सत्यमेव जयते

Government of India
Ministry of Water Resources

RIVER BASIN ATLAS OF INDIA

Central Water Commission
Ministry of Water Resources
Sewa Bhawan, R.K. Puram
New Delhi – 110 066

Regional Remote Sensing Centre – West
National Remote Sensing Centre
ISRO, Department of Space
CAZRI Campus, Jodhpur – 342 003

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Cover page depicts DEM and hillshade view over part of Narmada basin.

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इंडिया-वारिस
India-WRIS

A Joint Project of CWC and ISRO

देश में जल संसाधन आँकड़ों का जनन व वेब सामर्थ्य सूचना प्रणाली का क्रियान्वयन

Generation of Database and Implementation of Web Enabled Water Resources Information System (India-WRIS) in the country

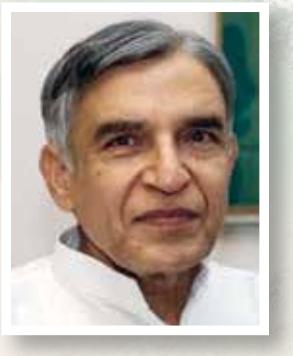
पवन कुमार बंसल
PAWAN KUMAR BANSAL

सत्यमेव जयते

संसदीय कार्य एवं जल संसाधन मंत्री
भारत सरकार
नई दिल्ली-110001
MINISTER OF PARLIAMENTARY AFFAIRS
&
WATER RESOURCES
GOVERNMENT OF INDIA
NEW DELHI-110001

23 AUG 2012

Foreword



India is endowed with a large number of rivers, some of them amongst the mightiest in the world. Indian rivers have a great significance in our socio-cultural and religious ethos and have played a vital role in shaping the history and spirituality of this vast land. Almost all major cities of India are located along the rivers. They are the veritable life-line of India and the livelihood of a large population is dependent on our rivers.

River basins are ideal units for planning and implementation of water resources projects. They provide ecologically sound and economically cost effective solutions for development and conservation. Basins have defined water boundaries within which there is an inter-relationship between the surface and groundwater resources and provide basis for planning overall development activities. The basin planning also presents comprehensive development possibilities of land and water resources to meet the anticipated regional and local needs.

The National Water Policy, inter-alia lays down that planning and development of water, the precious natural resource needs to be governed by the national perspective. Resource planning in case of water is to be done for a hydrological unit such as drainage basin as a whole or for a sub-basin. All individual projects and proposals need to be formulated by the states and considered within the framework of such an overall plan for basin or sub-basin.

The 'River Basin Atlas of India' is an outcome of joint project 'Generation of Database and implementation of Web Enabled Water Resources Information System (India-WRIS) in the country', is a timely publication by the Central Water Commission (CWC) and Indian Space Research Organisation (ISRO).

This is a comprehensive publication which gives detailed information of major water resources projects along with the location of all hydrological observation sites including major dams, barrages etc. in all the river basins of India. All these features have been portrayed on the maps with river network, major cities and terrain in background. This Atlas is also enriched with relevant ancillary information like basin wise land use/land cover, Parliament constituencies as well as state wise basin area.

I compliment the India-WRIS project team for doing a commendable job in bringing out this national river atlas. I am sure that it will serve a long felt need of comprehensive information about all our river-basin systems and help in planning and management of our water resources and related matters.

(PAWAN KUMAR BANSAL)

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सत्य पाल काकरान
S P KAKRAN

सत्यमेव जयते

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CENTRAL WATER COMMISSION
Ministry of Water Resources
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Preface

Water resources and their development are pivotal to growth of any civilized society. India with 2.4 % of global geographic area supports 17.5 % of human population through 4 % of world's fresh water resources. The river system in India is classified into four groups - Himalayan Rivers, Deccan Rivers, Coastal Rivers and River of Inland Drainage. It has been divided into twelve major basins and eight composite basins. These twenty basins are shown in the River Basin Atlas of India.

India is among the foremost countries in the world in exploiting its river water resources after independence for irrigation, generation of hydro-power and water supply. Being an agrarian society, Irrigation had acquired increasing importance in agriculture. India has the highest irrigated land in the world today. This is achieved through construction of 5125 dams and number of barrages, weirs, etc.

The River Basin Atlas of India has been prepared by Central Water Commission and Indian Space Research Organization initiated project `India-WRIS' presents broadly the status of water resources development in each of the river basins as per CWC classification. All important major dams, barrages, weirs, reservoirs and multipurpose projects have been shown in the Atlas. The hydrological and Flood Forecasting observation sites of Central Water Commissions are also marked in the basin maps.

I would like to acknowledge the contribution and guidance provided by Shri Rajesh Kumar, Member (WP&P), CWC, Shri W.M. Tembhurney, Chief Engineer (EMO) and Dr J. R. Sharma, Project Director, India-WRIS in finalization of this Atlas. My special appreciation is also due for Shri Yogesh Paithankar, Director (Remote Sensing Dte.), CWC, Shri Alok Pal Kalsi, Deputy Director, CWC and other officers from ISRO and CWC for their dedicated work which has helped in bringing out this Atlas.

This atlas shall be a very useful reference for diverse users, like, Ministry of Water Resources, Agriculture, Rural development etc. of union government and various line departments of state governments and several non-governmental organizations, research institutes involved in natural resources management in the country.

Chairman
Central Water Commission

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Preface

Realizing the importance of periodic natural resources inventory, National Remote Sensing Centre (NRSC) under the Indian Space Research Organization (ISRO) of the Department of Space, Government of India has carried out several national level projects to generate spatial database on land, water and vegetation using satellite remote sensing technology for monitoring and management of natural resources in the country. Water, a scarce natural resource, is fundamental to life, livelihood and food security. India has only 4% of world's water resources to support more than 17 percent of the world's population. Due to rapid rise in population and food demand, growing economy and improving living standards; the pressure on our water resources is increasing with time and that needs an integrated approach for management of water resources.

In the emerging knowledge society and wide spread use to IT tools in different sectors, up-to-date information on water resources is vital to support economic development, improve the quality of life as well as to conserve the nature. Water resources management requires a multi-disciplinary approach that combines a collection of technical tools, expertise along with stakeholders of diverse interests, priorities in planning and management and for this an operational water resources information system at national level is the first requirement.

In this respect, at the behest of Central Water Commission (CWC), Ministry of Water Resources (MoWR), NRSC / ISRO has jointly conceptualised and executing the project India-WRIS WebGIS *(http:www.india-wris.nrsc.gov.in)* aimed as 'Single Window' solution of all water resources related data and information in a standardized GIS format. The current version of this scalable web-enabled information system provides comprehensive, authoritative and consistent data of India's water resources along with allied natural resources data and information, tools to search, access, visualize, understand, look into context and study the spatial patterns. Based on the requirements and data availability, comprehensive information have been collected, thoughtfully organised in GIS environment under 12 major and 30 sub information systems having large number of attributes and temporal data sets in a rich user interface for easy access and use.

The project team has also brought out 'River Basin Atlas of India' as one of the outcomes under India-WRIS project. It depicts snapshot of present status of water resources development in all the basins of the country with details of major water resources projects, hydrological observations, terrain and rainfall variability as well as land use / land cover.

My compliments to the entire project team for bringing out this publication. I hope this atlas would serve as a useful reference to all the stakeholders involved in water resources development and management in the country.

11|10|12

Dr. K. Radhakrishnan
Chairman, ISRO & Secretary, DOS

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Acknowledgements

Optimal management of water is the necessity of time in the wake of development and growing need of population. Realizing the need for effective and economical management of our water resources, National Water Policy (2002) emphasizes the development of "Water Resources Information System" for the country. In this regard, Central Water Commission (CWC) and National Remote Sensing Centre (NRSC) of Indian Space Research Organization (ISRO) have jointly conceptualized and are executing project India-WRIS WebGIS *(http:www.india-wris.nrsc.gov.in)* aimed as 'Single Window' solution of all water resources related data and information in a standardized GIS format.

This Atlas is one of the publications of India-WRIS project showing River basins of India as per CWC classification; depicting snapshot of present status of water resources development, major water resources projects, hydrological observations sites, terrain and rainfall variability as well as land use / land cover and basin wise parliament constituencies along with country level maps to provide overview of water scenario in the country. This Atlas is published through compilation of information from various sources, as well as technical and administrative support from large number of professionals and stakeholders in design and development of data sets for the publication.

We, on behalf of the authors and project team of India-WRIS project acknowledge; Hon'ble Union Minister for Water Resources, Shri Pawan Kumar Bansal; Minister of State for Water Resources, Shri Vincent H. Pala; Shri Dhruv Vijay Singh, Secretary, Ministry of Water Resources; Shri G. Mohan Kumar, Additional Secretary, Ministry of Water Resources; Shri R.C. Jha, Ex-Chairman, Central Water Commission; Shri S.P. Kakran, Chairman, Central Water Commission; Dr. K. Radhakrishnan, Chairman, Indian Space Research Organization and Secretary, Department of Space; Shri. V. Venkateshwara Bhat, Secretary to GOI and Member- Finance, Department of Space; Shri Sudarsanam Srinivasan, Additional Secretary, Department of Space; Shri A. Vijay Anand, Joint Secretary, Department of Space; Dr. V. Jayaraman, Ex-Director, NRSC and Dr. V.S. Hedge, MD, AC, for constant encouragement and guidance, technical discussions and for evincing keen interest in India-WRIS project execution and this atlas.

Our foremost acknowledgement is towards India-WRIS project team who created and organized large number of data and information in GIS format as seamless WebGIS framework for the entire country of all spatial layers and attribute data which served as base for this atlas. Thanks are also due to all CWC and ISRO officials who carried out the quality assurance and shown their enthusiastic involvement. Finally, our sincere thanks are to all divisions and officials of NRSC and CWC for their valuable support during the preparation of atlas.

Dr. J R Sharma
Project Director, India-WRIS

Er. Yogesh Paithankar
Director, CWC & Project In-charge, India-WRIS

Contents

Acronyms

BCM	Billion Cubic Meter
BR	Balancing Reservoir
CCA	Culturable Command Area
EFR	East Flowing Rivers
G	Gauge stations
GD	Gauge and Discharge stations
GDQ	Gauge, Discharge and Water Quality stations
GDS	Gauge, Discharge and Sediment stations
GDSQ	Gauge, Discharge, Sediment and Water Quality stations
FF	Flood Forecasting stations
GSC	Gross Storage Capacity
HE Project	Hydro Electric Project
IC	Installed Capacity
LBC	Left Bank Canal
LSC	Live Storage Capacity
MCM	Million Cubic Meter
MW	Mega Watt (MW)
PSS	Pumped Storage Scheme
RBC	Right Bank Canal
Sq. Km	Square Kilometer
Th ha	Thousand Hectare
U/C	Under Construction
WFR	West Flowing Rivers

Introduction

India is seventh-largest country with geographical area 32, 87,263 km² (2.45% of the World's land resources) and the second-most populous country with over 1.2 billion people (17.5% of the World's population) and holds 4% of the world's fresh water resources.

Access to water is a major factor in development. Every year India receives 4,000 BCM of water, out of which, the available water accounts for 1,869 BCM. Out of this total available water, the utilizable water from surface water resources is 690 BCM and from ground water resources is 433 BCM, adding upto only 1,123 BCM. As per Central Water Commission, the per capita availability of water is 1,588 cubic meter per year (2010) which is sufficient as of now against the benchmark value of 1,000 cubic meter per capita per year as 'Water Stressed" condition. In the shadow of continued population growth, water availability projected for the year 2025 is 1,434 cubic meter per capita per year.

Being an agrarian country a major part of water resources withdrawal is used for irrigation. Over the years, India has made remarkable progress through high level engineering expertise permitting the storage and diversion of large capacities of water. As on July 2007, total live storage capacity of all basins assessed is 282 BCM with 5,125 large dams and 1,894 number of Major and Medium irrigation projects.

All water resources projects of the basin should be considered for basin level planning to achieve optimal development of the water resources. In the initial stages of development, interactions between projects of different states were absent and each project could be planned and implemented independently. As the demand for water has increased due to increase in the developmental activities as well as increase in population, interactions between individual projects have come into play and have called for integrated development of river basins.

The National Water Policy of India (2002) recognizes that development and management of water resources need to be governed by national perspectives and aims to develop and conserve the water resources in an integrated and environmentally sound basis. It emphasizes development of our water resources by intensifying research efforts with use of space technology and developing an information system.

First systematic delineation of river basins was done in the year 1949 by CWC erstwhile Central Waterways, Irrigation and Navigation Commission (Renamed as Central Water and Power Commission, CWPC in 1951). CWC has come up with 20 river basins comprising of 12 major river basins and 8 composite basins using Survey of India (SOI) toposheets and contour maps. Thereafter in 1990, AISLUS gave hydrological unit classification and came up with 35 basins. National Commission for Integrated Water Resources Development Plan (NCIWRDP) classified country into 24 basins in year 1990. Central Ground Water Board (CGWB) in 2006 concluded 34 basins. Each organisation has adopted different methodology and criteria for basin classification and hence arrived at different number of basins and its area.

Central Water Commission (CWC), Ministry of Water Resources, Govt. of India, and Indian Space Research Organisation (ISRO), Department of Space, Govt. of India, joined hands for development of Web-enabled Water Resources Information System of India (India-WRIS). Considering river basins as the basic hydrological units for water resources planning and management, the country is divided into 25 basins and 101 sub basins under India-WRIS project based on digital elevation model.

This publication is an effort to provide an overall water resources scenario in the country. The basin maps provided in this atlas are as per CWC basin classification. The maps are given with DEM and hillshade of the country as the background so as to provide topographical details. Total 22 river basin maps/plates of 20 CWC basins are generated indicating major dams, hydrological observation sites of CWC and major cities. The drainage network shows all major rivers and important tributaries. State wise distribution of basin area is also represented through pie charts. The culturable command area and ultimate irrigation potential of major irrigation projects in each basin is tabulated. Salient features of the basin like live storage capacity, catchment area and average water resource potential are also given in tabular form. An explanatory line diagram is given for each basin showing the course of major river from its origin to outfall and its tributaries along with headworks and photographs of water resource structures. To impart the geographical land use of the basin, land use / land cover map (2005-2006) is also given. Elevation zone and average annual rainfall maps with statistics are also provided. The parliamentary constituencies are also displayed within the river basin boundary.

Apart from this, thirteen country level maps of Administrative Boundaries, Population Growth, Parliamentary Constituencies, Water Resources Division, Water Resources Region, Hydrology of Indian Region, CWC Basins, India-WRIS Basins, India-WRIS Sub-Basins, Flood Forecasting Stations, Land use / Land cover, Average annual and monthly rainfall are also provided for complete insight of water scenario in the country.

The average annual rainfall and average monthly rainfall maps generated using IMD gridded data of 0.5° × 0.5° (1971 to 2005) are provided to envisage an overall idea of rainfall pattern in the country. IMD data has been interpolated using spatial interpolation techniques. Among available algorithms for interpolation, ordinary Kriging with exponential semi-variogram model shows best result. Based on average annual rainfall variation, the entire country has been divided in to 12 zones. Annual average rainfall variation map for each basin have also been generated using similar technique. The water resources division map depicts major hydrological divides based on drainage's outfalls of India and adjacent countries. In India-WRIS project the Water Resources Divisions are further divided into six regions viz., Indus, Rivers draining into Arabian sea, Rivers draining into Bay of Bengal, Brahmaputra Drainage, Minor Rivers draining into other country and Island drainages. The regions are further divided into 25 basins and 101 sub basins based on Digital Elevation Model.

In the Hydrology of Indian Region map, trans-boundary water inflow and out flow of the country is depicted for Indus, Ganga, Brahmaputra and Barak basins.

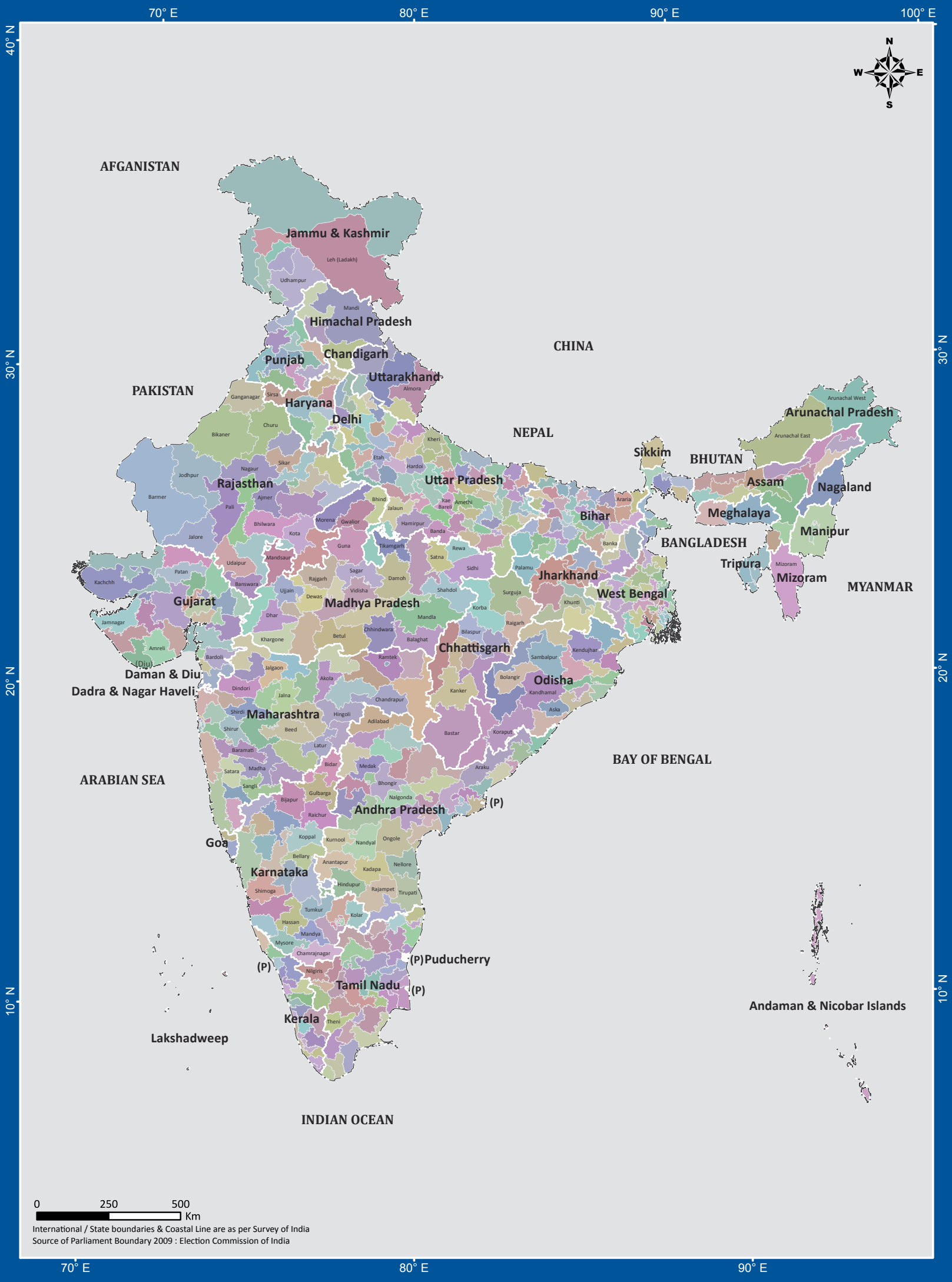
State-wise Area, Population, Population Growth and Parliamentary Constituencies

