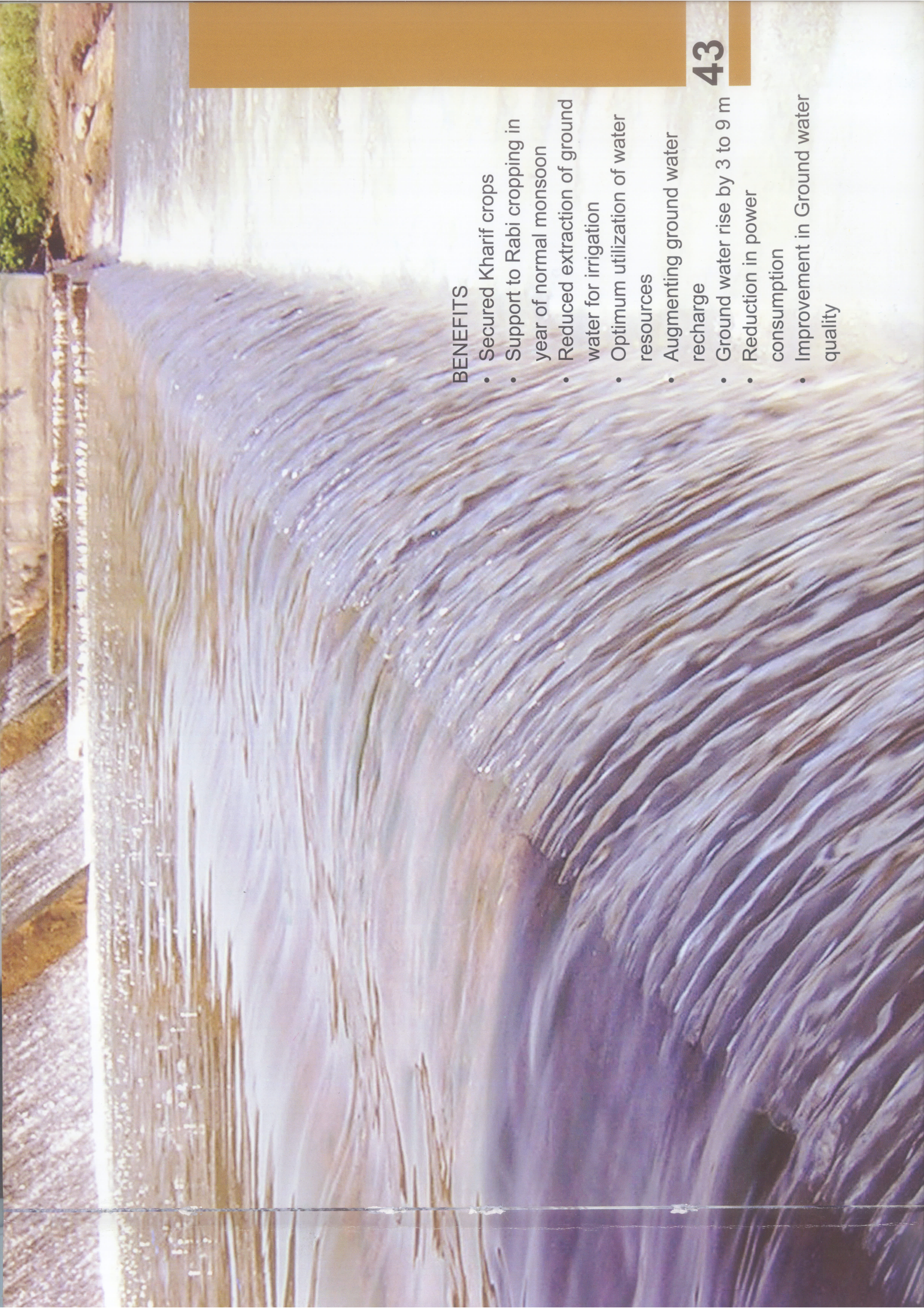
- To ensure that irrigation water be distributed efficiently and equitably in the command area.
- Involvement of beneficiaries and stakeholders in irrigation management
- Enactment of PIM act -2007
- Formation of 2412 Surface Water users association (WUA)
- Rehabilitation of canals by Govt. before handing over
- 90% of cost for community mobilization is borne by Govt.
- Involvement of experienced farmers in PIM promotion.
- Increasing Women's participation in the WUA.
- Area Covered Under Surface Water PIM : 6,31,336 Ha.
- Formation of 2324 Ground Water users association (WUA)
- Area Covered Under Ground Water PIM : 34,860 Ha.