S. No	State Name	Reported Area (Sq. km)	Population (2001)	Population (2011)	Population Growth (%) (2001-2011)	No. of Parliamentary Constituencies (2009)
1	Jammu & Kashmir	222236	10143700	12548926	23.7	06
2	Himachal Pradesh	55673	6077900	6856509	12.8	04
3	Punjab	50362	24358999	27704236	13.7	13
4	Chandigarh **	114	900635	1054686	17.1	01
5	Uttarakhand	53483	8489349	10116752	19.2	05
6	Haryana	44212	21144564	25353081	19.9	10
7	Delhi **	1483	13850507	16753235	21.0	07
8	Rajasthan	342239	56507188	68621012	21.4	25
9	Uttar Pradesh	240928	166197921	199581477	20.1	80
10	Bihar	94163	82998509	103804637	25.1	40
11	Sikkim	7096	540851	607688	12.4	01
12	Arunachal Pradesh	83743	1097968	1382611	25.9	02
13	Nagaland	16579	1990036	1980602	-0.5	01
14	Manipur	22327	2293896	2721756	18.7	02
15	Mizoram	21081	888573	1091014	22.8	01
16	Tripura	10486	3199203	3671032	14.7	02
17	Meghalaya	22429	2318822	2964007	27.8	02
18	Assam	78438	26655528	31169272	16.9	14
19	West Bengal	88752	80176197	91347736	13.9	42
20	Jharkhand	79714	26945829	32966238	22.3	14
21	Odisha	155707	36804660	41947358	14.0	21
22	Chhattisgarh	135191	20833803	25540196	22.6	11
23	Madhya Pradesh	308245	60348023	72597565	20.3	29
24	Gujarat	196024	50671017	60383628	19.2	26
25	Daman & Diu **	112	158204	242911	53.5	01
26	Dadra & Nagar Haveli **	491	220490	342853	55.5	01
27	Maharashtra	307713	96878627	112372972	16.0	48
28	Andhra Pradesh	275045	76210007	84665533	11.1	42
29	Karnataka	191791	52850562	61130704	15.7	28
30	Goa	3702	1347668	1457723	8.2	02
31	Lakshadweep **	32	60650	64429	6.2	01
32	Kerala	38863	31841374	33387677	4.9	20
33	Tamil Nadu	130058	62405679	72138958	15.6	39
34	Puducherry **	479	974345	1244464	27.7	01
35	Andaman & Nicobar Islands **	8249	356152	379944	6.7	01
	Total (India)	3287240	1028737436	1210193422	Growth 17.6% (Average)	543

** Union Territories
Source: Census of India, 2011

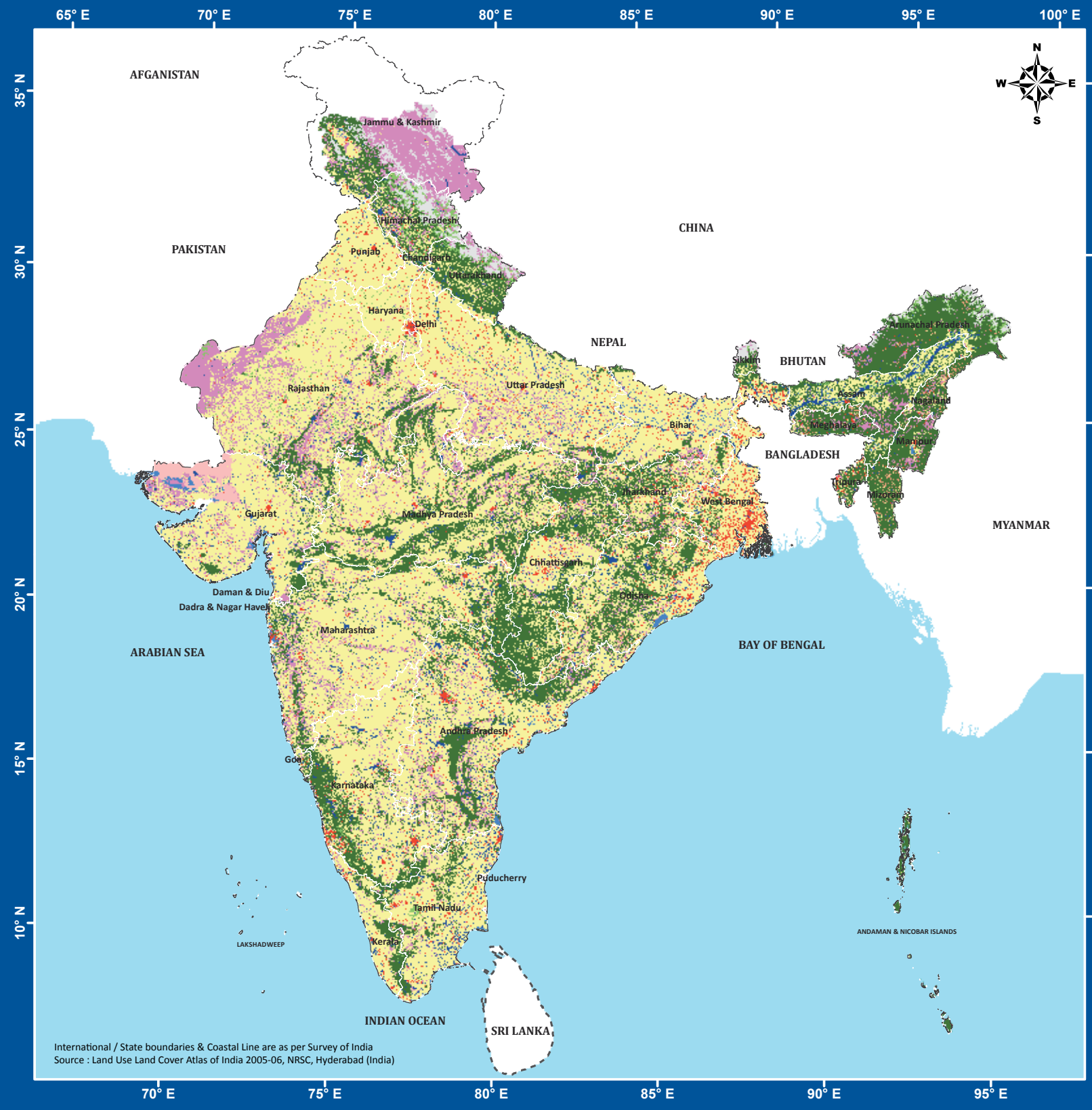
Administrative Units

PARLIAMENTARY CONSTITUENCIES (2009)

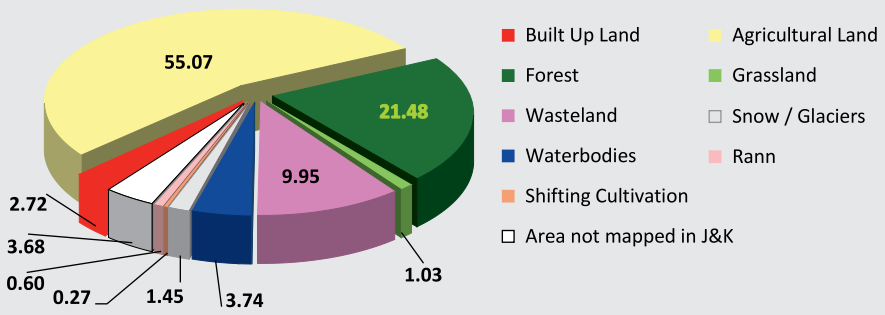


Population Growth (2001-2011)

Land Use / Land Cover (2005-2006)



Land Use / Land Cover Area (%)

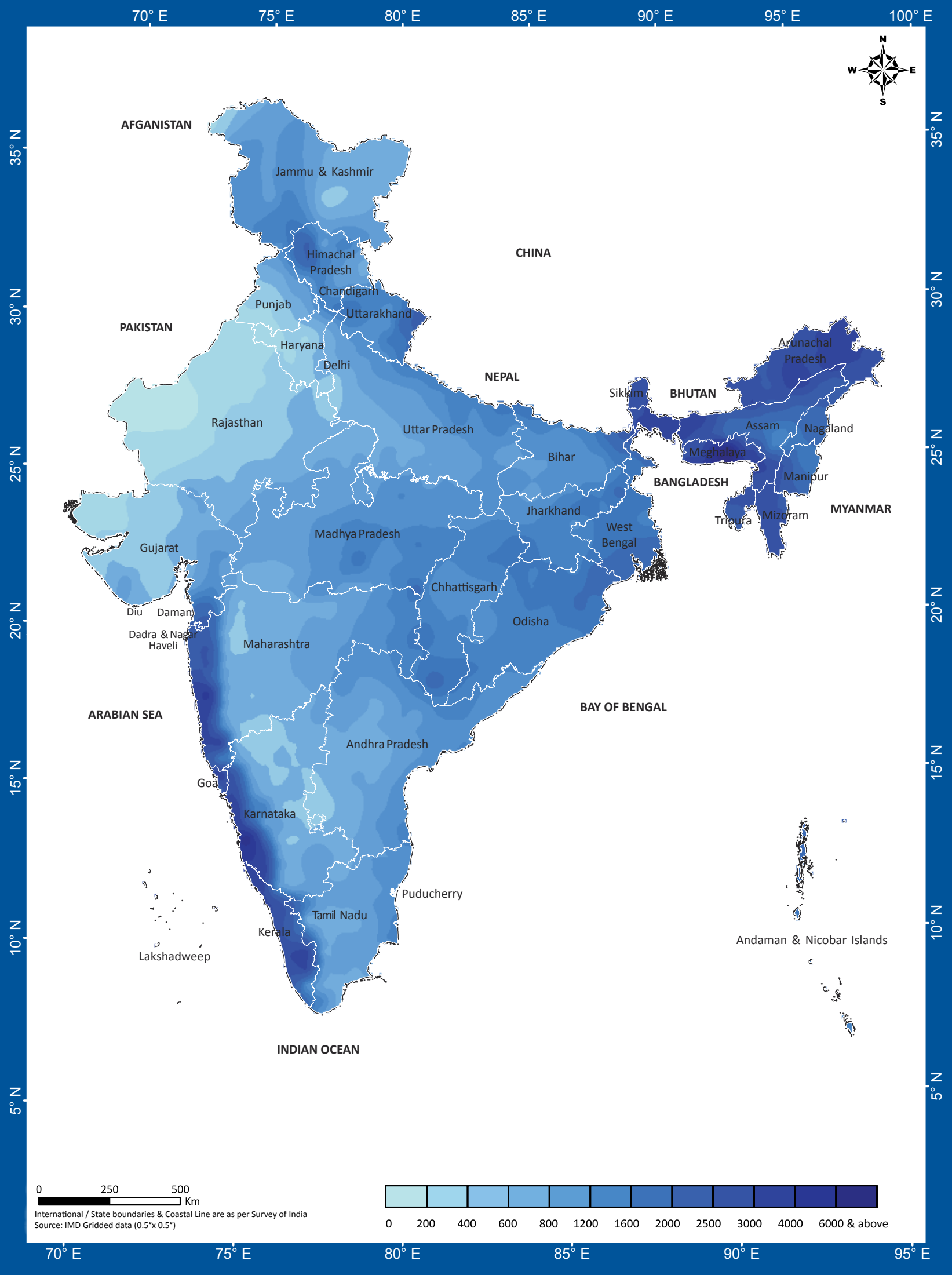


Land Use / Land Cover Area (Sq.km)

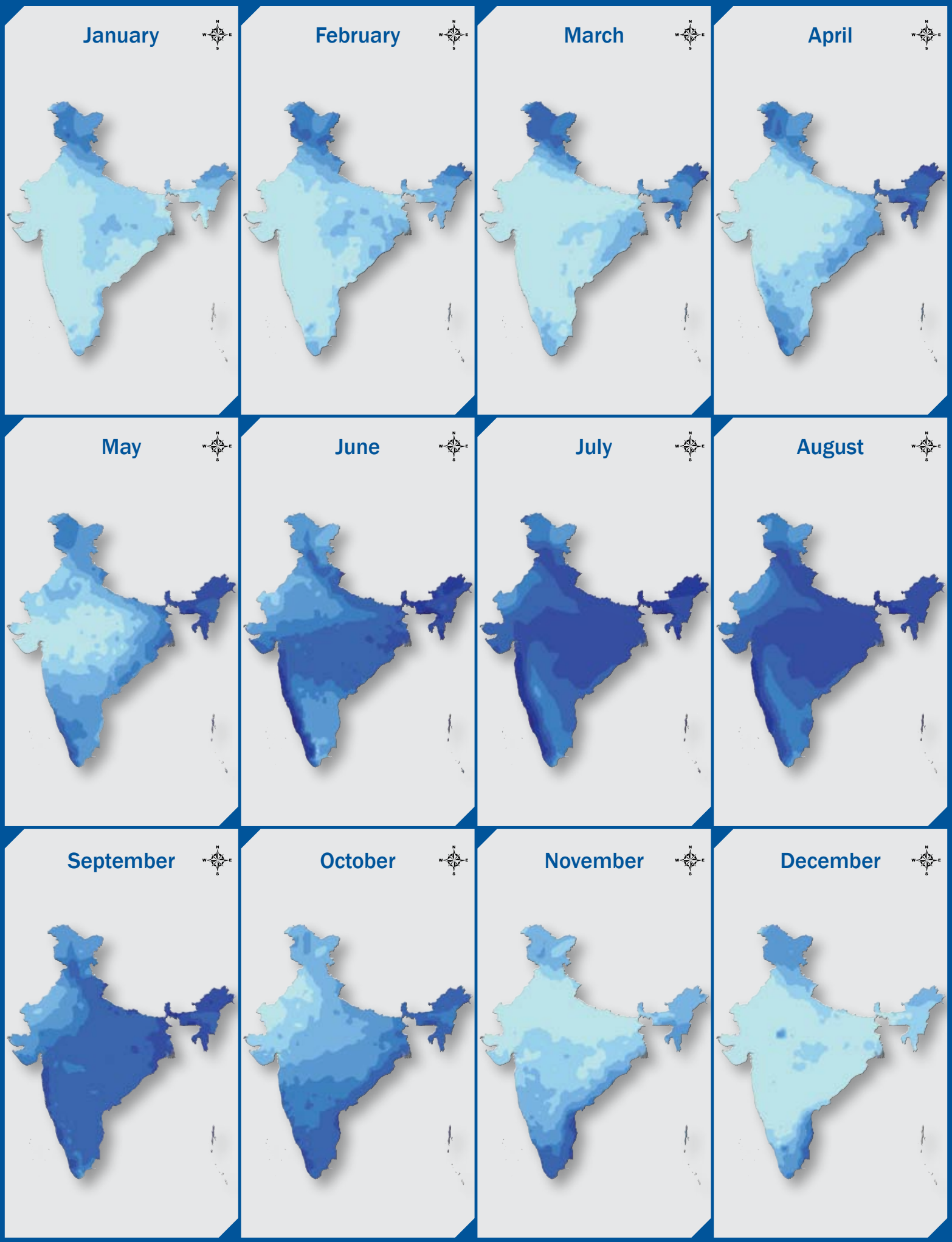
Category	Area (Sq.km)
Built Up Land	89363.8
Agricultural Land	1810403
Forest	706201.05
Grassland	33731.83
Wasteland	327111.63
Waterbodies	123166.90
Snow / Glacial	47773.87
Shifting Cultivation	8824.76
Rann	19837.17
Area not mapped in J&K	120849
TOTAL	3287263

Source: Land Use Land Cover Atlas of India (Based on Multi-temporal Satellite Data of 2005-06), April 2011

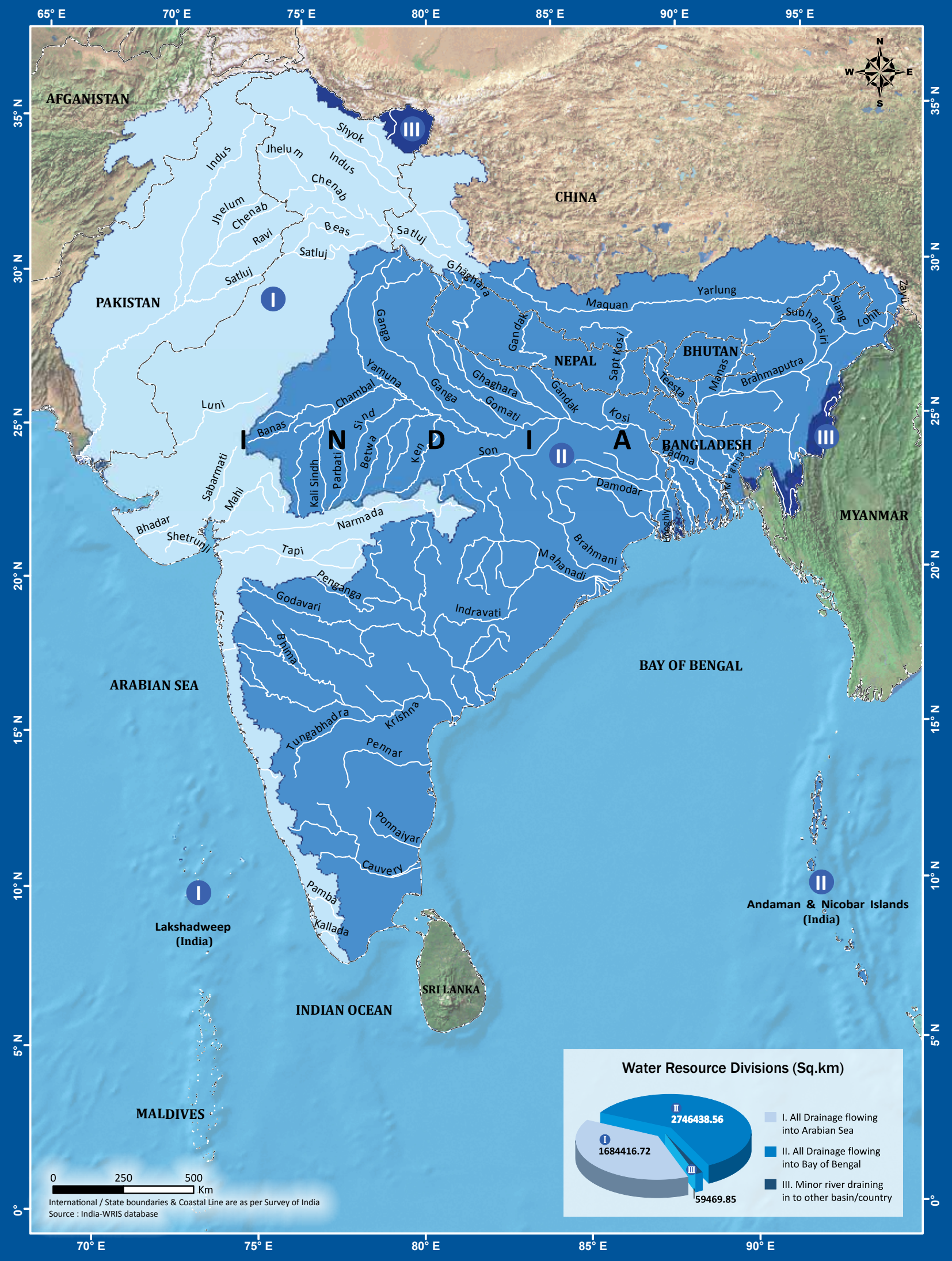
Average Annual Rainfall (1971-2005)



Average Monthly Rainfall (1971-2005)



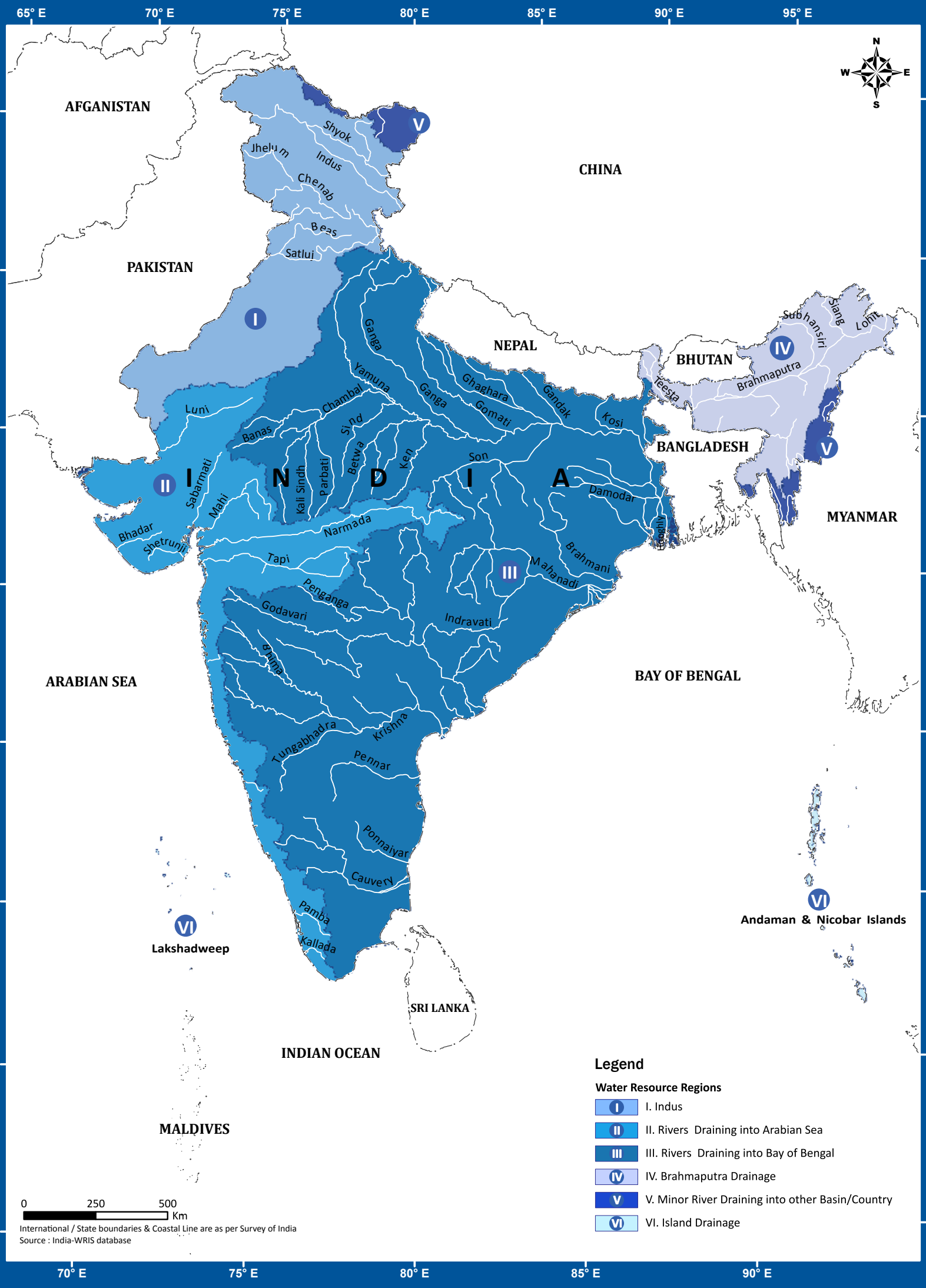
Water Resource Divisions



Water Resource Divisions (Sq.km)

- I. All Drainage flowing into Arabian Sea
- II. All Drainage flowing into Bay of Bengal
- III. Minor river draining in to other basin/country

Water Resource Regions



Hydrology of Indian Region

Trans-boundary Basins of India

Basin Name	Trans-boundary Basins		
	India	Drainage coming from other countries	Drainage flowing to other countries
Ganga			
Indus			
Brahmaputra			
Barak and Others			
WFR of Kutch and Saurashtra including Luni			

CWC Basins & India-WRIS Basins

A COMPARISON

CWC Basins			India-WRIS Basins		
Sl. No.	**Basin Code (CWC)**	**Basin Name (CWC)**	**Sl. No.**	**Basin Code (India-WRIS)**	**Basin Name (India-WRIS)**
1	**1**	Indus (Up to border)	1	**1**	Indus (Up to border)
2	**2 a**	Ganga	2	**2 a**	Ganga
3	**2 b**	Brahmaputra	3	**2 b**	Brahmaputra
4	**2 c**	Barak and others	4	**2 c**	Barak and others
5	**3**	Godavari	5	**3**	Godavari
6	**4**	Krishna	6	**4**	Krishna
7	**5**	Cauvery	7	**5**	Cauvery
8	**6**	Subernarekha	8	**6**	Subernarekha
9	**7**	Brahmani and Baitarni	9	**7**	Brahmani and Baitarni
10	**8**	Mahanadi	10	**8**	Mahanadi
11	**9**	Pennar	11	**9**	Pennar
12	**10**	Mahi	12	**10**	Mahi
13	**11**	Sabarmati	13	**11**	Sabarmati
14	**12**	Narmada	14	**12**	Narmada
15	**13**	Tapi	15	**13**	Tapi
16	**14**	West flowing rivers from Tapi to Tadri	16	**14**	West flowing rivers South of Tapi
17	**15**	West flowing rivers from Tadri to Kanyakumari			
18	**16**	East flowing rivers between Mahanadi and Pennar	17	**15**	East flowing rivers between Mahanadi and Godavari
			18	**16**	East flowing rivers between Godavari and Krishna
			19	**17**	East flowing rivers between Krishna and Pennar
19	**17**	East flowing rivers between Pennar and Kanyakumari	20	**18**	East flowing rivers between Pennar and Cauvery
			21	**19**	East flowing rivers South of Cauvery
20	**18**	West flowing rivers of Kutch and Saurashtra including Luni	22	**20**	West flowing rivers of Kutch and Saurashtra including Luni
21	**19**	Area of inland drainage in Rajasthan			
22	**20**	Minor rivers draining into Myanmar (Burma and Bangladesh)	23	**21**	Minor rivers draining into Bangladesh
			24	**22**	Minor rivers draining into Myanmar
			25	**23**	Area of North Ladakh not draining into Indus Basin
			26	**24**	Drainage area of Andaman & Nicobar Islands
			27	**25**	Drainage area of Lakshadweep Islands

While delineating the basins under India-WRIS, the Area of inland drainage in Rajasthan is merged with the Indus Basin (upto border). This basin is recognized as a separate basin by CWC wherein the river dries out in desert part before draining its water. West flowing rivers from Tapi to Tadri and Tadri to Kanyakumari which are counted as separate basins by CWC, has been combined as West flowing rivers South of Tapi under India-WRIS. The East flowing rivers between Mahanadi & Godavari, Godavari & Krishna, and Krishna & Pennar are recognized as one basin by CWC. As all three of them are separated by Godavari and Krishna Basin and drains independently into Bay of Bengal, these basins are considered separate as per India-WRIS categorization. Similarly, the East flowing rivers between Pennar and Cauvery basin and East flowing rivers south of Cauvery basin are kept as distinct basins under India-WRIS as they are physically interrupted by Pennar basin. Likewise, the outfall of rivers draining into Myanmar and Bangladesh is different, hence the two are considered as different basins. Apart from already existing basin as per CWC, three new basins for rivers not outfalling into any of the existing basins have been introduced as- Area of north Ladakh not draining into Indus basin, Drainage area of Lakshadweep Islands and Drainage area of Andaman & Nicobar Islands.

CWC Basins


65° E
70° E
75° E
80° E
85° E
90° E
95° E
100° E
35° N
30° N
25° N
20° N
15° N
10° N
5° N
N
W
E
S
AFGANISTAN
PAKISTAN
CHINA
NEPAL
BHUTAN
BANGLADESH
MYANMAR
SRI LANKA
INDIAN OCEAN
ARABIAN SEA
BAY OF BENGAL
JAMMU & KASHMIR
HIMACHAL PRADESH
PUNJAB
CHANDIGARH
UTTARAKHAND
HARYANA
NEW DELHI
RAJASTHAN
UTTAR PRADESH
BIHAR
SIKKIM
ARUNACHAL PRADESH
ASSAM
NAGALAND
MEGHALAYA
MANIPUR
TRIPURA
MIZORAM
JHARKHAND
WEST BENGAL
MADHYA PRADESH
GUJARAT
CHHATTISGARH
ODISHA
DIU
DAMAN
DADRA & NAGAR HAVELI
MAHARASHTRA
ANDHRA PRADESH
GOA
KARNATAKA
PUDUCHERRY
TAMIL NADU
KERALA
LAKSHADWEEP
ANDAMAN & NICOBAR ISLANDS
20a
20a
1
19
18
11
10
12
6
7
13
8
3
16
14
4
16
16
9
17
5
15
17
2a
2b
2c
20
20
20
Legend
Basin Code
CWC HQ
Basin Boundary
State Boundary
Elevation
High
Low
0
250
500
Km
International / State boundaries & Coastal Line are as per Survey of India
Source : Basin Layer, Central Water Commission

INDIA-WRIS BASINS

INDIA-WRIS Sub Basins

INDIA-WRIS Basins & Sub Basins

Code	Basin Name	Sub Basin Code	Sub Basin Name
1	Indus (Up to border)	1	Barmer
		2	Beas
		3	Chautang and other
		4	Chenab
		5	Churu
		6	Ghaghar and other
		7	Gilgit
		8	Jhelum
		9	Lower Indus
		10	Ravi
		11	Shyok
		12	Sutlaj Lower
		13	Sutlaj Upper
		14	Upper Indus
2a	Ganga	1	Above Ramganga Confluence
		2	Banas
		3	Bhagirathi and other (Ganga Lower)
		4	Chambal Lower
		5	Chambal Upper
		6	Damodar
		7	Gandak and other
		8	Ghaghara Confluence to Gomti confluence
		9	Ghaghara
		10	Gomti
		11	Kali Sindh and other up to Confluence with Parbati
		12	Ramganga
		13	Sone
		14	Tons
		15	Upstream of Gomti confluence to Muzaffar Nagar
		16	Yamuna Lower
		17	Yamuna Middle
		18	Yamuna Upper
		19	Kosi
2b	Brahmaputra	1	Brahmaputra Lower
		2	Brahmaputra Upper
2c	Barak and others	1	Barak
		2	Kynchiang and other south flowing rivers
		3	Naoch chara and other
3	Godavari	1	Godavari Lower
		2	Godavari Middle
		3	Godavari Upper
		4	Indravati
		5	Manjra
		6	Pranhita and other
		7	Wardha
		8	Weinganga
4	Krishna	1	Bhima Lower
		2	Bhima Upper
		3	Krishna Lower
		4	Krishna Middle
		5	Krishna Upper
		6	Tungabhadra Lower
		7	Tungabhadra Upper

Code	Basin Name	Sub Basin Code	Sub Basin Name
5	Cauvery	1	Cauvery Lower
		2	Cauvery Middle
		3	Cauvery Upper
6	Subernarekha	1	Subarnarekha
7	Brahmani and Baitarni	1	Baitarni
		2	Brahmani
8	Mahanadi	1	Mahanadi Lower
		2	Mahanadi Middle
		3	Mahanadi Upper
9	Pennar	1	Pennar Lower
		2	Pennar Upper
10	Mahi	1	Mahi Lower
		2	Mahi Upper
11	Sabarmati	1	Sabarmati Lower
		2	Sabarmati Upper
12	Narmada	1	Narmada Lower
		2	Narmada Middle
		3	Narmada Upper
13	Tapi	1	Tapi Lower
		2	Tapi Middle
		3	Tapi Upper
14	West flowing rivers South of Tapi	1	Vasishti and other
		2	Netravati and other
		3	Periyar and other
		4	Varrar and other
		5	Bhatsol and other
15	East flowing rivers between Mahanadi and Godavari	1	Nagvati and other
		2	Vamsadhara and other
16	East flowing rivers between Godavari and Krishna	1	East flowing rivers between Krishna and Godavari
17	East flowing rivers between Krishna and Pennar	1	East flowing rivers between Krishna and Pennar
18	East flowing rivers between Pennar and Cauvery	1	Palar and other
		2	Ponnaiyar and other
19	East flowing rivers South of Cauvery	1	Pamba and other
		2	Vaippar and other
20	West flowing rivers of Kutch and Saurashtra including Luni	1	Bhadar and other west flowing rivers
		2	Drainage of Rann
		3	Luni Lower
		4	Luni Upper
		5	Saraswati
		6	Shetranjuli and other east flowing rivers
21	Minor rivers draining into Bangladesh	1	Karnaphuli and other
		2	Muhury and other
22	Minor rivers draining into Myanmar	1	Imphal and other
		2	Mangpui Lui and other
23	Area of North Ladakh not draining into Indus	1	Shaksgam
		2	Sulmar
24	Drainage Area of Andaman & Nicobar Islands	1	Drainage Area of Andaman & Nicobar Islands
25	Drainage Area of Lakshadweep Islands	1	Drainage Area of Lakshadweep Islands

Total No. of Basins - 25, Total No. of Sub Basins - 101

Flood Forecasting Stations in India

Flood Forecasting Stations

Sl. No	Site Name	Sl. No	Site Name	Sl. No	Site Name
1	Dibrugarh	60	Allahabad (Chatnag)	119	Mohanpur
2	Naharkatia	61	Mirzapur	120	Dantiwada Dam
3	Chenimari (Khowang)	62	Varanasi	121	Dharoi Dam
4	Nanglamoraghat	63	Hanuman Setu(Lucknow)	122	Subash Bridge (Ahmedabad)
5	Sibsagar	64	Jaunpur	123	Kadana Dam
6	Neamatighat	65	Rae-Bareilly	124	Wanakbori Weir
7	Badatighat	66	Ghazipur	125	Mandla
8	Golaghat	67	Ballia	126	Hoshangabad
9	Numaligarh	68	Buxar	127	Garudeshwar
10	N T Road Crossing (Jiabharali)	69	Elgin Bridge	128	Bharuch
11	Tezpur	70	Ayodhya	129	Hathnur Dam
12	Kampur	71	Balrampur	130	Ukai Dam
13	Dharamtul	72	Bansi	131	Surat
14	Guwahati (D C Court)	73	Gorakhpur (Birdghat)	132	Kopergaon
15	N H Crossing (Puthimari)	74	Turtipar	133	Jaikwadi Dam
16	N T Road Crossing (Pagladiya)	75	Darauli	134	Gangakhed
17	Goalpara	76	Gangpur Siswan	135	Nanded
18	Beki Road Bridge	77	Chhapra	136	Singur Dam
19	N H Crossing (Manas)	78	Inderpuri	137	Nizamsagar Dam
20	Dhubri	79	Koelwar	138	Sriramsagar
21	Golokganj	80	Maner	139	Bhandara
22	Tufangunj	81	Patna (Dighaghat)	140	Pauni
23	Ghughumari	82	Patna (Gandhighat)	141	Balharsha
24	N H 31	83	Khadda	142	Kaleswaram
25	Mathabhanga	84	Chatia	143	Jagdalpur
26	Domohani Road Bridge	85	Hazipur	144	Eturunagaram
27	Mekhligunj	86	Kamtaul	145	Dummagudem
28	Sonamura	87	Sripalpur	146	Bhadrachalam
29	Kailashshar	88	Hathidah	147	Kunavaram
30	Matizuri	89	Munger	148	Rajahmundry Railway Bridge
31	Karimgunj	90	Lalbeghiaghat	149	Dowlaiswaram Barrage
32	Annapurnaghat (Silchar)	91	Muzzafarpur (Sikandarpur)	150	Hirakud Dam
33	Hathnikund Barrage	92	Rewaghat	151	Naraj
34	Mawi	93	Samastipur	152	Alipingal
35	Dhansa Regulator	94	Rosera	153	Nimapara
36	Delhi Railway Bridge	95	Khagaria	154	Jenapur Expressway
37	Mathura	96	Bhagalpur	155	Anandpur
38	Agra	97	Colgong/Kahalgaon	156	Akhuapada
39	Etawah	98	Benibad	157	N H 5 Road Bridge
40	Gandhisagar Dam	99	Ekmighat	158	Rajghat
41	Auraiya	100	Hayaghat	159	Purushottampur
42	Kalpi	101	Jhanjharpur	160	Gunupur
43	Hamirpur	102	Basua	161	Kashinagar
44	Mohana	103	Balthara	162	Gotta Barrage
45	Sahjiana	104	Kursela	163	Madhuban Dam
46	Banda	105	Sahibganj	164	Daman
47	Chillaghat	106	Dengraghat	165	Vapi Town
48	Naini	107	Jhawa	166	Deongaon Bridge
49	Srinagar	108	Farakka Barrage	167	Arjunwad
50	Rishikesh	109	Massanjore Dam	168	Almatti Dam
51	Hardwar	110	Tilpara Barrage	169	Narayanpur Dam
52	Narora Barrage	111	Narayanpur	170	Priyadharshini Jurala Project
53	Moradabad	112	Gheropara	171	Tungabhadra Dam
54	Bareilly	113	Tenughat Dam	172	Mantralayam
55	Kannauj (Gurnatia)	114	Panchet Dam	173	Srisailam Dam
56	Ankinghat	115	Maithon Dam	174	Prakasam Barrage
57	Kanpur	116	Durgapur Barrage	175	Nellore Anicut
58	Dalmau	117	Harinkhola		
59	Phaphamau	118	Kangsabati Dam		

Water Resource Projects of India

FACTS AT A GLANCE

Basin-wise Storages in India

(Projects having Live Storage Capacity of 10 MCM & above)

Sl. No.	Basin	Total Live Storage Capacity (MCM)
1	Indus	16568.43
2	A) Ganga	60660.38
	B) Brahmaputra & Barak	11680.56
3	Godavari	31330.39
4	Krishna	49547.52
5	Cauvery	8867.02
6	Pennar	4820.11
7	EFR B/W Mahanadi and Pennar	3026.41
8	EFR B/W Pennar and Kanyakumari	1906.90
9	Mahanadi	14207.80
10	Brahmani & Baitarani	5523.69
11	Subernarekha	2322.21
12	Sabarmati	1367.54
13	Mahi	4984.03
14	WFR of Kutch and Saurashtra including Luni	5524.15
15	Narmada	23604.60
16	Tapi	10255.79
17	WFR from Tapi to Tadri	14732.41
18	WFR from Tadri to Kanyakumari	11553.70
19	Area of Inland Drainage in Rajasthan	–
20	Minor River Draining into Myanmar and Bangladesh	312.00
	TOTAL IN MCM	282795.64
	TOTAL IN BCM	282.80

Note: Projects having a live storage capacity of 10 MCM and above only are included. An additional live storage capacity of 6.241 Billion Cubic Metre (BCM) (approx.) is estimated to be created through medium projects each having a capacity of less than 10 MCM thus making a total live storage capacity of 289.036 Billion Cubic Metre (BCM). As per latest data of CWC total Live Storage Capacity of completed and under construction dams is 304.348 BCM.