TOWARDS WATER CONSERVATION

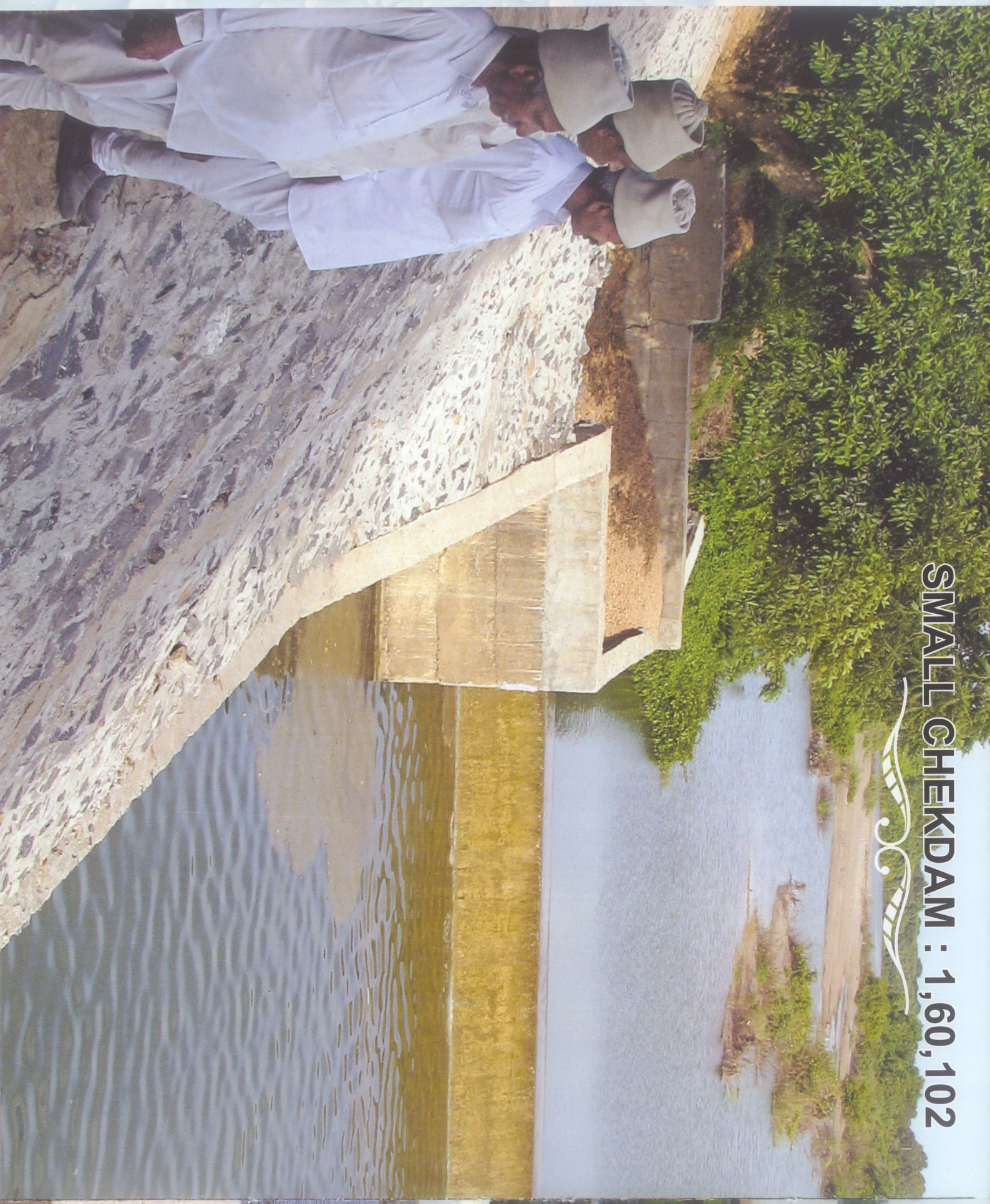




BENEFITS

- Secured Kharif crops
- Support to Rabi cropping in year of normal monsoon
- Reduced extraction of ground water for irrigation
- Optimum utilization of water resources
- Augmenting ground water recharge
- Ground water rise by 3 to 9 m
- Reduction in power consumption
- Improvement in Ground water quality

SMALL CHEKDAM : 1,60,102

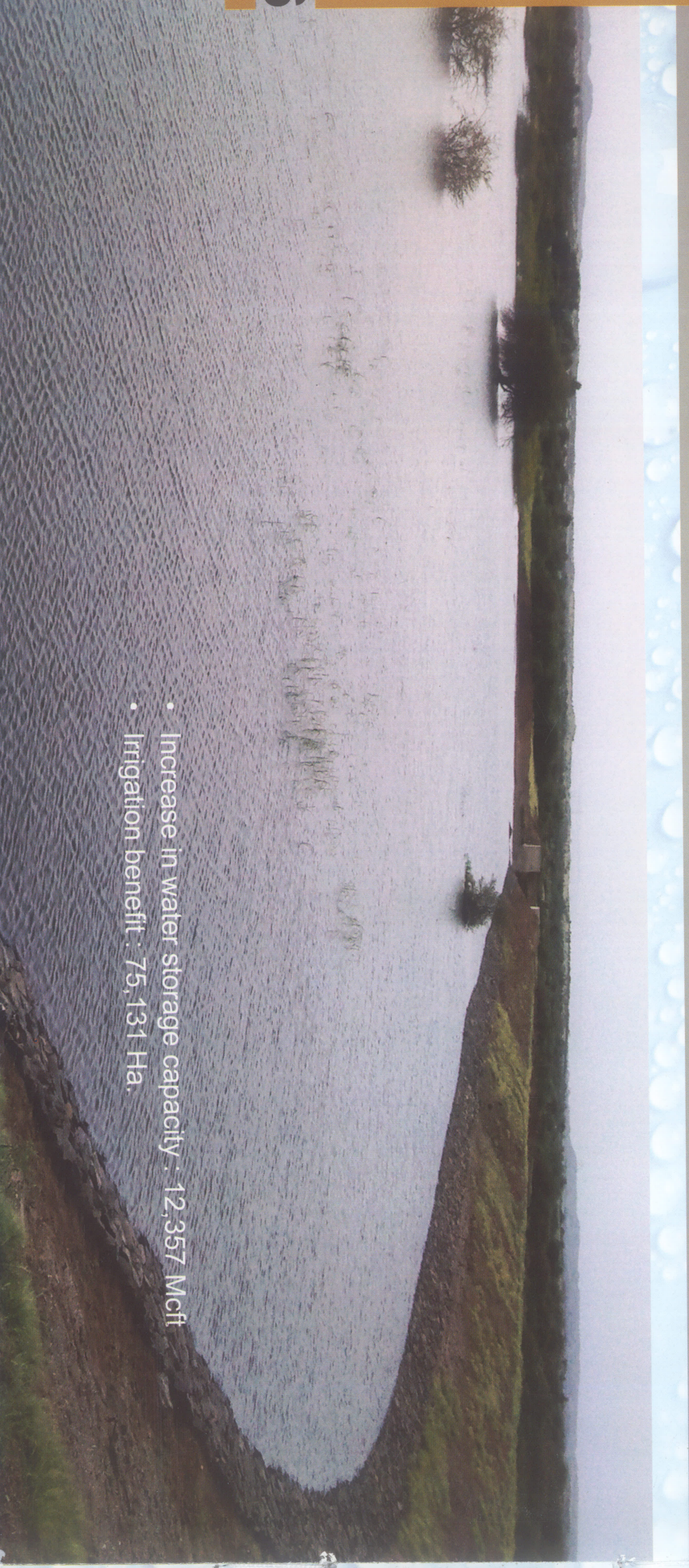
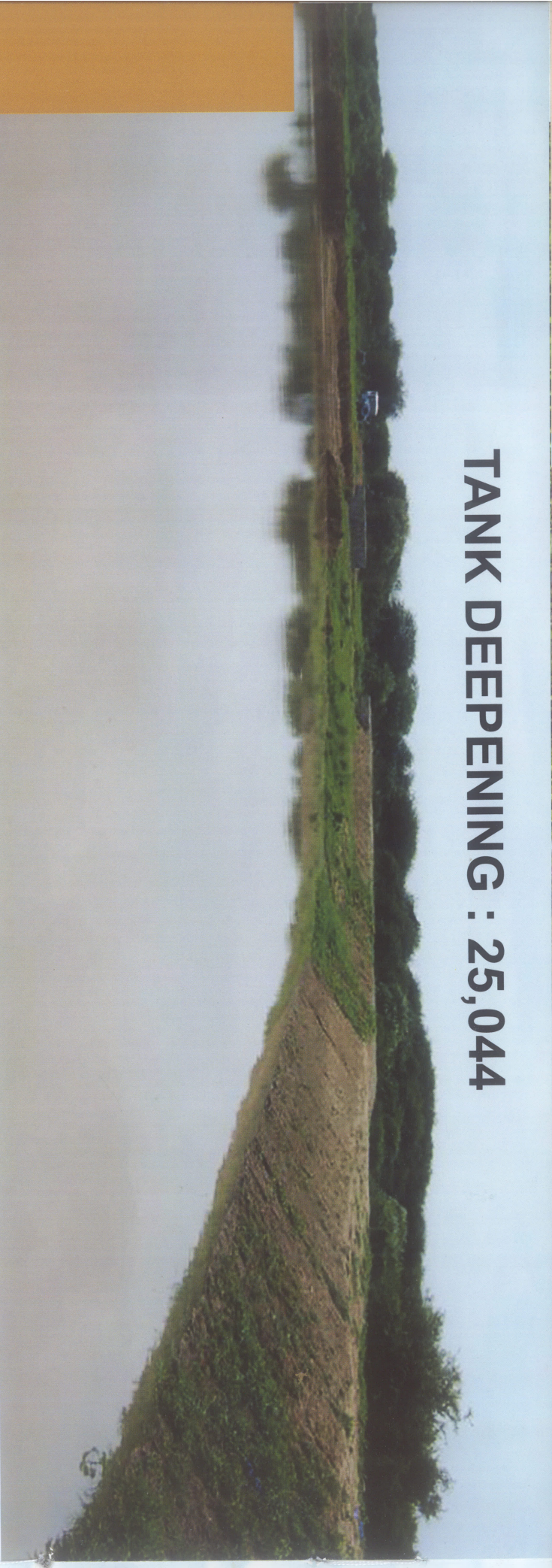


LARGE CHEKDAM : 5,045



- Increase in water storage capacity: 27,587 MCFT
- Irrigation benefit : 4,11,715 Ha.