State-wise Distribution of Large Dams – Abstract

(Information Compiled upto January 2009)

Sl. No.	State/ U.T.	Total Completed Dams	Dams Under Construction
1	Andaman & Nicobar Islands	2	0
2	Andhra Pradesh	283	51
3	Arunachal Pradesh	1	0
4	Assam	2	2
5	Bihar	24	4
6	Chhattisgarh	243	16
7	Goa	5	0
8	Gujarat	598	68
9	Haryana	0	0
10	Himachal Pradesh	13	6
11	Jammu & Kashmir	10	3
12	Jharkhand	49	28
13	Karnataka	229	7
14	Kerala	53	1
15	Madhya Pradesh	899	7
16	Maharashtra	1693	152
17	Manipur	2	3
18	Meghalaya	5	2
19	Mizoram	0	0
20	Nagaland	0	0
21	Odisha	157	0
22	Punjab	14	1
23	Rajasthan	180	23
24	Sikkim	2	0
25	Tamil Nadu	107	1
26	Tripura	1	0
27	Uttar Pradesh	115	16
28	Uttarakhand	13	6
29	West Bengal	28	0
	TOTAL	4728	397

Plan-wise Position of Irrigation Potential Created and Utilized

Plan	Potential Created (Cumulative) (M ha)	Potential Utilized (Cumulative) (M ha)
Upto 1951 (Pre Plan)	22.60	22.60
I Plan (1951 - 1956)	26.26	25.04
II Plan (1956 - 1961)	29.08	27.80
III Plan (1961 - 1966)	33.57	32.17
Annual Plan (1966 - 1969)	37.10	35.75
IV Plan (1969 - 1974)	44.20	41.89
V plan (1974 - 1978)	52.02	48.46
Annual Plan (1978 - 1980)	56.61	52.64
VI Plan (1980 - 1985)	65.22	58.82
VII Plan (1985 - 1990)	76.44	68.59
Annual Plan (1990 - 1992)	81.09	72.85
VIII Plan (1992 - 1997)	86.26	77.21
IX Plan (1997 - 2002)	93.95	81.00
X Plan (2002 - 2007)	101.74	85.22

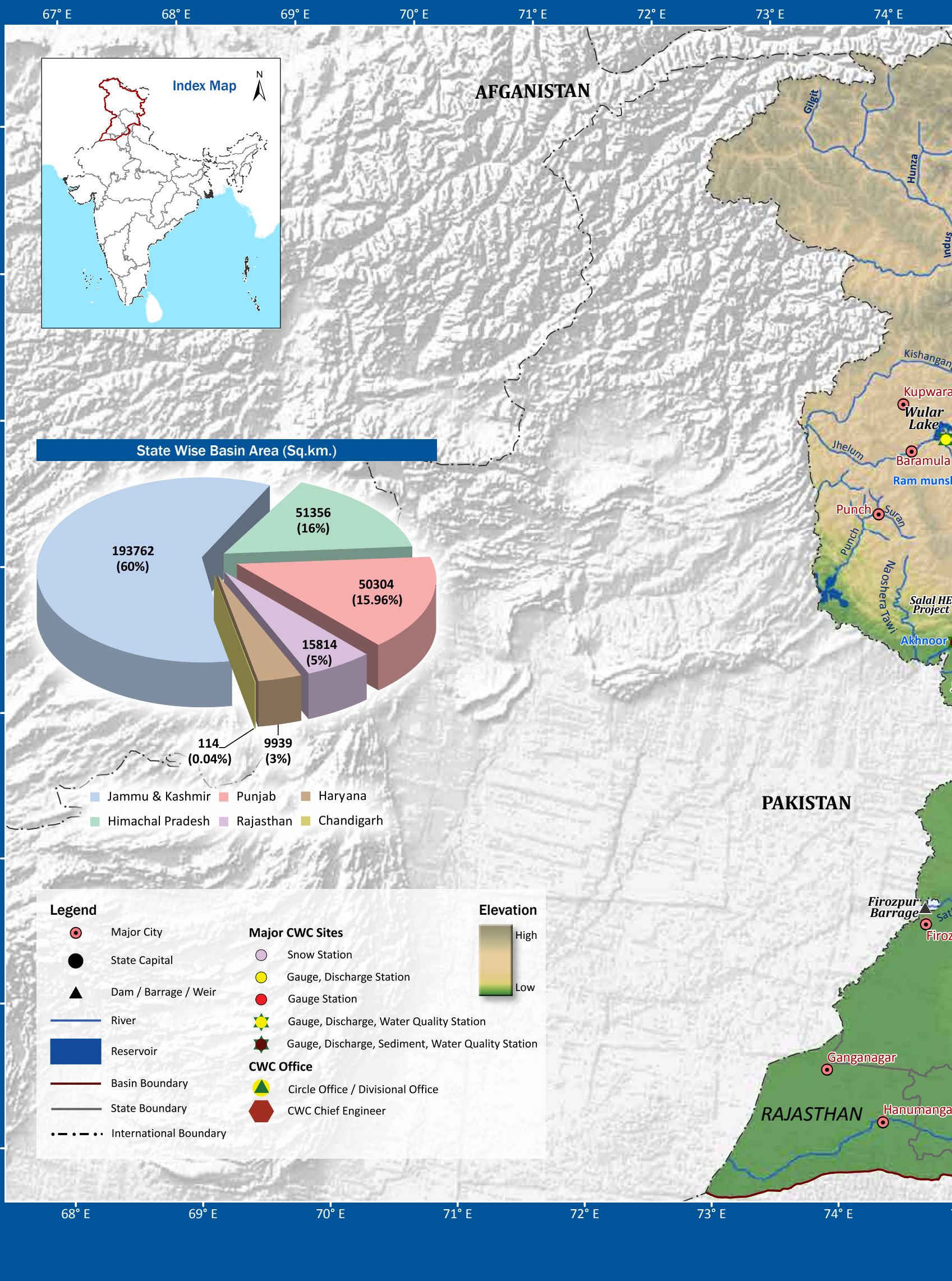
Note: Anticipated potential created (upto XI plan) is 110.84 M ha.

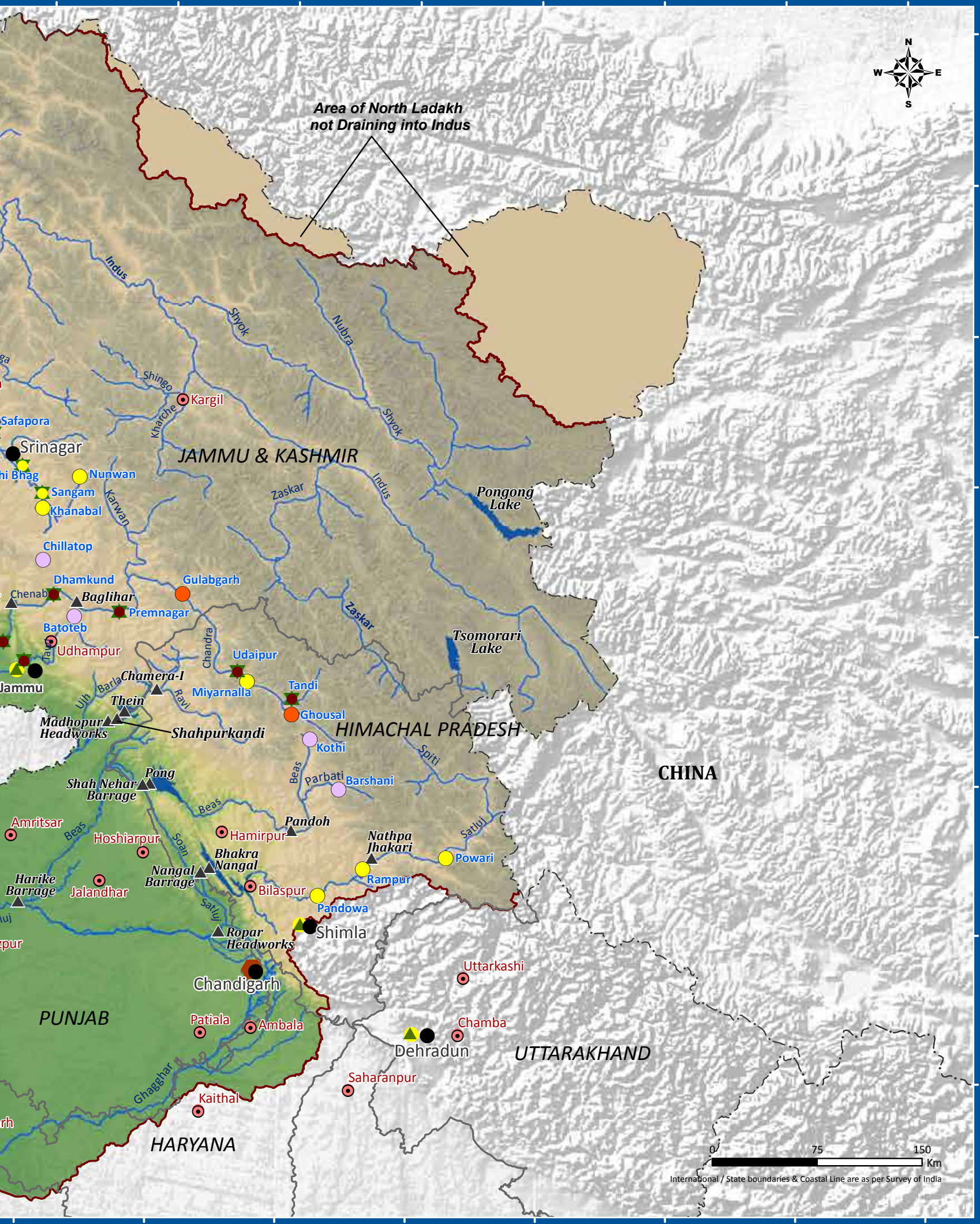
Plan-wise Financial Expenditure on Major & Medium Irrigation Projects in India

Sl. No.	Period	Major & Medium Irrigation (Rs. in Crore)
1	First (1951 - 1956)	376.20
2	Second (1956 - 1961)	380.00
3	Third (1961 - 1966)	576.00
4	Annual (1966 - 1969)	429.80
5	Fourth (1969 - 1974)	1242.30
6	Fifth (1974 - 1978)	2516.20
7	Annual (1978 - 1980)	2078.60
8	Sixth (1980 - 1985)	7368.80
9	Seventh (1985 - 1990)	11107.30
10	Annual (1990 - 1991)	2634.80
11	Annual (1991 - 1992)	2824.00
12	Eighth (1992 - 1997)	21669.20
13	Ninth (1997 - 2002)	49289.00
14	Tenth (2002 - 2007)	83647.00

RIVER BASINS OF INDIA

INDUS BASIN (Up to border)




75° E
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34° N
33° N
32° N
31° N
30° N
N
W
E
S
Area of North Ladakh
not Draining into Indus
Indus
Shyok
Nubra
Shingo
Kargil
Kharche
Safapora
Srinagar
JAMMU & KASHMIR
Nunwan
Sangam
Khanabal
Karwan
Zaskar
Indus
Pongong
Lake
Chillatop
Dhamkund
Gulabgarh
Chenab
Baglihar
Premnagar
Batoteb
Udhampur
Tawi
Chandra
Udaipur
Jammu
Chamera-I
Ujh
Barla
Ravi
Miyarnalla
Tandi
Thein
Ghousal
Madhopur
Headworks
Shahpurkandi
HIMACHAL PRADESH
Kothi
Spiti
Tsomorari
Lake
Zaskar
CHINA
Pong
Shah Nehar
Barrage
Beas
Parbati
Barshani
Amritsar
Beas
Hoshiarpur
Soan
Pandoh
Hamirpur
Nathpa
Jhakari
Satluj
Powari
Bhakra
Nangal
Nangal
Barrage
Harike
Barrage
Jalandhar
Bilaspur
Rampur
Pandowa
Satluj
Ropar
Headworks
Shimla
Uttarkashi
Chandigarh
PUNJAB
Patiala
Ambala
Chamba
Dehradun
UTTARAKHAND
Saharanpur
Ghaggar
Kaithal
HARYANA
0
75
150
Km
International / State boundaries & Coastal Line are as per Survey of India

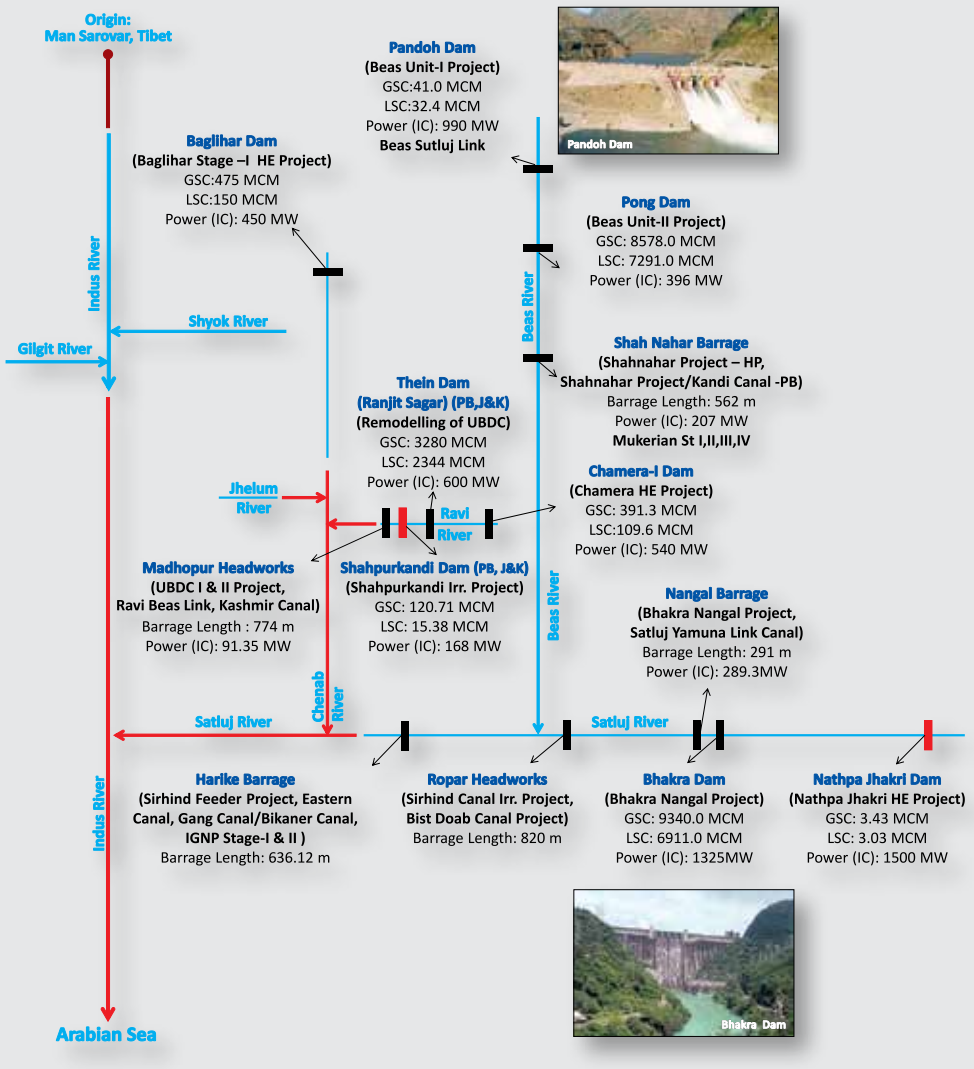
The Indus basin extends over China (Tibet), India, Afghanistan and Pakistan draining an area of 11,65,500 Sq.km. In India, the basin spreads over states of Jammu & Kashmir, Himachal Pradesh, Punjab, Rajasthan, Haryana and Union Territory of Chandigarh having an area of 3,21,289 Sq.km which is nearly 9.8% of the total geographical area. The geographical extent of the basin is between 72°28' to 79°39' east longitudes and 29°8' to 36°59' north latitudes of the country with a maximum length and width of 756 km and 560 km. The basin is bounded by the Himalayas on the east, by the Karakoram and Haramosh ranges on the north, by the Sulaiman and Kirthar ranges on the west, and by the Arabian Sea on the south.

The Indus River rises from the lofty mountains of Himalayas around Mansarovar Lake in Tibet at an elevation of 5,182 m. The total length of Indus from origin to its outfall in Arabian Sea is 2,880 km, out of which 1,114 km flows through India. Its principal tributaries in India are the Jhelum, the Chenab, the Ravi, the Beas and the Satluj, all joining from left.

The major part of basin is covered with agricultural land accounting to 35.8% of the total area and 1.85% of the basin is covered by water bodies. The basin spreads over 32 parliamentary constituencies (2009) comprising 13 of Punjab, 7 of Jammu & Kashmir, 4 each of Himachal Pradesh and Haryana, 3 of Rajasthan and 1 of Chandigarh.

The water resource development in the Indus basin is governed by the various provision of the Indus water treaty, 1960. According to this treaty the water of the Ravi, the Beas and the Satluj shall be available for the unrestricted use by India. India has also been permitted to make domestic use, non-consumptive use, uses for runoff the river Hydroelectric plants and specified agricultural use from the Indus, the Jhelum and the Chenab.

River Flow Line Diagram



India Portion
Pakistan Portion
Tibet Portion
= Under Construction Structures
= Operational Structures
GSC = Gross Storage Capacity (Original)
LSC = Live Storage Capacity (Original)
IC = Installed Capacity (Mega Watt)
PSS = Pumped Storage Schemes

Salient Features of Indus Basin

(Upto border)

Basin Extent	Longitude	72° 28' to 79° 39' E
	Latitude	29° 8' to 36° 59' N
Length of Indus River (Km)		1114 (in India)
Catchment Area (Sq.km.)		321289
Average Water Resource Potential (MCM)		73310
Utilizable Surface Water Resource (MCM)		46000
Live Storage Capacity of Completed Projects (MCM)		16285.9
Live Storage Capacity of Projects Under Construction (MCM)		282.53
Total Live Storage Capacity of Projects (MCM)		16568.43
No. of Hydrological Observation Stations		22
No. of Flood Forecasting Stations		0

Major Water Resources Projects of Indus Basin (Upto border)

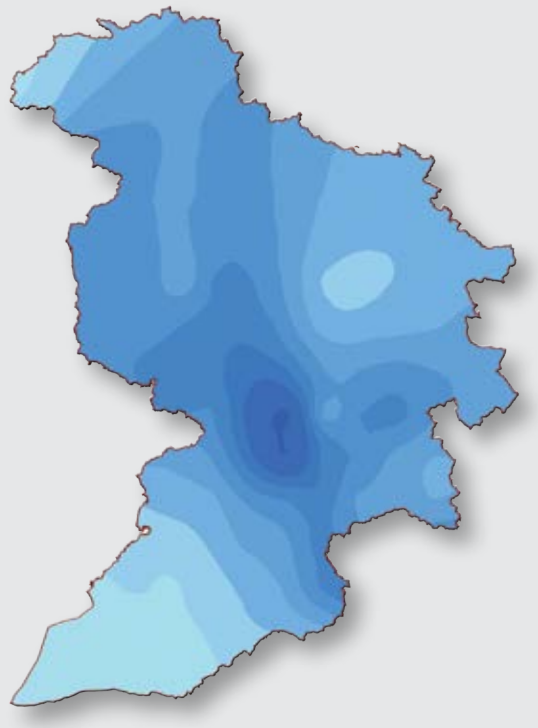
Name of Project	Associated Structures	Type	Status	Culturable Command Area (Th ha)	Ultimate Irrigation Potential (Th ha)	Power (MW)
Beas Unit-I Project (PB,RJ,HR)	Pandoh Dam	Major	Completed	1970.00	1970	990
Beas Unit-II Project (PB,RJ,HR)	Pong Dam	Major	Completed			396
Shahnahar Project (PB,HP)	Shahnahar Barrage	Major	Ongoing	15.28 (HP)	24.76 (HP)	
Upper Bari Doab Project I & II-(UBDC) including remodelling (PB)	Madhopur Headworks, Thein Dam	Major	Completed	543	472	91.35
ShahpurKandi Irr. Project (JK)	Shahpurkandi Dam	Major	Ongoing	37.173	37.173	168
Bhakra Nangal Project (PB, HR, RJ)	Bhakra Dam, Nangal Barrage	Major	Completed	2088.47	1355	1480.3
Sirhind Canal Irr. Project (PB)	Ropar Headworks	Major	Completed	1373.00	845	
Indira Gandhi Nahar Pariyojna (IGNP) Stage-I (RJ)	Harike Barrage	Major	Completed	557.60	553	
Indira Gandhi Nahar Pariyojna (IGNP) Stage-II (RJ)	Harike Barrage	Major	Ongoing	1410	964	
Eastern Canal Project (PB)	Harike Barrage	Major	Completed	216	97	
Gang Canal/ Bikaner Canal (RJ)	Harike Barrage	Major	Completed	355.70	281	
Mukerian (I,II,III,IV) HE Project (PB)	Shahnahar Barrage	Major	Completed	-	-	207

*Th. ha = Thousand Hectare, MW = Mega Watt, MCM = Million Cubic Meter

Elevation Zone Map

Symbol	Elevation (m)	Area (Sq. km)	% of Total Area
	100-200	22205.12	6.91
	200-300	49421.81	15.38
	300-400	5998.09	1.87
	400-500	4143.97	1.29
	500-750	8440.16	2.63
	750-1000	6208.49	1.93
	1000-1500	9251.46	2.88
	1500-2000	14330.58	4.46
	2000-3000	25967.21	8.08
	3000-4000	40641.81	12.65
	4000-5000	75318.77	23.44
	5000-6000	56252.13	17.51
	>6000	3109.38	0.97

Average Annual Rainfall (1971-2005)



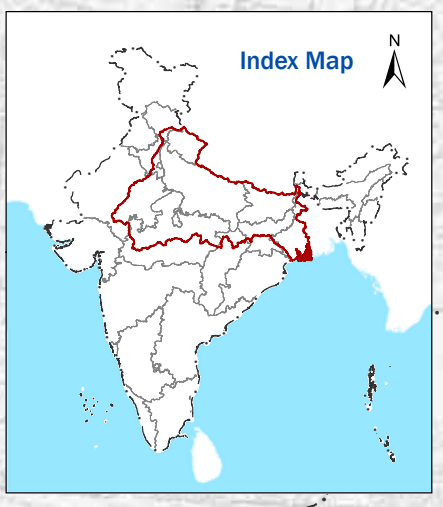
Symbol	Rainfall (mm)	Area (Sq. km)	% of Total Area
	200-400	28078.72	8.74
	400-600	26009.49	8.10
	600-800	62036.18	19.31
	800-1000	76116.57	23.69
	1000-1200	81987.17	25.52
	1200-1400	31035.11	9.66
	1400-1600	7905.88	2.46
	1600-2000	7400.06	2.30
	2000-2500	719.83	0.22

Land Use / Land Cover (2005-06)

Symbol	Category	Area (Sq. km)	% of Total Area
	Built Up Land	6700.63	2.09
	Agricultural	115005.40	35.80
	Forest	48481.44	15.09
	Grassland	13472.88	4.19
	Wasteland	91651.37	28.53
	Waterbodies	5934.74	1.85
	Snow/Glaciers	40042.54	12.46

Parliamentary Constituencies (2009)

GANGA BASIN


Index Map
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State Wise Basin Area (Sq.km.)
112496 (13%)
93580 (11%)
71489 (8.3%)
52988 (6.1%)
50389 (5.85%)
34343 (4%)
17908 (2.07%)
4317 (0.5%)
1484 (0.17%)
241392 (28 %)
181066 (21.01%)
Uttar Pradesh
Rajasthan
West Bengal
Jharkhand
Chhattisgarh
Ut Of Delhi
Madhya Pradesh
Bihar
Uttarakhand
Haryana
Himachal Pradesh

71° E
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22° N
HIMACHAL PRADESH
Bilaspur
Shimla
Chandigarh
Dakpatthar Barrage
Asan/Ahsan Barrage
Hathni Kund Barrage
Tajewala Headworks
Rishi Kesh Barrage
Bhimgoda Barrage
Tehri Dam
Dehradun
UTTARA
Fatehabad
HARYANA
NEW DELHI
NOIDA
New Okhla Barrage
FARIDABAD
Madhya Ganga Barrage
Ramganga
Rampur
Champaw
Narora Barrage
Shahjahanpur
Sikar
Rajgarh
Sambhar Lake
Jaipur
Dausa
AGRA
Mainpuri
Ajmer
Bisalpur
Gwalior
Harsi
Madikheda
Parichha Weir
Dhukwan Weir
Matatila
Rajghat
Rangwan
Kota Barrage
Jawahar Sagar
Ranapratap Sagar
Gandhi Sagar
RAJASTHAN
Udaipur
Guna
Sagar
GUJARAT
Gandhinagar
Bhopal
Indore
Hoshangabad
MADHYA PRADESH
Giri
Tons
Bhagira thi
Alaknanda
Pinder
Saryu
Hindon
Kosi
RAMGANGA
GANGA
Garra
Sahibi
Kali
YAMUNA
Banganga
Utangan
Dain
Khari
Mansi
Banas
Kural
CHAMBAL
Retam
Siwana
Kali Sindh
Newaj
Parwati
Shipra
Gambhir
SIND
Pahuj
BETWA
Mahuar
Panwan
Beradi
Urmil
Banne
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Sonar
Beamma
Senger
Rind
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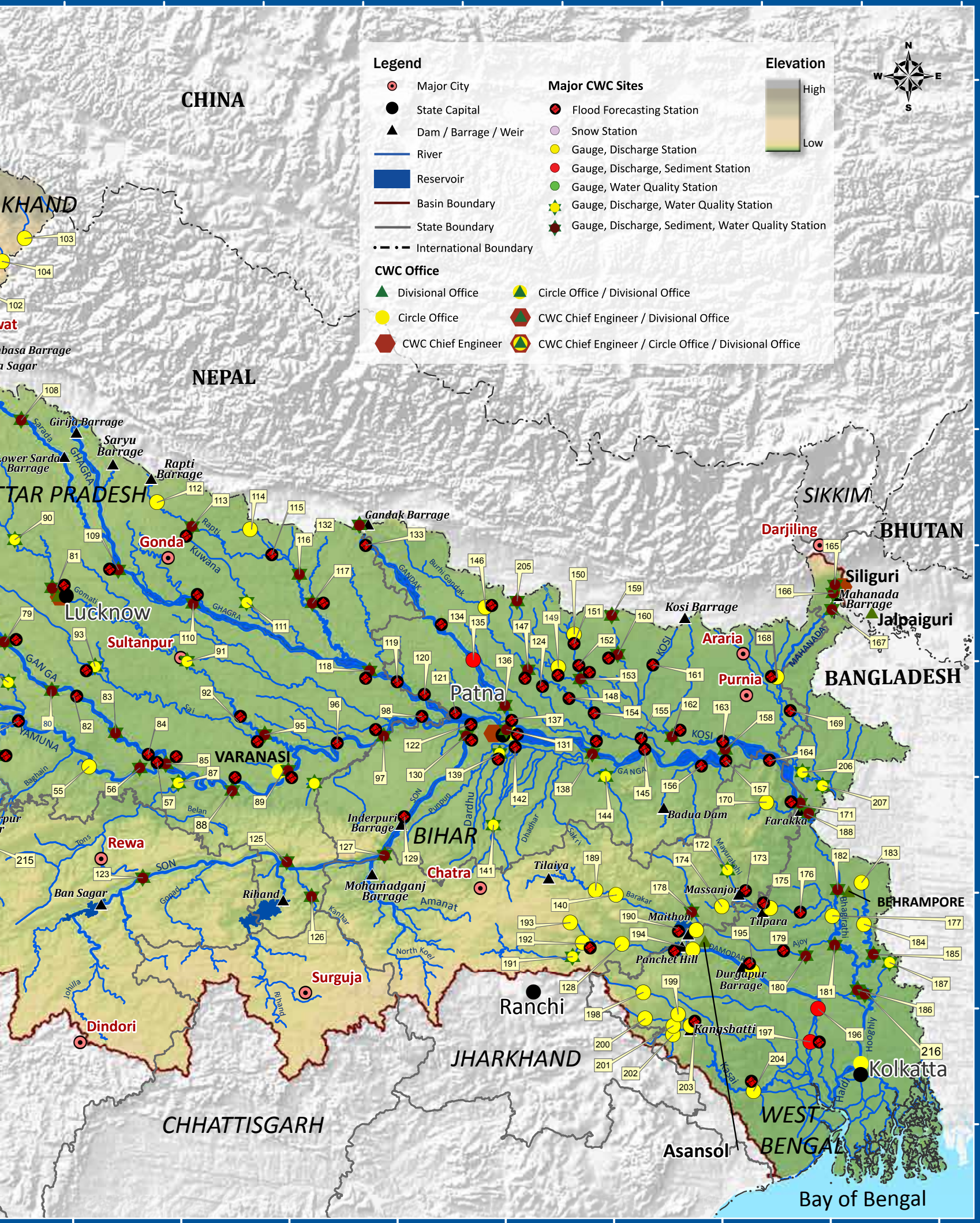
Km
International / State boundaries & Coastal Line are as per Survey of India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29° N
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26° N
25° N
24° N
23° N
22° N
Legend
Major City
State Capital
Dam / Barrage / Weir
River
Reservoir
Basin Boundary
State Boundary
International Boundary
Major CWC Sites
Flood Forecasting Station
Snow Station
Gauge, Discharge Station
Gauge, Discharge, Sediment Station
Gauge, Water Quality Station
Gauge, Discharge, Water Quality Station
Gauge, Discharge, Sediment, Water Quality Station
Elevation
High
Low
CWC Office
Divisional Office
Circle Office
CWC Chief Engineer
Circle Office / Divisional Office
CWC Chief Engineer / Divisional Office
CWC Chief Engineer / Circle Office / Divisional Office
N
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E
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CHINA
NEPAL
BHUTAN
BANGLADESH
SIKKIM
BIHAR
JHARKHAND
CHHATTISGARH
WEST BENGAL
Bay of Bengal
Lucknow
Sultanpur
VARANASI
Rewa
Ban Sagar
Dindori
Surguja
Gonda
Patna
Ranchi
Asansol
Kolkatta
Siliguri
Jalpaiguri
Darjiling
Araria
Purnia
BEHRAMPORE
Girija Barrage
Saryu Barrage
Rapti Barrage
Gandak Barrage
Kosi Barrage
Mahanada Barrage
Inderpuri Barrage
Mohamadganj Barrage
Chatra
Tilaiya
Badua Dam
Farakka
Massanjor
Maithon
Panchet Hill
Durgapur Barrage
Kangsbatti
Tilpara
GHAGRA
GANGA
YAMUNA
KOSI
SON
Gomati
Sai
Baghain
Belan
Tons
Gopad
Kanhar
Rihand
North Koel
Johilla
Dardhu
Punpun
Dhadhar
Sakri
Barakar
Amanat
Mayurakhi
Ajoy
DAMODAR
Bhagirathi
Hooghly
Haldi
Kasai
MAHANADA
Burhi Gandak
GANDAK
Sarada
Rapti
Kuwana

Ganga Basin Hydrological Observation Sites

S. No.	Site Name	S. No.	Site Name	S. No.	Site Name
1	Tuini (P)(GD)	73	Fatehgarh (GDSQ)	145	Munger (FF)
2	Tuini(T) (GDQ)	74	Moradabad (GDQ & FF)	146	Lalbegia ghat (GD & FF)
3	Naugaon (GD)	75	Bareilly (GDSQ & FF)	147	Sikanderpur (GDSQ & FF)
4	Bausan (GD)	76	Dabri (GDSQ)	148	Samastipur (FF)
5	Haripur (GD)	77	Kannauj (FF)	149	Benibad (GD & FF)
6	Yashwant Nagar (GDQ)	78	Ankinghat (GDSQ & FF)	150	Saulighat (GD)
7	Paonta (GDQ)	79	Kanpur (GDSQ & FF)	151	Kamtaul (FF)
8	Kalanaur (GDQ)	80	Bhitaura (GDSQ)	152	Ekmighat (GDSQ & FF)
9	Karnal (GD)	81	Lucknow (GDSQ & FF)	153	Hayaghat (GDSQ & FF)
10	Mawi (GDSQ & FF)	82	Dalmau (FF)	154	Rosera (FF)
11	Baghpat (GD)	83	Shahjadpur (GDSQ)	155	Khagaria (FF)
12	Delhi Rly Bridge (GDSQ & FF)	84	Phaphamau (FF)	156	Bhagalpur (FF)
13	Galeta (GDQ)	85	Chhatnag (GDSQ & FF)	157	Colgong/ Kahalgaon (FF)
14	Mohana (GDSQ)	86	Garrauli (GDSQ)	158	Azmabad (GDSQ)
15	Mathura (FF)	87	Mejja Road (GDQ)	159	Jainagar (GDSQ)
16	Agra (GDSQ & FF)	88	Mirzapur (GDSQ & FF)	160	Jhanjharpur (GDSQ & FF)
17	Arnota (GD)	89	Varanasi (GDSQ & FF)	161	Basua (FF)
18	Etawah (GDSQ & FF)	90	Neemsar (GDQ)	162	Baltara (GDSQ & FF)
19	Chittorgarh (GD)	91	Sultanpur (GDQ)	163	Kursela (FF)
20	Bigod (GD)	92	Jaunpur (G & FF)	164	Sahibganj (FF)
21	Tonk (GDSQ)	93	Raibareli (GDQ & FF)	165	Siliguri (GDSQ)
22	Baranwada (GDSQ)	94	Palla (GDQ)	166	Matigara (GDSQ)
23	Dhareri (GD)	95	Maighat (GDSQ)	167	Sonapur (GDSQ)
24	Tal (GDSQ)	96	Ghazipur (FF)	168	Dhengra ghat (GD & FF)
25	Ujjain (GD)	97	Buxar (GDSQ & FF)	169	Jhawa (FF)
26	Mahidpur (GDSQ)	98	Ballia (FF)	170	Barhait (GD)
27	Gandhi Sagar (FF)	99	Masani (GD)	171	Farakka (GDSQ & IF)
28	Mandawara (GD)	100	Dadri (GD)	172	Maharo (GDQ)
29	Sarangpur (GD)	101	Dhansa (GD & FF)	173	Massanjore Dam (GD & IF)
30	Salavad (GD)	102	Ghat (GDQ)	174	Tantloi (GD)
31	Aklera (GDSQ)	103	Tawaghat (GD)	175	Tilpara Barrage (GD & IF)
32	Sangod (GDQ)	104	Jauljibi (GD)	176	Narayanpur (FF)
33	Barod (GDSQ)	105	Zero Point (GDSQ)	177	Bazarsaw(GD)
34	A.B. Road X-ing (GDSQ)	106	Nahargarh (GD)	178	Jamtara (GDSQ)
35	Khatoli (GDSQ)	107	Tumri (GD)	179	Gheropara (FF)
36	Pali (GD)	108	Paliakalan (GDSQ)	180	Nutanhat (GDSQ)
37	Manderial (GD)	109	Elginbridge (GDSQ & FF)	181	Katwa (Purbast hali) (GDSQ)
38	Dholpur (GDSQ)	110	Ayodhya (GDSQ & FF)	182	Berhampore (GDSQ)
39	Udi (GDSQ)	111	Basti (GDQ)	183	Islampur (GD)
40	Bhind (GD)	112	Bhinga (GD)	184	Palashi para (GD)
41	Pachauli (GDQ)	113	Balrampur (GDSQ & FF)	185	Chapra (GDSQ)
42	Seondha (GDSQ)	114	Kakarahi(GD)	186	Kalna (Ebb) (GDSQ)
43	Auraiya (GDSQ & FF)	115	Bansi (G & FF)	187	Hanskhali (GDQ)
44	Kalpi (GD & FF)	116	Regauli (GDSQ)	188	H/R Farraka (GDSQ)
45	Lalpur (GD)	117	Birdghat (GDSQ & FF)	189	Barkisuriya (GD)
46	Hamirpur (GDQ & FF)	118	Turtipar (GDSQ & FF)	190	Maithon Dam (GD & IF)
47	Basoda (GD)	119	Darauli (FF)	191	Ramgarh (GDQ)
48	Mohana (GD & FF)	120	Gangpur Siswan (FF)	192	Tenughat Dam (GD & IF)
49	Shahijina (GDSQ & FF)	121	Chhapra (FF)	193	Konar Dam (GD)
50	Chillaghat (FF)	122	Maner (FF)	194	Panchet Dam (GD & IF)
51	Garhakota (GD)	123	Kuldah Bridge (GDSQ)	195	Durgapur Barrage (GD & IF)
52	Gaisabad (GD)	124	Rewaghat (FF)	196	Jamalpur (GDS)
53	Banda (GDSQ & FF)	125	Chopan (GDSQ)	197	Harinkhola (GDS & FF)
54	Kora (GDQ)	126	Duddhi (GDSQ)	198	Simulia (GD)
55	Rajapur (GD)	127	Japla (GDSQ)	199	Tusuma (GD)
56	Pratappur (GDSQ)	128	Pupunki (GD)	200	Rangagora (GD)
57	Naini (FF)	129	Inderpuri (FF)	201	Kharidwar (GD)
58	Uttarkashi (GDSQ)	130	Koelwar (GDSQ & FF)	202	Phulberia (GD)
59	Deoprayag (GD)	131	Gandhi ghat (GDSQ)	203	Kangsabati Dam (GD & IF)
60	Badrinath (GD)	132	Tribeni (GDSQ)	204	Mohanpur (GD & FF)
61	Joshimath (GD)	133	Khadda (FF)	205	Dheng Bridge (GDSQ)
62	Karanprayag (GD)	134	Chatia (FF)	206	Labha (GDQ)
63	Rudraprayag (GDSQ)	135	Dumariaghat(GDS)	207	English Bazar (GDQ)
64	Rudraprayag (GD)	136	Lalganj (GDSQ)	208	Kufri SHO
65	Srinagar (FF)	137	Hazipur (FF)	209	Jubbal SHO-II
66	Deoprayag (GDSQ)	138	Hathidah (GDSQ & FF)	210	Jubbal SHO-I
67	Marora (D/S) (GD)	139	Sripalpur (GDQ & FF)	211	Hanuman Chetty SHO
68	Rishikesh (GDSQ & FF)	140	Nandadih (GD)	212	Harsil SHO
69	Haridwar (FF)	141	Gaya (GDQ)	213	Auli SHO
70	Garhamukteshwar (GDSQ)	142	Patna (Dighaghat) (FF)	214	Tajewala Weir (Hathnikund) (FF)
71	Narora Barrage (U/S)(FF)	143	Gokul Barrage (GQ)	215	Madla (GD)
72	Kachlabridge (GDSQ)	144	Lakhisarai (GDQ)	216	Kalna (Flow) (GDSQ)