TANK DEEPENING : 25,044



- Increase in water storage capacity : 12,357 Mcft
- Irrigation benefit : 75,131 Ha.

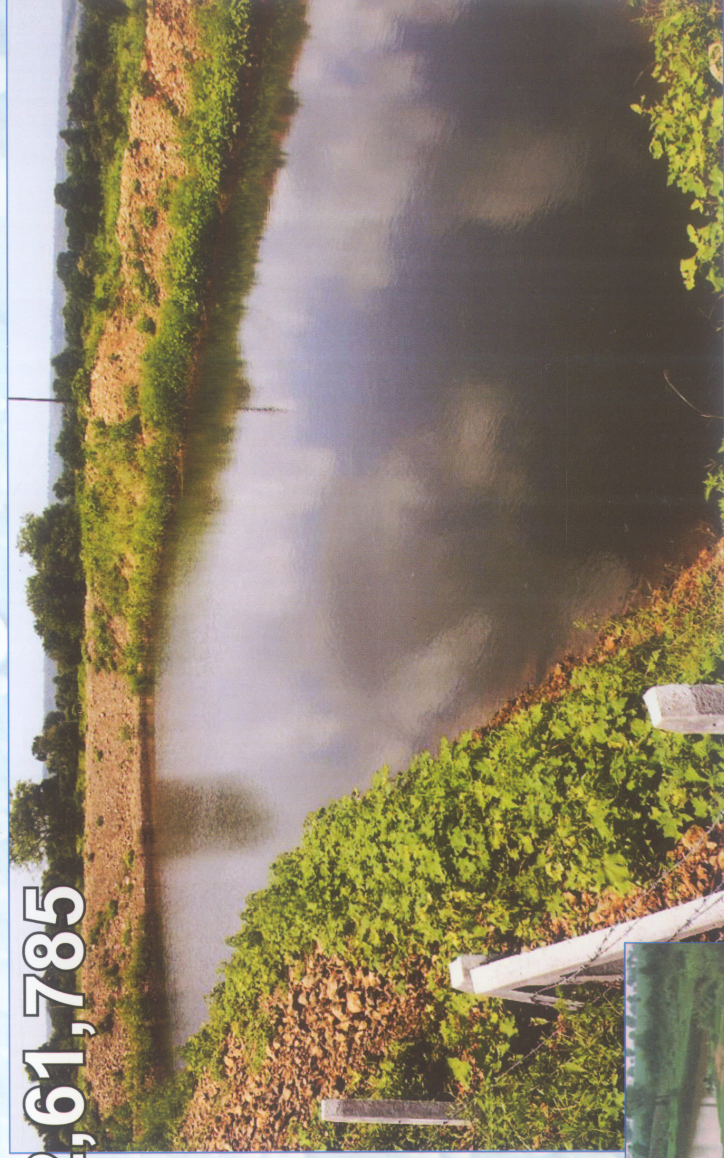
BORI BUNDS : 1,22,035



Construction of temporary dykes of Gunny bags to conserve water at low cost

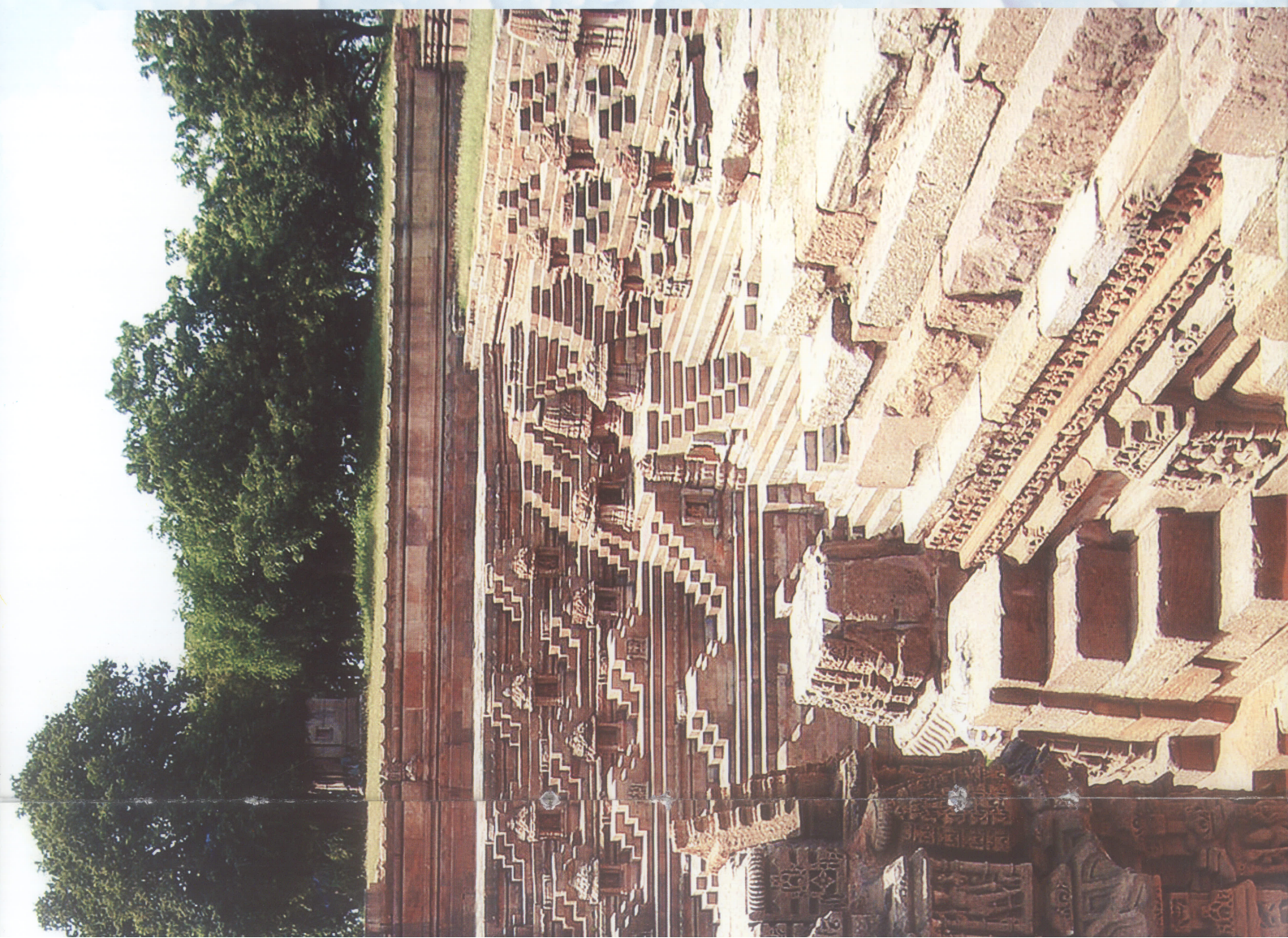
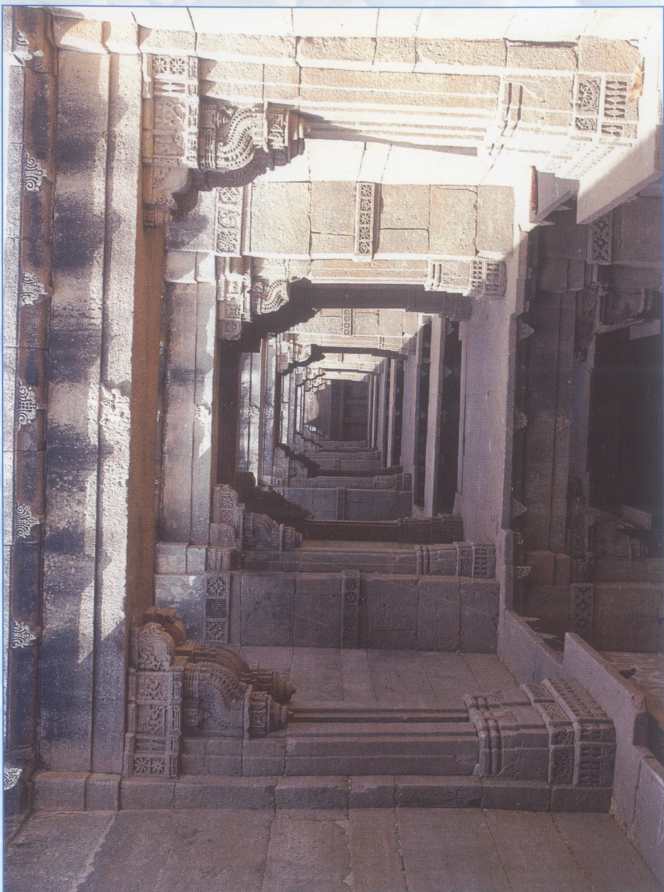
FARM PONDS : 2,61,785

Khet- Talavadi scheme received International Recognition from Commonwealth association for Public administration and Management



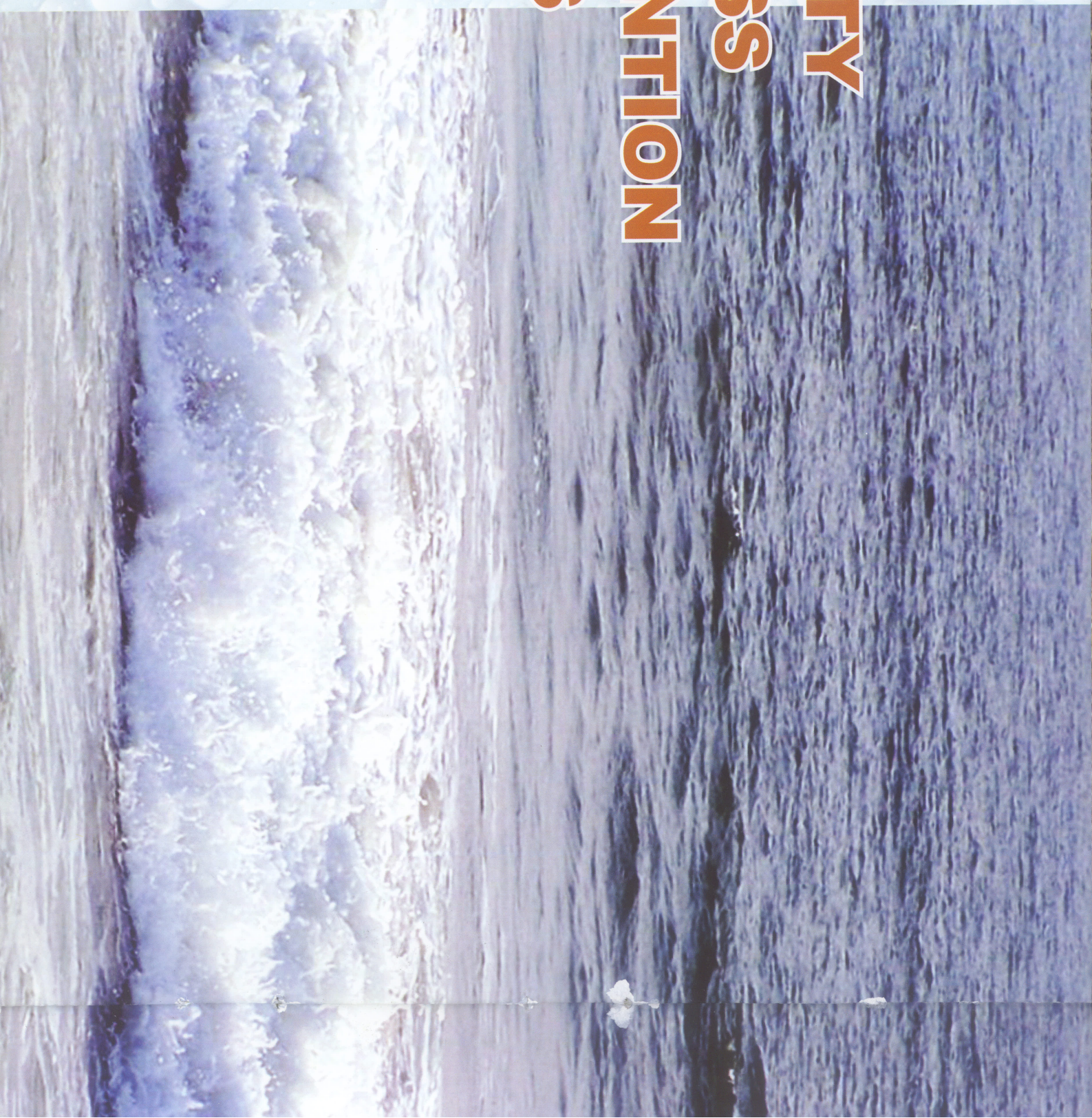
REVIVAL OF JAL MANDIR : 1,000





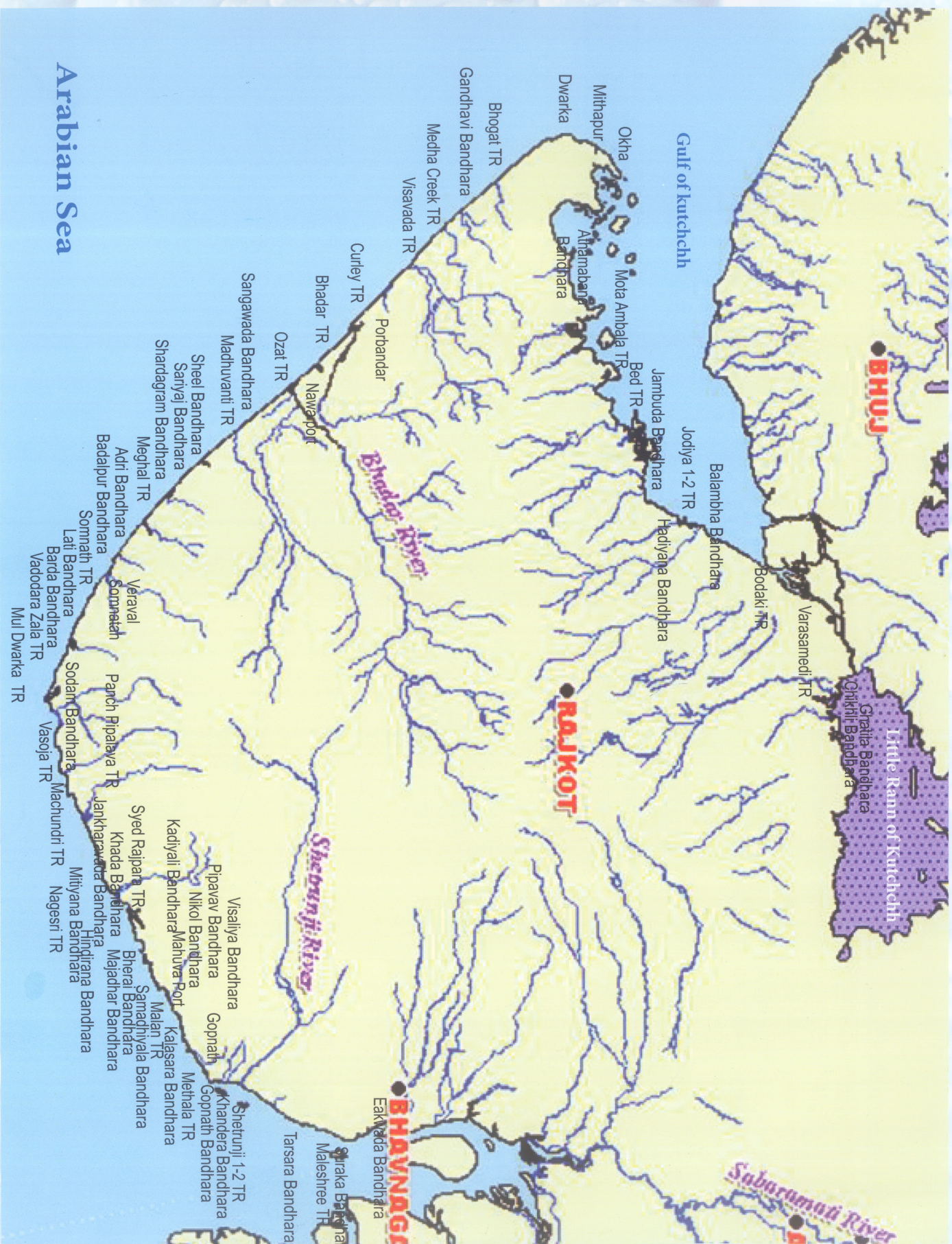