Major Water Resources Projects of Ganga Basin

Name of Project	Associated Structures	Type	Status	Culturable Command Area (Th ha)	Ultimate Irrigation Potential (Th ha)	Power (MW)
Tehri Project (UP & THDC)	Tehri Dam	Major	Ongoing	270	270	1000 + 1000PSS (U/C)
Eastern Ganga Canal System (UP)	Bhimgoda Barrage	Major	Completed	233	105	29.7
Upper Ganga Canal System (UP)	Bhimgoda Barrage	Major	Completed		699.09	
Madhya Ganga Canal Stage-I (UP)	Madhya Ganga Barrage	Major	Completed	249	178	
Madhya Ganga Canal Phase-II (UP)	Madhya Ganga Barrage	Major	Ongoing	225	146.52	
Lower Ganga Canal Project (UP)	Narora Barrage	Major	Completed	902	527	
Ramganga Project (UP)	Ramganga Dam	Major	Completed	1201	591	198
Sharda Sahayak Irr. Project (UP)	Lower Sarda Barrage & Girija Barrage	Major	Completed	1522	1750	
Sarju Nahar Irr. Project (UP)	Girija, Saryu and Rapti Barrage	Major	Ongoing	1200	1404	
Kangsbatti Irr. Project (WB)	Kangsbatti dam	Major	Completed	396	401	
Yamuna Canal System						
Western Yamuna Canal (HR)	Hathnikund Barrage	Major	Completed		684	48
Eastern Yamuna Canal (UP)	Hathnikund Barrage	Major	Completed	309	226	
Agra & Gurgaon Canal System						207
Agra Canal System (UP,HR) – Including Modernization	New Okhla Barrage	Major	Completed	327	308	
Gurgaon Canal Irr. Project (HR)	New Okhla Barrage	Major	Completed	131	81	
Gurgaon Canal Irr. Project (RJ)	New Okhla Barrage	Major	Completed	46.9	28.2	
Sarda Complex						
Sarda Canal Project (UP & Nepal)	Banbassa Barrage	Major	Completed	1612.6	806.3	41.4
Sarda Sagar Stage-I Irr. Project (UP)	Sarda Sagar Dam					
Sarda Sagar Stage-II Irr. Project (UP)	Sarda Sagar Dam					
Chambal System						
Chambal Irr. Project (RJ)	Kota Barrage	Major	Completed	230	213	
Chambal Irrigation Project (MP)	Kota Barrage	Major	Completed	328	251	
Chambal Power Complex (RJ, MP)	Gandhisagar, Ranapratapsagar, Jawahar Sagar	Major	Completed	-	-	386
Betwa Complex						
Rajghat Dam & HE Project (MP, UP)	Rajghat Dam	Major	Completed			45
Rajghat Canal (UP)	Rajghat Dam	Major	Completed	270	196	
Rajghat Canal Project (MP)	Rajghat Dam, Paricha & Dhukwa Weir	Major	Completed	121.45	121.45	
Matatila Dam Project (MP,UP)	Matatila Dam	Major	Completed			30.6
Betwa Canal Project (UP)	Paricha Weir	Major	Completed	427	199	
Bhander Canal (MP)	Paricha Weir	Major	Completed	110.7	44.5	
Ken System						
Ken Canal (UP)	Bariarpur Weir	Major	Completed	229	75.22	
Bariarpur LBC Irr. Project (MP)	Bariarpur Weir	Major	Ongoing	44	43.8	
Rangwan Dam Project (UP)	Rangwan Dam, Bariarpur Weir	Major	Completed		37.63	
Rangwan HLC (MP)	Rangwan Dam	Major	Completed	15	17.1	
Bansagar Complex						
Bansagar Dam (MP, UP, BR)	Bansagar Dam	Major	Completed	No Direct benefits		
BanSagar Unit-II Irr. Project (MP)	Bansagar Dam	Major	Ongoing	199.0	249.0	
Bansagar Canal Irr. Project (UP)	Bansagar Dam	Major	Ongoing	232	150	
Bansagar HE Complex (Ph – I,II,III,IV) (MP)	Bansagar Dam, Tons Barrage	Major	Completed	-	-	425
Sone Canal System						
Sone Canal Project (BR)	Inderpuri Barrage	Major	Completed	560	761	9.9
Sone High Level Canal Project (BR)	Inderpuri Barrage	Major	Completed	139	139	
Gandak System						
Western Gandak Canal Project (UP) (India & Nepal)	Gandak Barrage	Major	Completed	395	332	
Western Gandak Canal Project (BR)	Gandak Barrage	Major	Completed	960	685	
Eastern Gandak Canal Project (BR)	Gandak Barrage	Major	Completed	480	662	15
Tribeni & Dhaka Canal Project (BR)	Gandak Barrage	Major	Completed	54.64	54.64	
Kosi System						
Kosi Eastern Canal Project (including rajpur Canal System) (BR)	Kosi Barrage	Major	Ongoing	612	735	20
Western Kosi Canal Irr. Project (BR) (India & Nepal)	Kosi Barrage	Major	Ongoing	203	234	
Mayurakshi System						
Mayurakshi LBC Project (JH)	Massanjore Dam	Medium	Completed	8.1	10.15	4
Mayurakshi Irr. Project (WB)	Massanjore Dam, Tilpara Barrage	Major	Completed	226.72	246.96	
DVC System						
Barrage and Irrigation System of DVC (WB)	Durgapur Barrage	Major	Completed	426	394	
DVC Power System (JH)	Maithon, Panchet Hill, Tilayia, Konar	Major	Completed	-	-	147.2

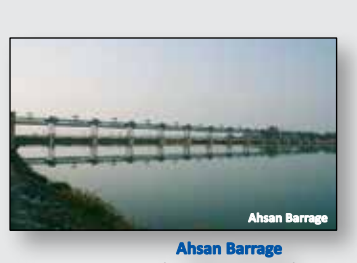
*Th ha = Thousand Hectare, MW = Mega Watt, MCM = Million Cubic Meter

The Ganga basin outspreads in India, Tibet (China), Nepal and Bangladesh over an area of 10,86,000 Sq.km. In India, it covers states of Uttar Pradesh, Madhya Pradesh, Rajasthan, Bihar, West Bengal, Uttarakhand, Jharkhand, Haryana, Chhattisgarh, Himachal Pradesh and Union Territory of Delhi draining an area of 8,61,452 Sq.km which is nearly 26% of the total geographical area of the country. The basin lies between east longitudes 73°2' to 89°5' and north latitudes 21°6' to 31°21' having maximum length and width of approx. 1,543 km and 1024 km. The basin is bounded by the Himalayas on the north, by the Aravalli on the west, by the Vindhyas and Chhotanagpur plateau on the south and by the Brahmaputra Ridge on the east.

The Ganga rises in the Gangotri glacier in the Himalayas at an elevation of about 7,010 m in the Uttarkashi district of Uttarakhand. At its source, the river is called as the Bhagirathi. It descends down the valley upto Devprayag where after joining another hill stream Alaknanda, it is called Ganga. The total length of river Ganga (measured along the Bhagirathi and the Hooghly) up to its outfall into Bay of Bengal is 2,525 km. The principal tributaries joining the river from right are the Yamuna and the Son. The Ramganga, the Ghaghra, the Gandak, the Kosi and the Mahananda join the river from left. The Chambal and the Betwa are the two other important sub- tributaries.

The major part of basin in Indian territory is covered with agricultural land accounting to 65.57% of the total area and 3.47% of the basin is covered by water bodies. The basin spreads over 239 parliamentary constituencies (2009) comprising 80 of Uttar Pradesh, 40 of Bihar, 40 of West Bengal, 25 of Madhya Pradesh, 16 of Rajasthan, 12 of Jharkhand, 8 of Haryana, 5 of Uttarakhand, 4 of Chhattisgarh, 2 of Himachal Pradesh and 7 of Union Territory of Delhi.

River Flow Line Diagram



Ahsan Barrage
(Kulhal HE Project)
Barrage Length:288 m
Power (IC): 30 MW

Hathnikund Barrage
(Eastern Yamuna Canal, Western Yamuna Canal)
Barrage Length: 565 m
Power (IC): 48 MW

Yamuna River

Dakpattar Barrage
(Dhakrani HE Project)
Barrage Length: 516.5 m
Power (IC): 33.75 MW

New Okhla Barrage
(Gurgaon Canal Irr. Project-HR,RJ, Agra Canal System)
Barrage Length:743.11 m

Chambal River

Kota Barrage
(Chambal Irr. Project- RJ, Chambal Canal Irr. Project-MP)
Barrage Length:551.7 m

Jawahar Sagar Dam
(Chambal HE Complex)
GSC:73.2 MCM
LSC:69.9 MCM
Power (IC): 99 MW

Rana Pratap Sagar Dam
(Chambal HE Complex)
GSC:3128.11 MCM
LSC:1715.74 MCM
Power (IC): 172 MW

Gandhi Sagar Dam
(Chambal HE Complex)
GSC: 7322 MCM
LSC: 6827 MCM
Power (IC): 115 MW

India Portion
Bangladesh Portion

= Operational Structures
GSC = Gross Storage Capacity (Original)
LSC = Live Storage Capacity (Original)
IC = Installed Capacity (Mega Watt)
PSS = Pumped Storage Schemes

Salient Features of Ganga Basin

Basin Extent	Longitude	73° 2' to 89° 5' E
	Latitude	21° 6' to 31° 21' N
Length of Ganga River (Km)		2525
Catchment Area (Sq.km.)		861452
Average Water Resource Potential (MCM)		525020
Utilizable Surface Water Resource (MCM)		250000
Live Storage Capacity of Completed Projects (MCM)		42060.2
Live Storage Capacity of Projects Under Construction (MCM)		18600.18
Total Live Storage Capacity of Projects (MCM)		60660.38
No. of Hydrological Observation Stations		288
No. of Flood Forecasting Stations		83

Origin: Gangotri Glaciers , Uttarakhand

Bhagirathi River

Alkhananda River

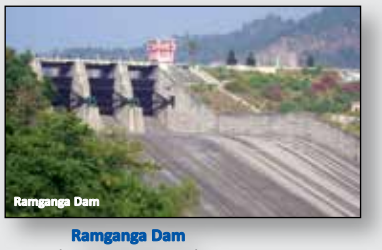
Tehri Dam
(Tehri Project)
GSC:3540 MCM
LSC:2614.9 MCM
Power (IC): 1000 MW +1000(PSS) (U/C)

Rishikesh Barrage
(Chilla HE Project)
Barrage Length:312 m
Power (IC): 144 MW

Bhimgoda Barrage
(Eastern Ganga Canal System, Upper Ganga Canal System)
Barrage Length:455 m
Power (IC): 29.7 MW

Madhya Ganga Barrage
(Madhya Ganga Canal Stage-I, Madhya Ganga Canal Phase-II)
Barrage Length:621 m

Narora Barrage
(Lower Ganga Canal Project)
Barrage Length: 922.4 m



Ramganga Dam
(Ramganga Project)
GSC:2442.6 MCM
LSC:2195.5 MCM
Power (IC): 198 MW

Ramganga River

Ganga River

Yamuna River

Banbassa Barrage
(Sarda Canal Project – UP, Nepal, Khatima HE Project)
Barrage Length:603.5 m
Power (IC): 41.4 MW

Sarda Sagar Dam
(Sarda Sagar Stage-I & II Irr. Project)
GSC:405.9 MCM
LSC:330.1 MCM

Sarda River

Lower Sarda Barrage
(Sharda Sahayak Irr. Project)
Barrage Length: 408 m

Girija Barrage
(Sharda Sahayak Irr. Project, Sarju Nahar Irr. Project)
Barrage Length: 716 m

Betwa River

Paricha Weir
(Betwa Canal Project , Rajghat Canal Project-MP, Bhander Canal Project)
Weir Length:1171.3 m

Rangwan Dam
(Rangwan HLC Project, Rangwan Dam Project- UP)
GSC: 165.0 MCM
LSC: 157.4 MCM

Ken River

Bariarpur Weir
(Ken Canal Project, Bariarpur LBC Irr. Project, Rangwan Dam Project-UP)
Weir Length: 613 m

Banne River

Ghaghara River

Dhukwa Weir
(Rajghat Canal Project – MP, UP)
Weir Length: 1171.9 m

BanSagar Dam (MP,UP,BR)
(BanSagar Canal Project-MP, Bansagar Canal Project-UP)
GSC: 6370 MCM
LSC: 5166 MCM
Power (IC): 425 MW

Inderpuri Barrage
(Sone Canal Project, Sone HLC project)
BarrageLength:1047 m
Power (IC): 9.9 MW

Rapti River

Saryu River

Rapti Barrage
(Sarju Nahar Irr. Project)
Barrage Length: 284.5 m

Saryu Barrage
(Sarju Nahar Irr. Project)
Barrage Length: 243.5 m

Matatila Dam (MP,UP)
(Matatila Project – MP, UP)
GSC: 963.90 MCM
LSC: 850.63 MCM
Power (IC): 30.6 MW

Sone River

Rihand River

Rihand Dam
(Rihand HE Project)
GSC: 10600 MCM
LSC: 8900 MCM
Power (IC): 300 MW

Gandak Barrage
(Western Gandak Canal Project, Eastern Gandak Canal Project, Tribeni & Dhaka Canal Project)
Barrage Length:739 m
Power (IC): 15 MW

Gandak River

Rajghat Dam (MP,UP)
(Rajghat Canal Project – MP, UP)
GSC: 2172 MCM
LSC: 1945 MCM
Power (IC): 45 MW

Kosi River

Kosi Barrage
(Kosi Eastern Canal including Rajpur Canal , Western Kosi Canal Project)
Barrage Length: 1149 m
Power (IC): 20 MW

Farraka Barrage
Barrage Length: 2240 m

Farraka Feeder Channel

Bhaghirathi River

Massanjore Dam
(Mayurakshi LBC Project, Mayurakshi Irr. Project)
GSC: 615.24 MCM
LSC: 547.59 MCM
Power (IC): 4 MW

Tilpara Barrage
(Mayurakshi Irr. Project)
Barrage Length:308.8 m

Mayurakshi River

Tilaiya Dam
(DVC System)
GSC: 217.0 MCM
LSC: 142.0 MCM
Power (IC): 4 MW

Barakar River

Maithon Dam
(DVC System)
GSC: 813.78 MCM
LSC: 607.26 MCM
Power (IC): 63.2 MW

Durgapur Barrage
(Barrage and Irrigation System of DVC)
Barrage Length:692.2 m

Damodar River

Panchet Hill Dam
(DVC System)
GSC: 486.45 MCM
LSC: 184.0 MCM
Power (IC): 40 MW +40 MW (PSS)

Brahmaputra River

Ganga (Padma) River

Meghna River

Meghna River

Damodar River

Hooghly River

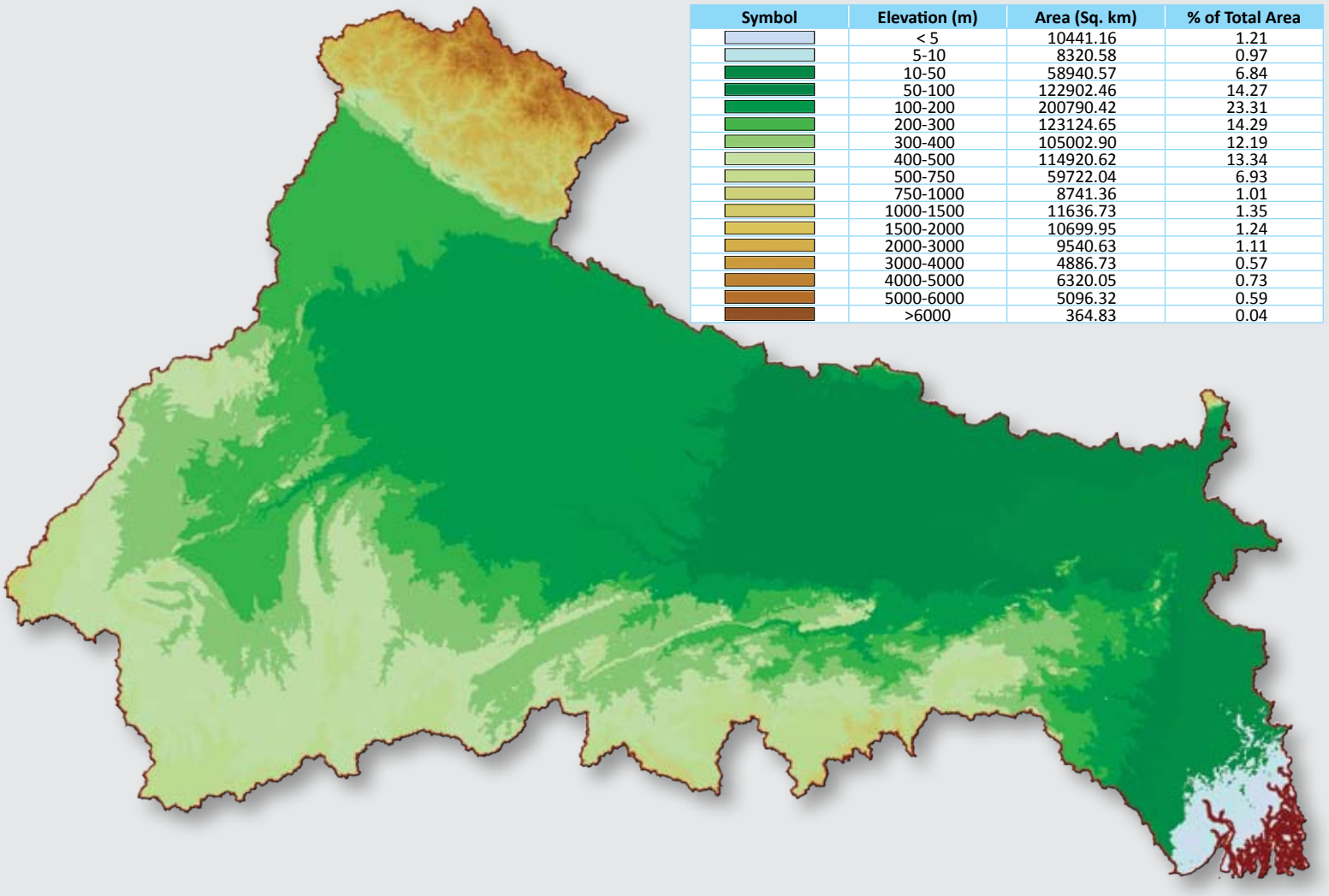
Kasai River

Kangsbatti Dam
(Kangsbatti Irr. Project)
GSC: 1053.5 MCM
LSC: 917.0MCM

Haldi River

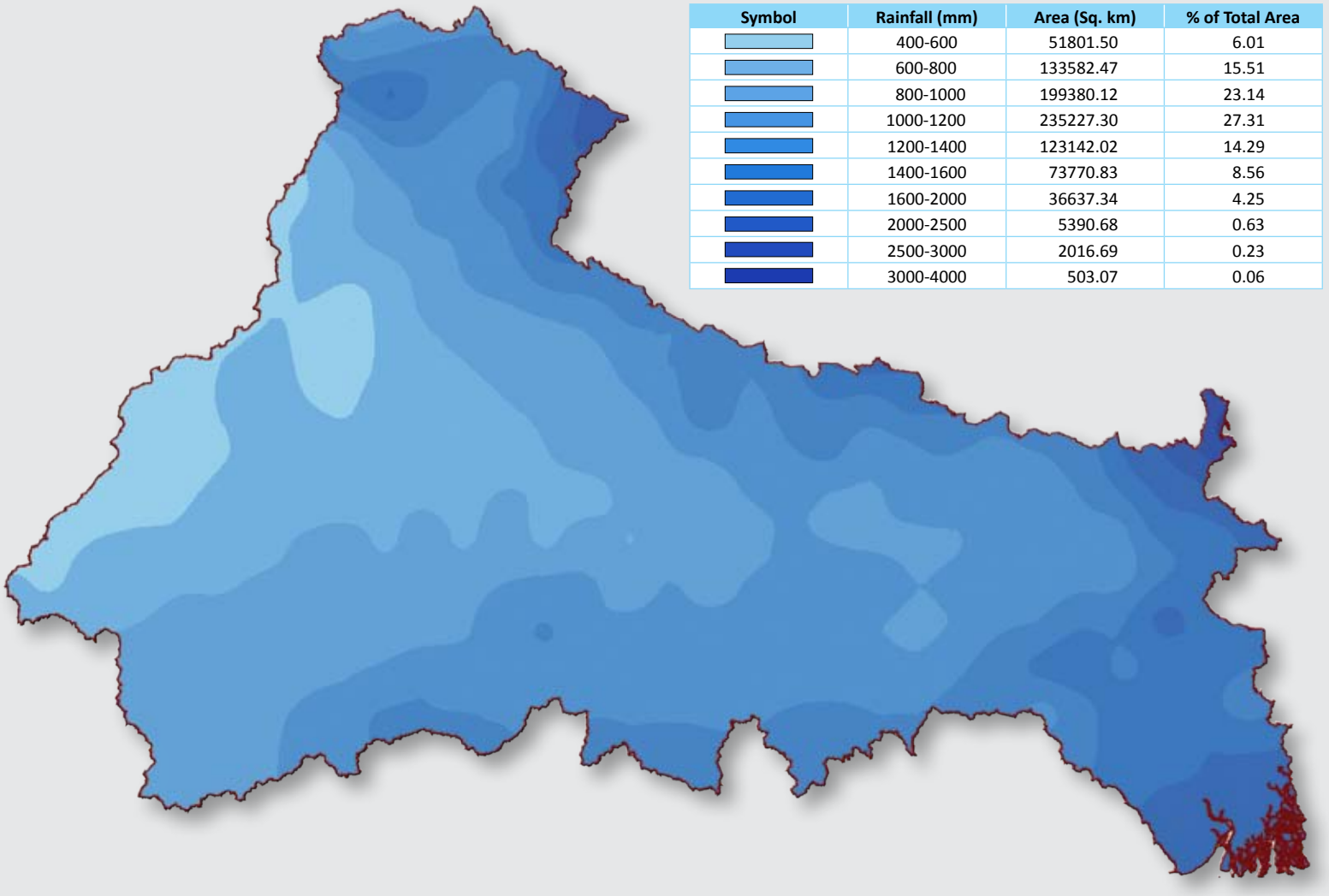
Bay of Bengal

Elevation Zone Map



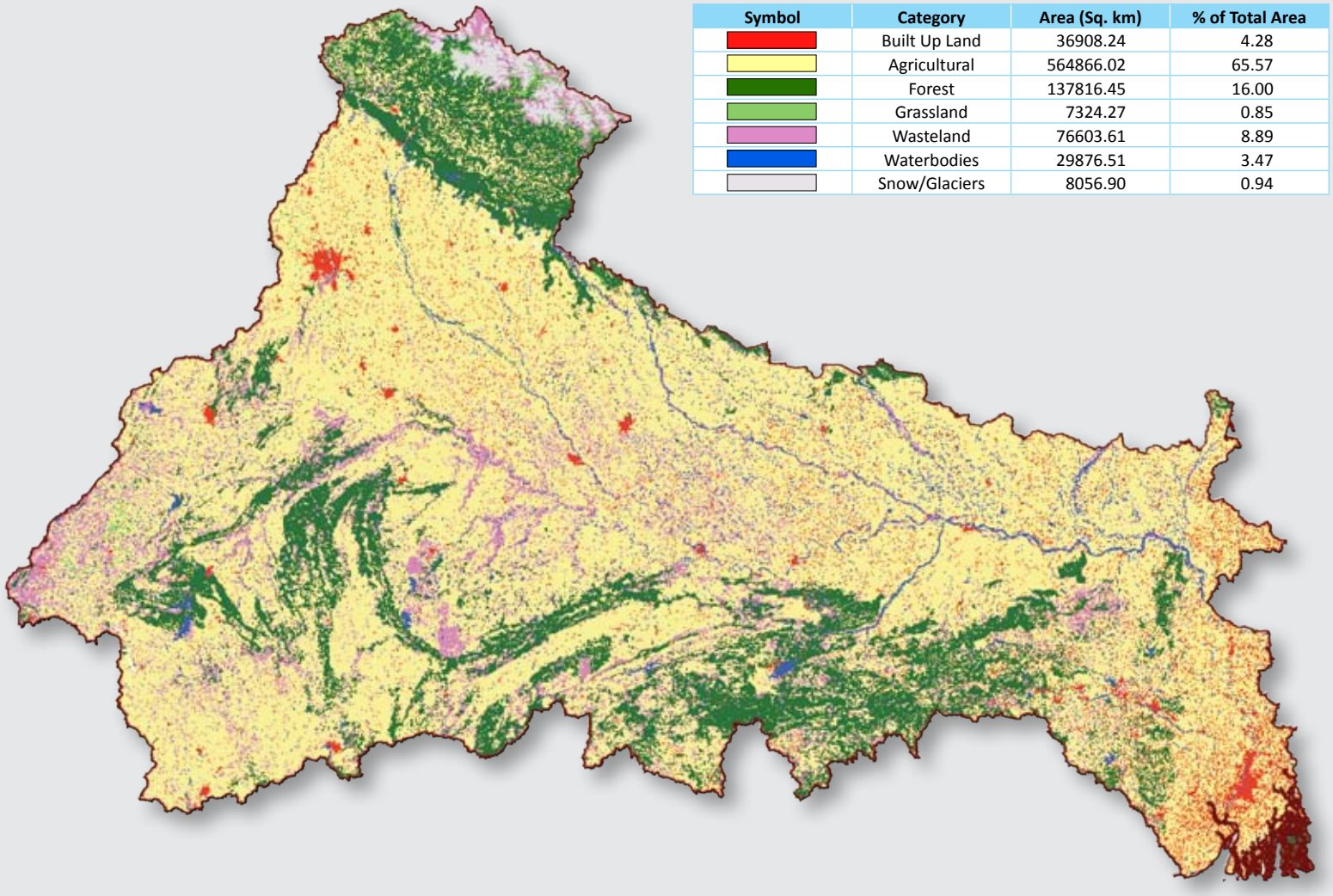
Symbol	Elevation (m)	Area (Sq. km)	% of Total Area
	< 5	10441.16	1.21
	5-10	8320.58	0.97
	10-50	58940.57	6.84
	50-100	122902.46	14.27
	100-200	200790.42	23.31
	200-300	123124.65	14.29
	300-400	105002.90	12.19
	400-500	114920.62	13.34
	500-750	59722.04	6.93
	750-1000	8741.36	1.01
	1000-1500	11636.73	1.35
	1500-2000	10699.95	1.24
	2000-3000	9540.63	1.11
	3000-4000	4886.73	0.57
	4000-5000	6320.05	0.73
	5000-6000	5096.32	0.59
	>6000	364.83	0.04

Average Annual Rainfall (1971-2005)



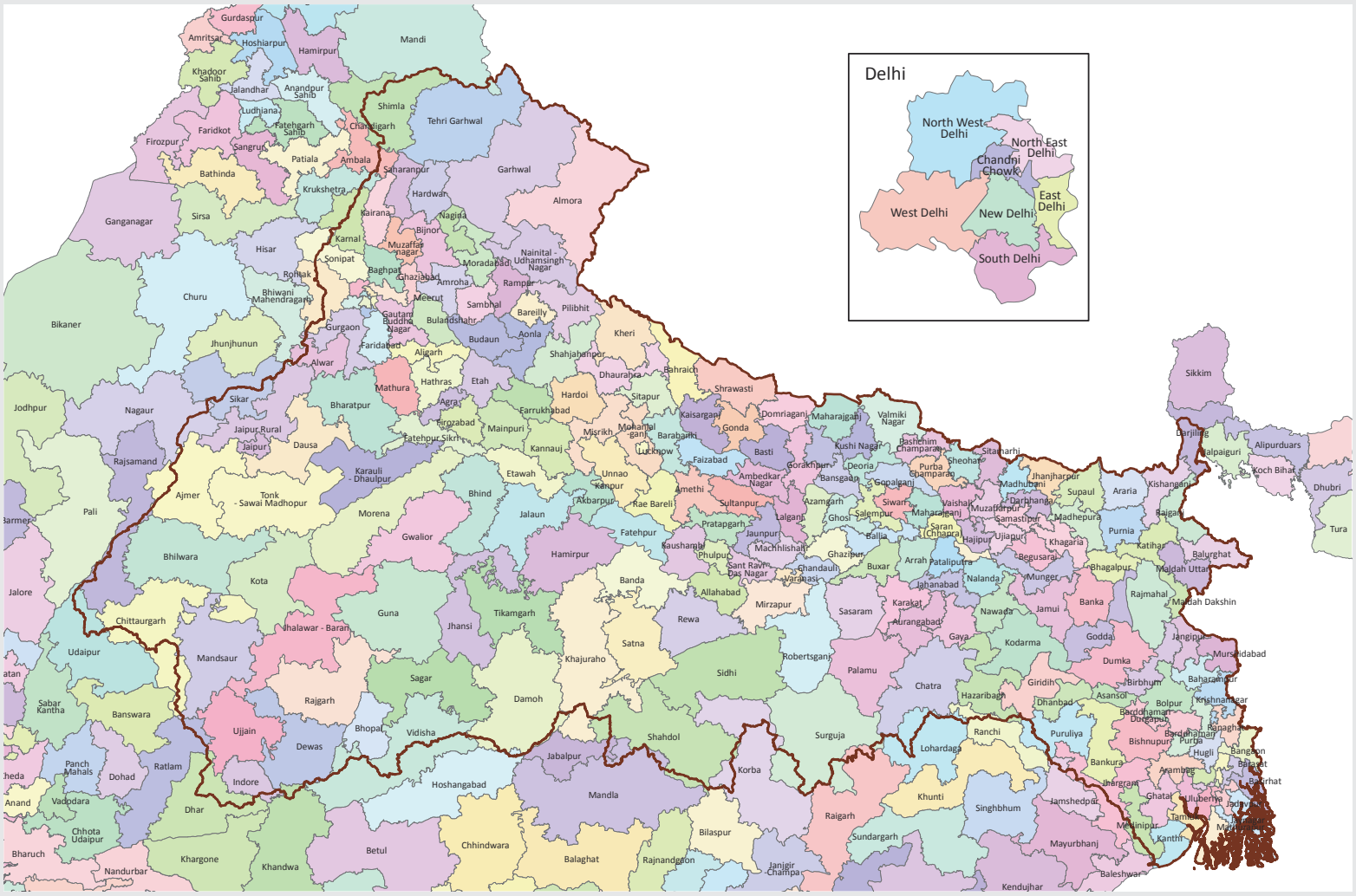
Symbol	Rainfall (mm)	Area (Sq. km)	% of Total Area
	400-600	51801.50	6.01
	600-800	133582.47	15.51
	800-1000	199380.12	23.14
	1000-1200	235227.30	27.31
	1200-1400	123142.02	14.29
	1400-1600	73770.83	8.56
	1600-2000	36637.34	4.25
	2000-2500	5390.68	0.63
	2500-3000	2016.69	0.23
	3000-4000	503.07	0.06

Land Use / Land Cover (2005-06)