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SALINITY INGRESS PREVENTION WORKS



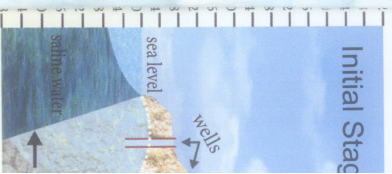


Arabian Sea

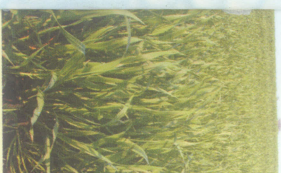


Sal

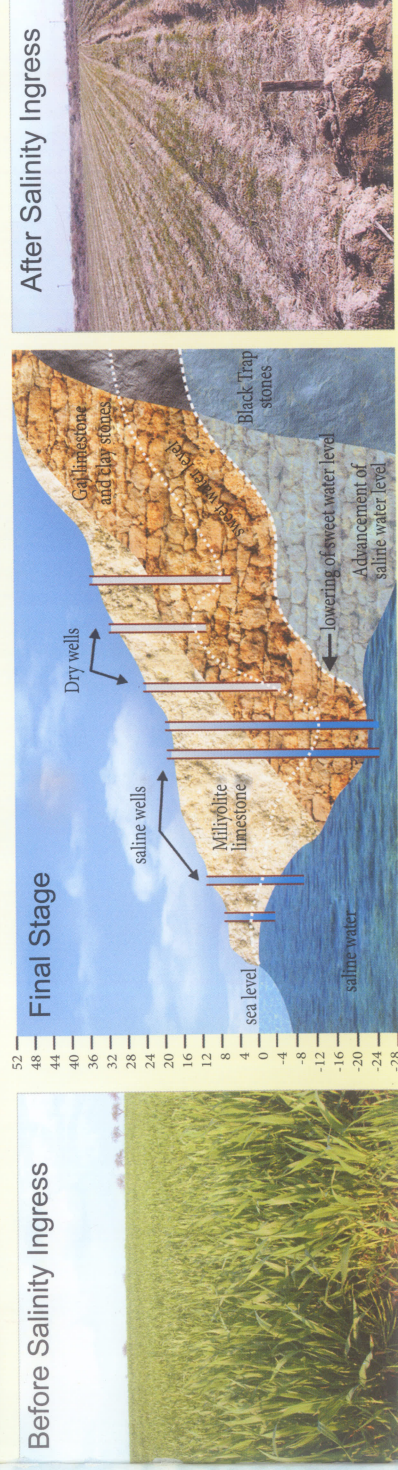
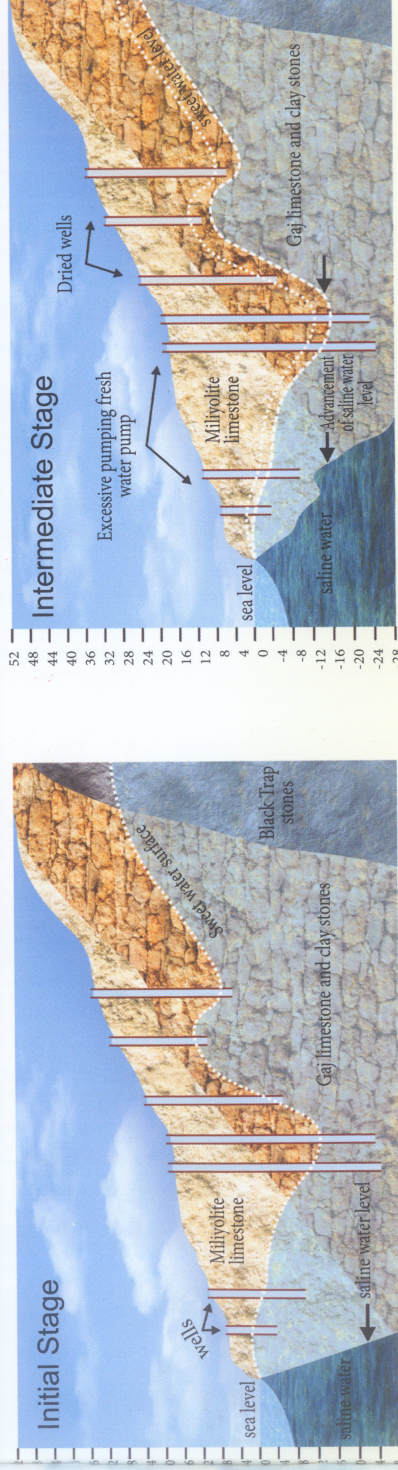
Initial Stage



Before Salir

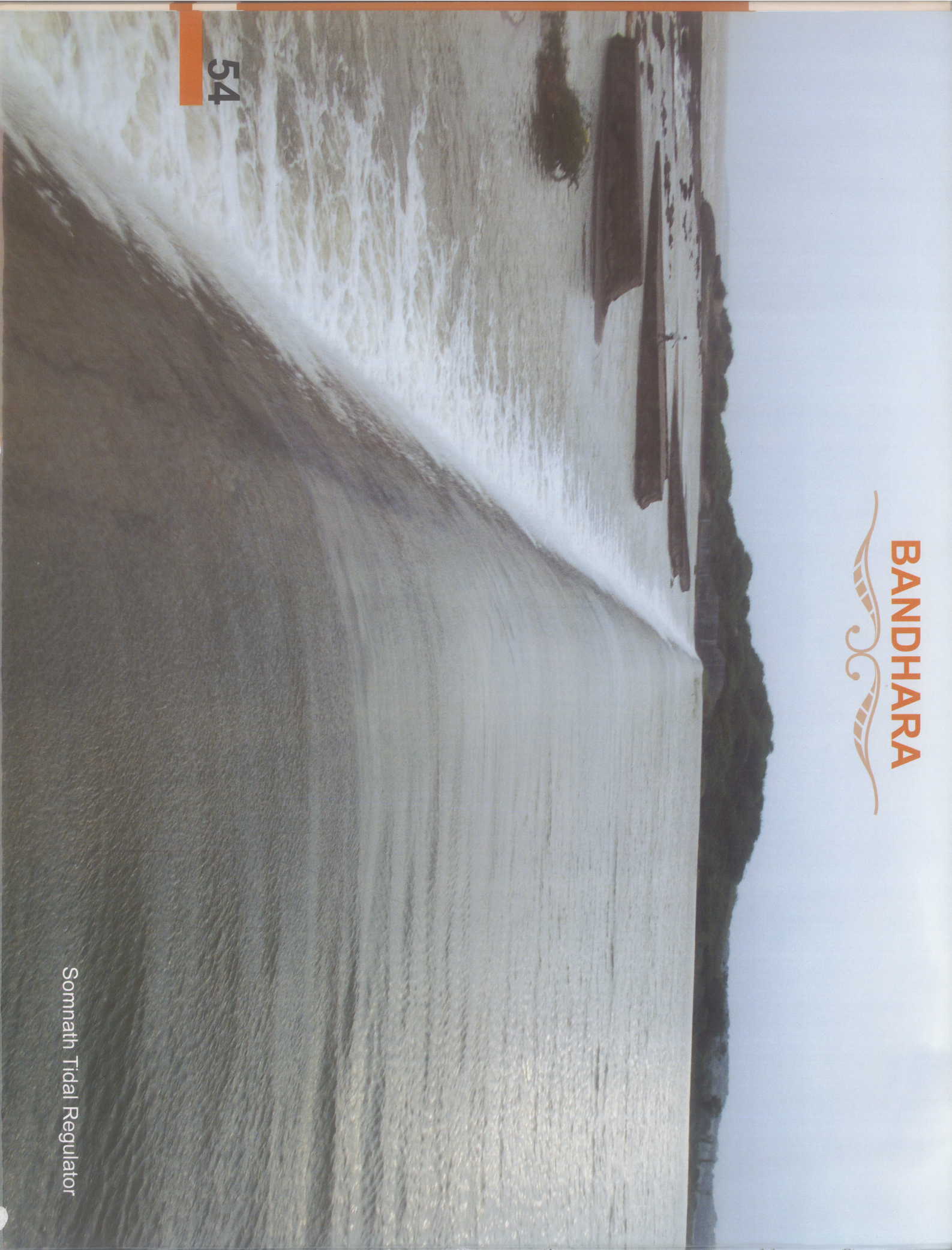


Salinity Ingress prevention in Coastal Area



- Gujarat has longest sea coast in India : 2125 km
- Measures to control salinity Ingress
 - Tidal regulators and Bandharas : 97
 - Recharge Reservoir and tanks : 50
 - Spreading channel : 215 km
 - Radial canal : 228 km
 - Checkdams : 881
 - Recharge wells: 1152
 - Nalaplugging : 4487
 - Afforestation : 5867 Ha.
- Salinity Ingress reduced and Improvement in Ground Water quality.

BANDHARA



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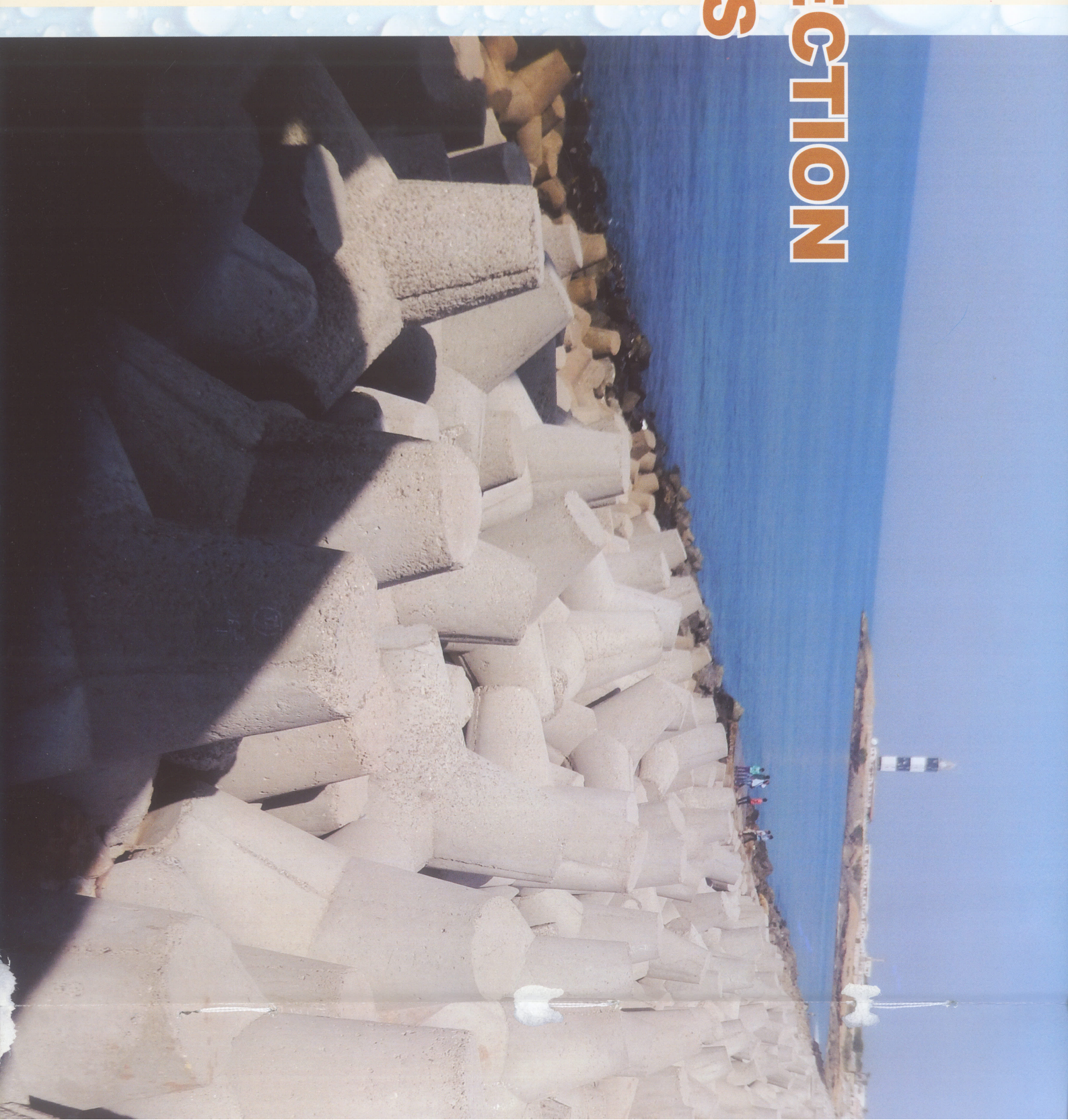
Somnath Tidal Regulator



SPREADING CHANNEL

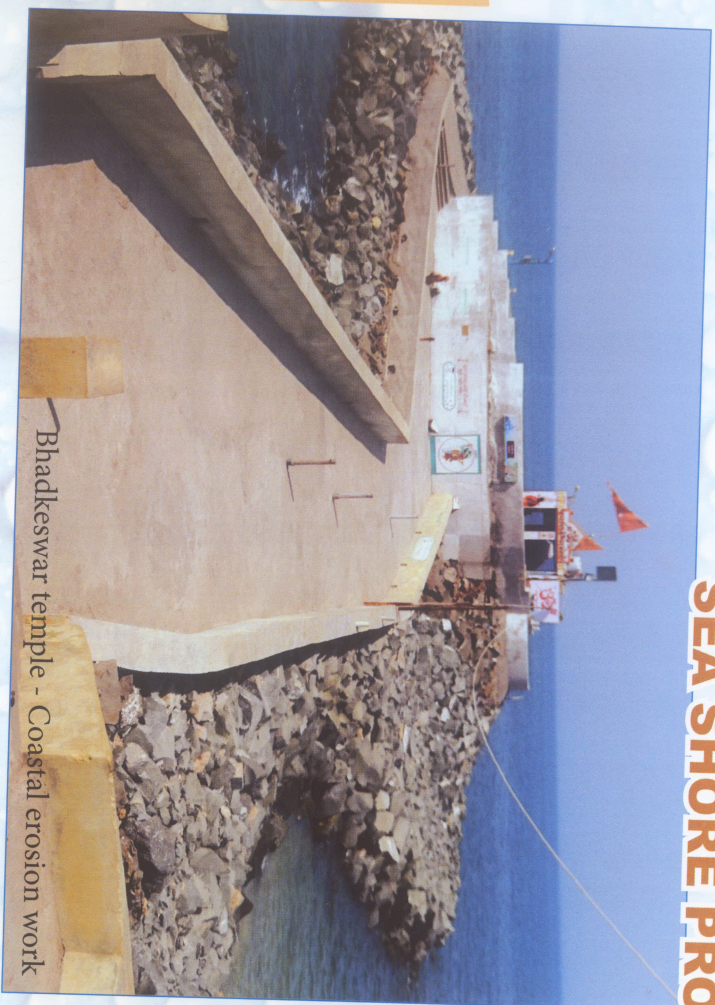


PROTECTION WORKS

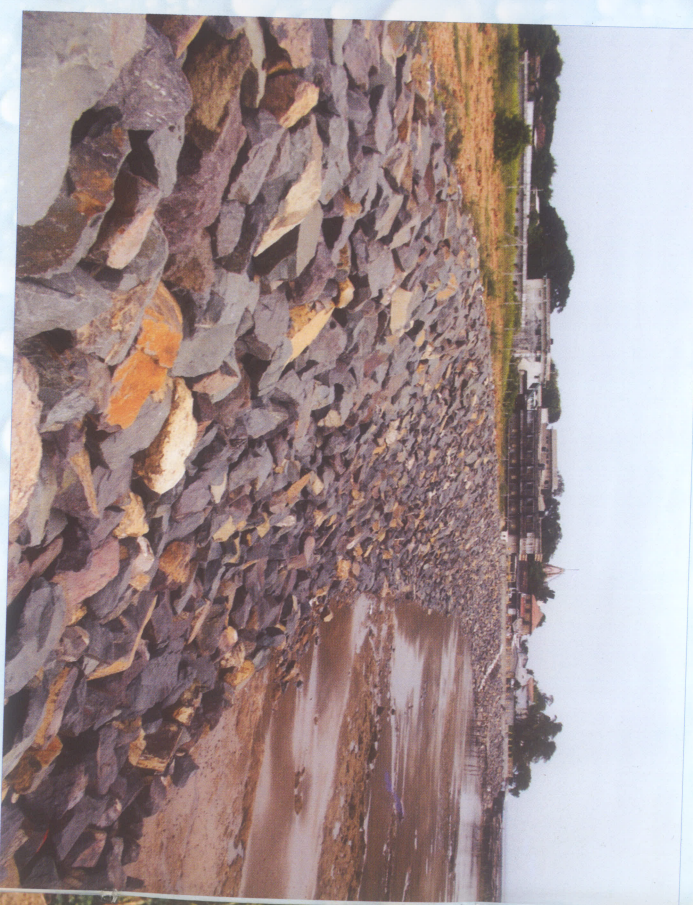




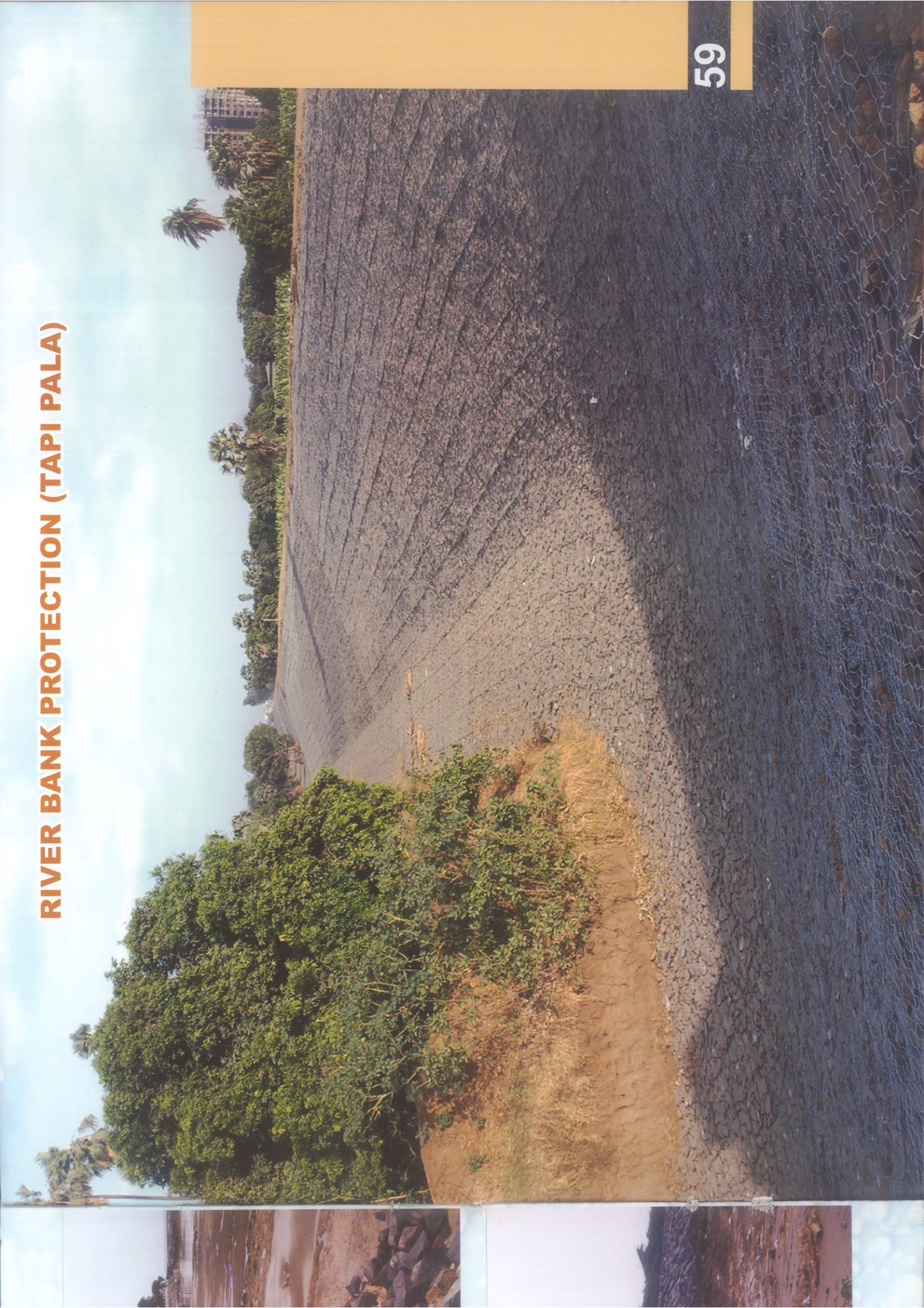
SEA SHORE PROTECTION

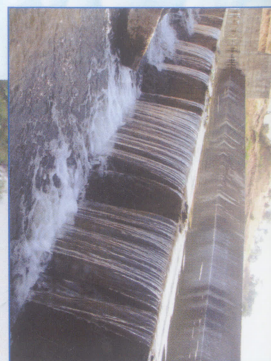


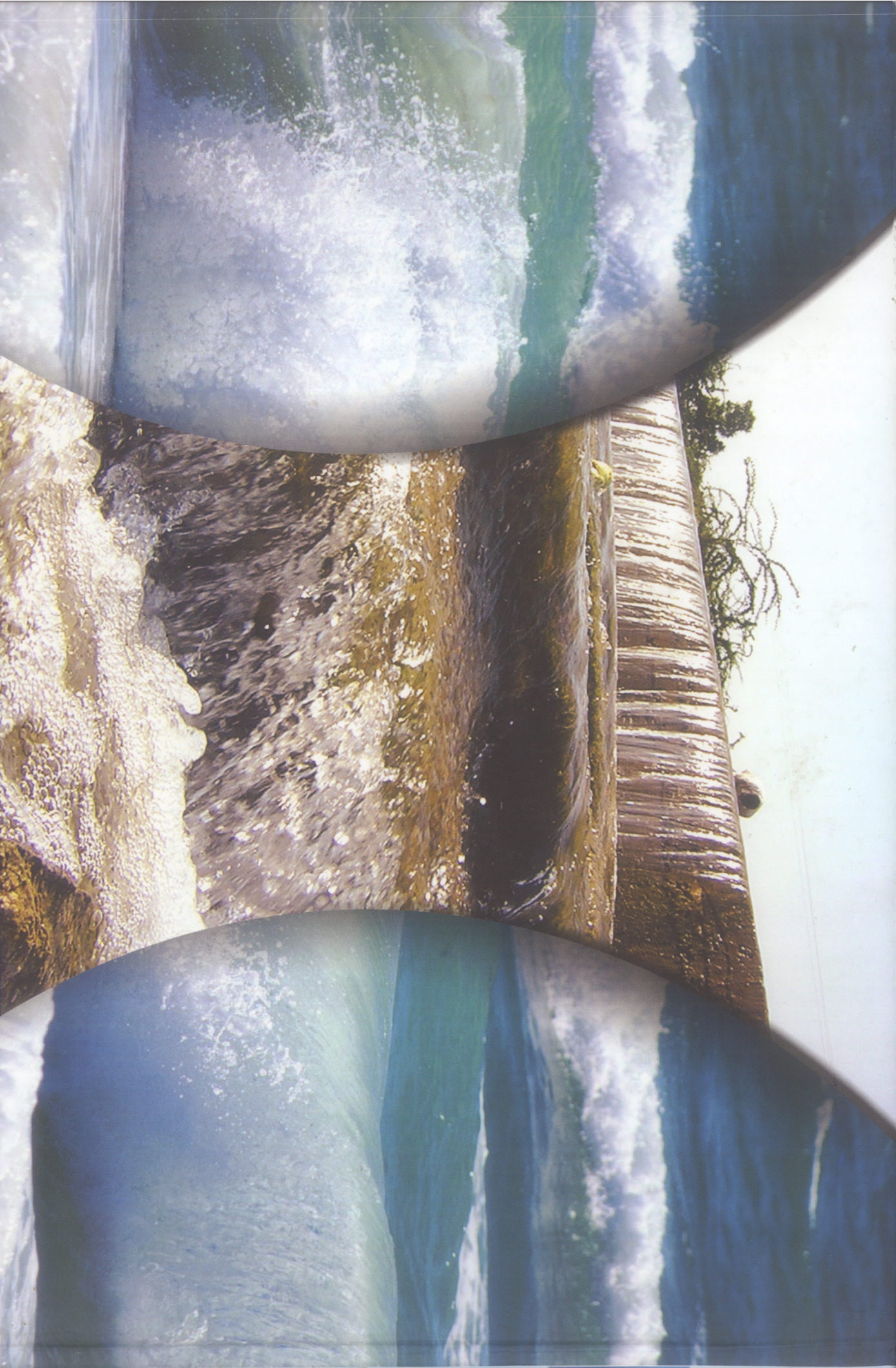
Bhadkeswar temple - Coastal erosion work



RIVER BANK PROTECTION (TAPI PALA)







Water
Resources
Department
WRD

WATER RESOURCES DEPARTMENT

NARMADA, WATER RESOURCES, WATER SUPPLY & KALPSAR DEPARTMENT,

GOVERNMENT OF GUJARAT