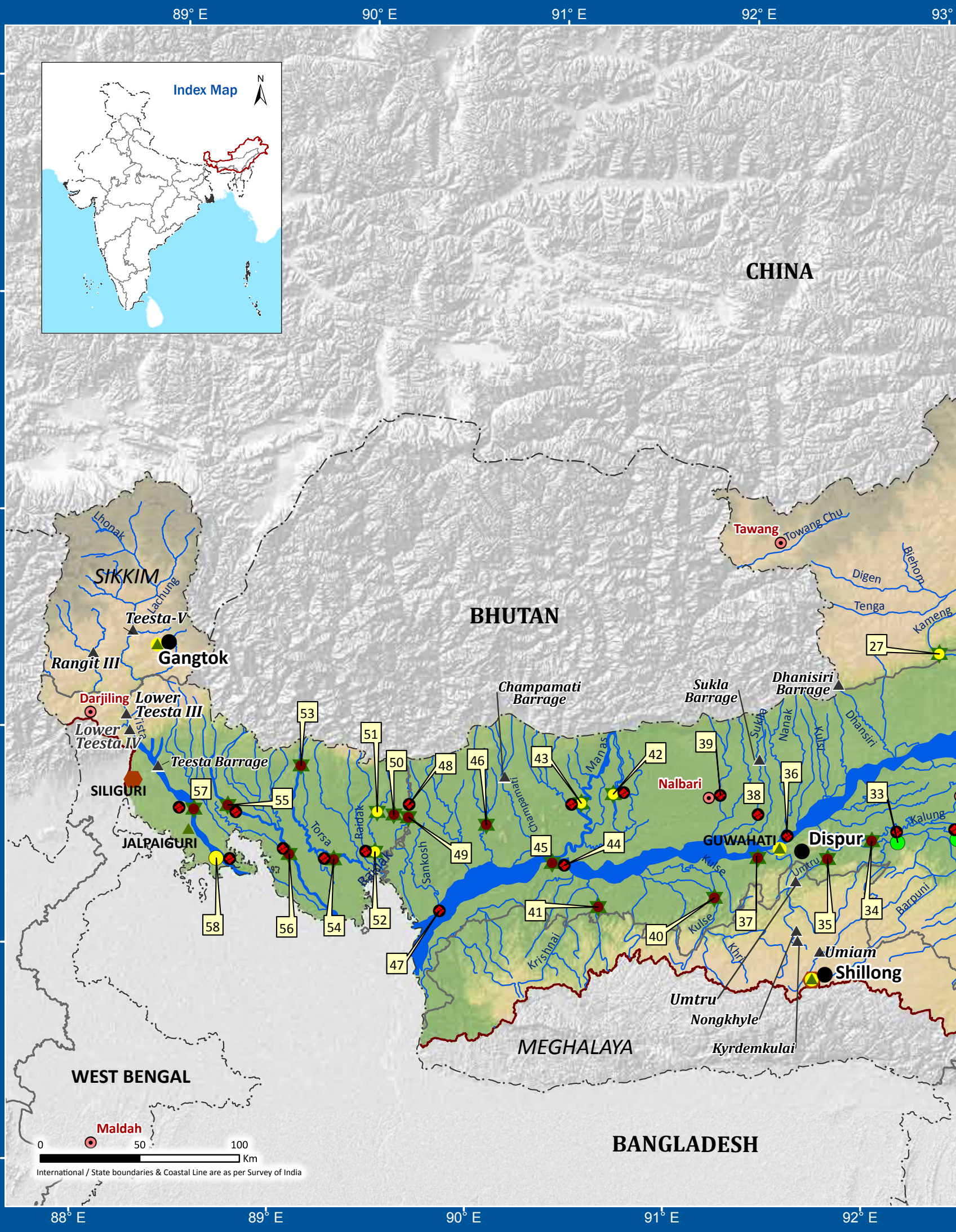


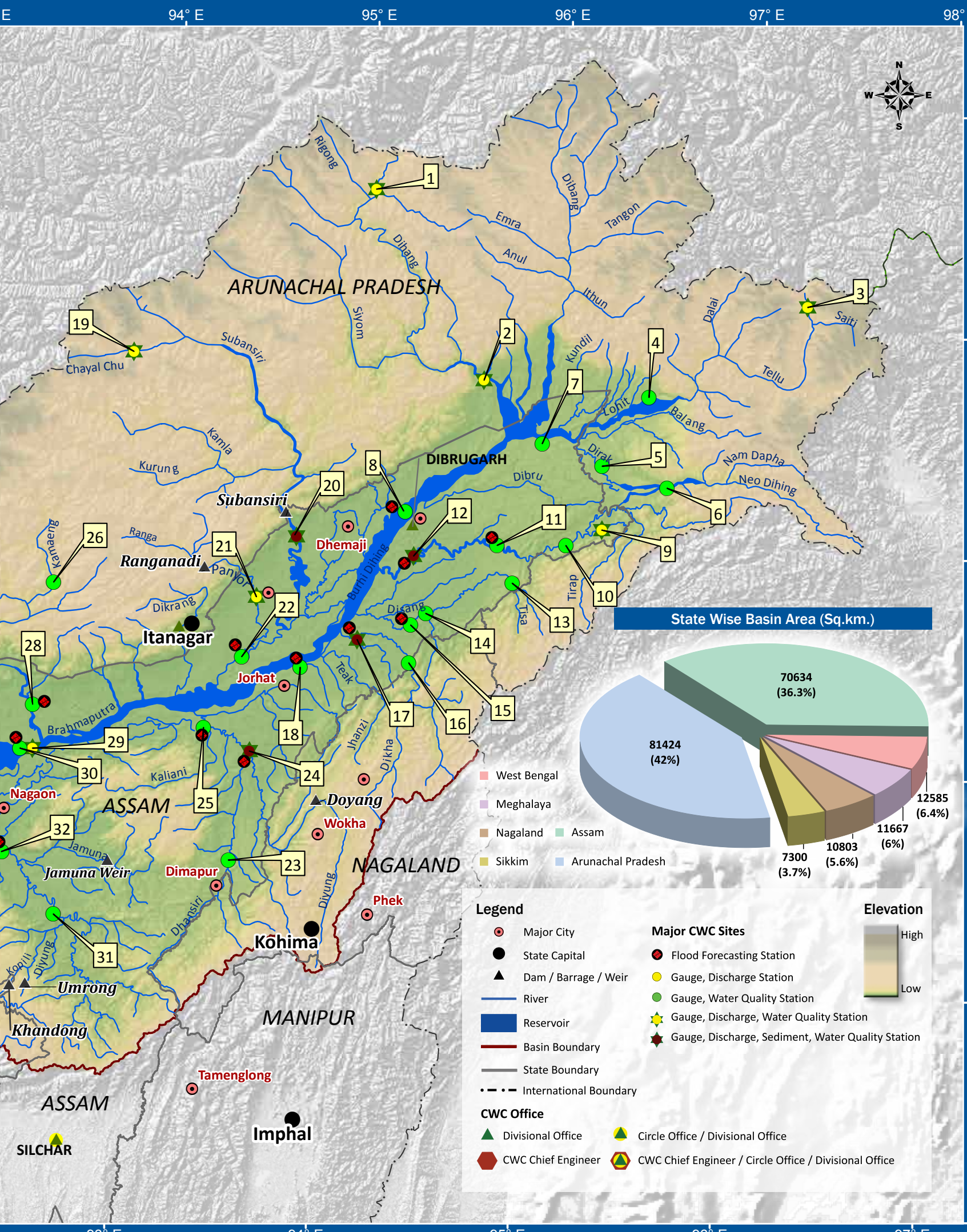
Symbol	Category	Area (Sq. km)	% of Total Area
	Built Up Land	36908.24	4.28
	Agricultural	564866.02	65.57
	Forest	137816.45	16.00
	Grassland	7324.27	0.85
	Wasteland	76603.61	8.89
	Waterbodies	29876.51	3.47
	Snow/Glaciers	8056.90	0.94

Parliamentary Constituencies (2009)



BRAHMAPUTRA BASIN




94° E
95° E
96° E
97° E
98° E
29° N
28° N
27° N
26° N
25° N
24° N
93° E
94° E
95° E
96° E
97° E
N
W
E
S
ARUNACHAL PRADESH
ASSAM
NAGALAND
MANIPUR
ASSAM
Rigong
Dibang
Emra
Tangon
Dihang
Anul
Ithun
Siyom
Subansiri
Chayal Chu
Dalai
Saiti
Kundil
Tellu
Lohit
Balang
Kamla
Kurung
Dirak
Nam Dapha
Neo Dihing
Dibru
DIBRUGARH
Subansiri
Dhemaji
Kamaeng
Ranga
Ranganadi
Panyor
Burhi Dihing
Tirap
Tisa
Dikrang
Itanagar
Disang
Teak
Jorhat
Brahmaputra
Jhanzi
Dikha
Kaliani
Nagaon
Doyang
Wokha
Jamuna
Jamuna Weir
Dimapur
Diyung
Phek
Dhansiri
Kohima
Kopili
Umrong
Khandong
Tamenglong
Imphal
SILCHAR
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23
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25
26
27
28
29
30
31
32
State Wise Basin Area (Sq.km.)
70634
(36.3%)
81424
(42%)
12585
(6.4%)
11667
(6%)
10803
(5.6%)
7300
(3.7%)
West Bengal
Meghalaya
Nagaland
Assam
Sikkim
Arunachal Pradesh
Legend
Major City
State Capital
Dam / Barrage / Weir
River
Reservoir
Basin Boundary
State Boundary
International Boundary
Major CWC Sites
Flood Forecasting Station
Gauge, Discharge Station
Gauge, Water Quality Station
Gauge, Discharge, Water Quality Station
Gauge, Discharge, Sediment, Water Quality Station
Elevation
High
Low
CWC Office
Divisional Office
Circle Office / Divisional Office
CWC Chief Engineer
CWC Chief Engineer / Circle Office / Divisional Office

The Brahmaputra basin spreads over countries of Tibet (China), Bhutan, India and Bangladesh having a total area of 5,80,000 Sq.km. In India, it spreads over states of Arunachal Pradesh, Assam, West Bengal, Meghalaya, Nagaland and Sikkim and lies between 88°11' to 96°57' east longitudes and 24°44' to 30°3' north latitudes and extends over an area of 1,94,413 Sq.km which is nearly 5.9 % of the total geographical area of the country. It is bounded by the Himalayas on the north, by the Patkari range of hills on the east running along the India-Myanmar border, by the Assam range of hills on the south and by the Himalayas and the ridge separating it from Ganga basin on the west.

The Brahmaputra River originates in the north from Kailash ranges of Himalayas at an elevation of 5,150 m just south of the lake called Konggyu Tsho and flows for about a total length of 2,900 km. In India, it flows for 916 km. The principal tributaries of the river joining from right are the Lohit, the Dibang, the Subansiri, the Jiabharali, the Dhansiri, the Manas, the Torsa, the Sankosh and the Teesta whereas the Burhidihing, the Desang, the Dikhow, the Dhansiri and the Kopili joins it from left.

The major part of basin is covered with forest accounting to 55.48% of the total area and 5.79% of the basin is covered by water bodies. The basin spreads over 22 parliamentary constituencies (2009) comprising 12 of Assam, 4 of West Bengal, 2 of Arunachal Pradesh, 2 of Meghalaya, 1 of Sikkim and 1 of Nagaland.

Brahmaputra Basin Hydrological Observation Sites

S. No.	Site Name	S. No.	Site Name
1	Tuting (GDQ)	30	Tezpur (GQ & FF)
2	Passighat (GDQ)	31	Kheronighat (GQ)
3	Kibithu (GDQ)	32	Kampur (GQ & FF)
4	Tezu (GQ)	33	Dharamtul (GQ & FF)
5	Namsai (GQ)	34	Jagibhakatgaon (GDSQ)
6	Miao (GQ)	35	Sonapur (GDSQ)
7	Dholabazar (GQ)	36	Guwahati (G & FF)
8	Dibrugarh (GQ & FF)	37	Pandu (GDSQ)
9	Udaipur (GDQ)	38	Puthimari (NHX) (G & FF)
10	Margherita (GQ)	39	Pagladia (NTX) (G & FF)
11	Naharkatia (GQ & FF)	40	Kulsi (GDSQ)
12	Chenimari (Khowang) (GDSQ)	41	Dudhnai (GDSQ)
13	Dillighat (GQ)	42	Beki Road bridge (GDQ & FF)
14	Desangpani (GQ)	43	Manas NH Crossing (GDQ & FF)
15	Nanglamoraghat (GQ & FF)	44	Goalpara (G & FF)
16	Bihubar (GQ)	45	Pancharatna (GDSQ)
17	Sivasagar (GDSQ & FF)	46	Kokrajhar (GDSQ)
18	Neamatighat (GQ & FF)	47	Dhubri (G & FF)
19	Lemeking (GDQ)	48	Golakganj (G & FF)
20	Chouldhowaghat (GDSQ)	49	Sankosh (GDSQ)
21	Ranganadi NT-Road Crossing (GDQ)	50	Barabisha (GDSQ)
22	Badatighat (GQ & FF)	51	Chepan (GDQ)
23	Bokajan (GQ)	52	Tufanganj (GDQ & FF)
24	Golaghat (GDSQ & FF)	53	Hasimara (GDSQ)
25	Numaligarh (GQ & FF)	54	Ghughumari (GDSQ & FF)
26	Seppa (GQ)	55	NH-31 (GDSQ & FF)
27	Bhalukpong (GDQ)	56	Mathabhanga (GDSQ & FF)
28	Jiabharali NT Road X-ing (GQ & FF)	57	Domohani (GDSQ & FF)
29	Bhomoraguri (GDQ)	58	Mekhliganj (GD & FF)

Salient Features of Brahmaputra Basin

Basin Extent	Longitude	88° 11' to 96° 57' E
	Latitude	24° 44' to 30° 3' N
Length of Brahmaputra River (Km)		916 (in India)
Catchment Area (Sq.km.)		194413
Average Water Resource Potential (MCM)		537240
Utilizable Surface Water Resource (MCM)		24000
Live Storage Capacity of Completed Projects (MCM)		2326.92*
Live Storage Capacity of Projects Under Construction (MCM)		9353.64*
Total Live Storage Capacity of Projects (MCM)		11680.56*
No. of Hydrological Observation Stations		108
No. of Flood Forecasting Stations		27

*Combined with Barak & others

Major Water Resources Projects of Brahmaputra Basin

Name of Project	Associated Structures	Type	Status	Culturable Command Area (Th ha)	Ultimate Irrigation Potential (Th ha)	Power (MW)
Teesta Barrage St-I, Ph-I Subphase I Project (WB)	Teesta Barrage	Major	Ongoing	342.30	527.00	67.50
Dhanisiri Project (AS)	Dhanisiri Barrage	Major	Ongoing	41.68	83.37	
Sukla Irr. Project (AS)	Sukla Barrage	Major	Completed	16.8	27.4	
Jamuna Irr. Project (AS)	Jamuna Weir	Major	Completed	27.7	41.01	
Champamati Irr. Project (AS)	Champamati Barrage	Major	Ongoing	17.41	24.99	
Umiam HE Complex (Stage I,II,III,IV) (MG)	Umsumer, Umiam (Sumer), Kyrdemkulai, Nongkhyllem	Major	Completed	-	-	174
Kopilli HE Complex (AS)	Umrong and Khandong	Major	Completed	-	-	275

*Th. ha = Thousand Hectare, MW = Mega Watt, MCM = Million Cubic Meter

River Flow Line Diagram

Origin: Konggyu Tsho Lake, Kailash Ranges, Tibet

Bramhaputra River

Subansiri River

Lower Subansiri Dam
(Lower Subansiri HE Project)
GSC: 1365 MCM
LSC: 923 MCM
Power (IC):2000 MW

Ranga River

Ranganadi Dam
(Ranganadi HE Project)
GSC: 21.28 MCM
LSC: 5.7 MCM
Power (IC):405 MW

Doyang Dam
(Doyang HE Project)
GSC: 565 MCM
LSC: 400 MCM
Power (IC):75 MW

Diyung River

Dhansiri (South) River

Dhansiri River

Dhanisiri Barrage
(Dhanisiri Project)
Barrage Length:160 m

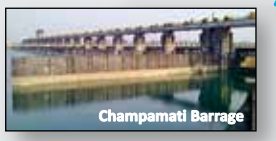
Sukla River

Sukla Barrage
(Sukla Irr. Project)
Barrage Length: 156.06 m

Umrong Dam
(Kopilli HE Project)
LSC:55.5 MCM
Power (IC):200 MW

Kalung River

Manas River



Champamati River

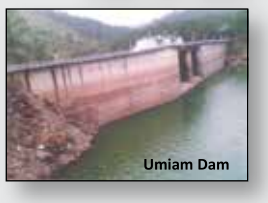
Champamati Barrage
(Champamati Irr. Project)
Barrage Length: 258.5 m

Umtru River

Umtru Dam
(Umtru HE Project)
Power (IC):11.2 MW

Umiam River

Umiam Dam
(Umiam HE Project)
GSC:171.10 MCM
LSC: 131.70 MCM
Power (IC): 36MW



Kopilli River

Umrong River

Khandong Dam
(Khandong HE Project)
LSC: 129.5 MCM
Power (IC):75 MW

Jamuna River

Jamuna Weir
(Jamuna Irr. Project)
Weir Length: 156.06 m

Teesta-V Dam
(Teesta- V HE Project)
GSC: 13.5 MCM
LSC: 6.3 MCM
Power (IC): 510 MW

Lower Teesta-III Dam
(Lower Teesta-III HE Project)
GSC: 18.36 MCM
LSC: 6.8 MCM
Power (IC): 132 MW

Teesta Barrage
(Teesta Barrage St-I, Ph-I Subphase I Project)
Barrage Length:921.5 m

Teesta River

Rangit River

Lower Teesta-IV Dam
(Lower Teesta-IV HE Project)
GSC: 36.63 MCM
LSC: 7.91 MCM
Power (IC):160 MW

Rangit III Dam
(Rangit III HE Project)
Power (IC):60 MW

Jamuna River

Ganga or Padma River

Meghna River

Meghna River

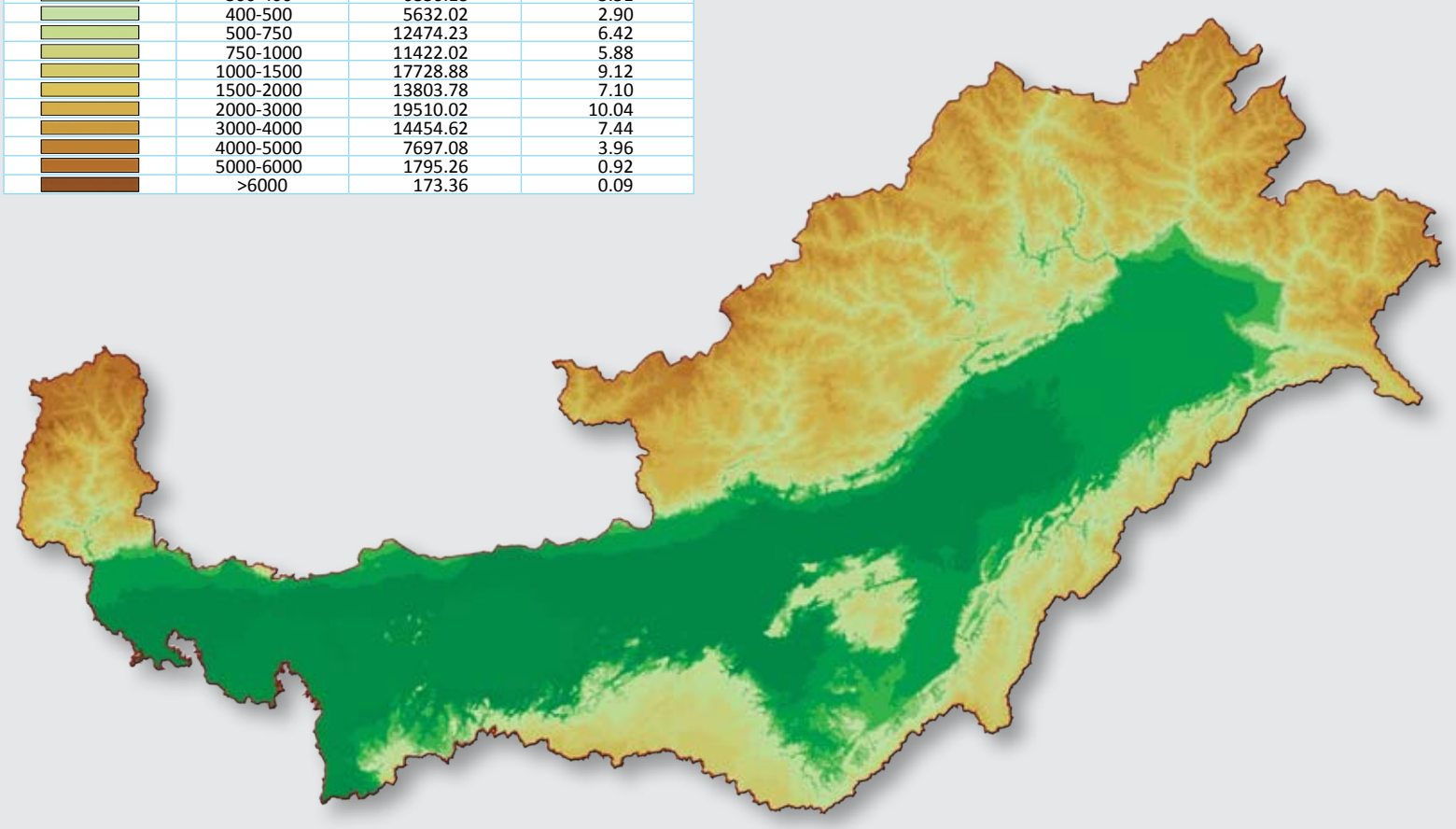
Bay of Bengal

India Portion
Bangladesh Portion
Tibet Portion

= Under Construction Structures
= Operational Structures
GSC = Gross Storage Capacity (Original)
LSC = Live Storage Capacity (Original)
IC = Installed Capacity (Mega Watt)
PSS = Pumped Storage Schemes

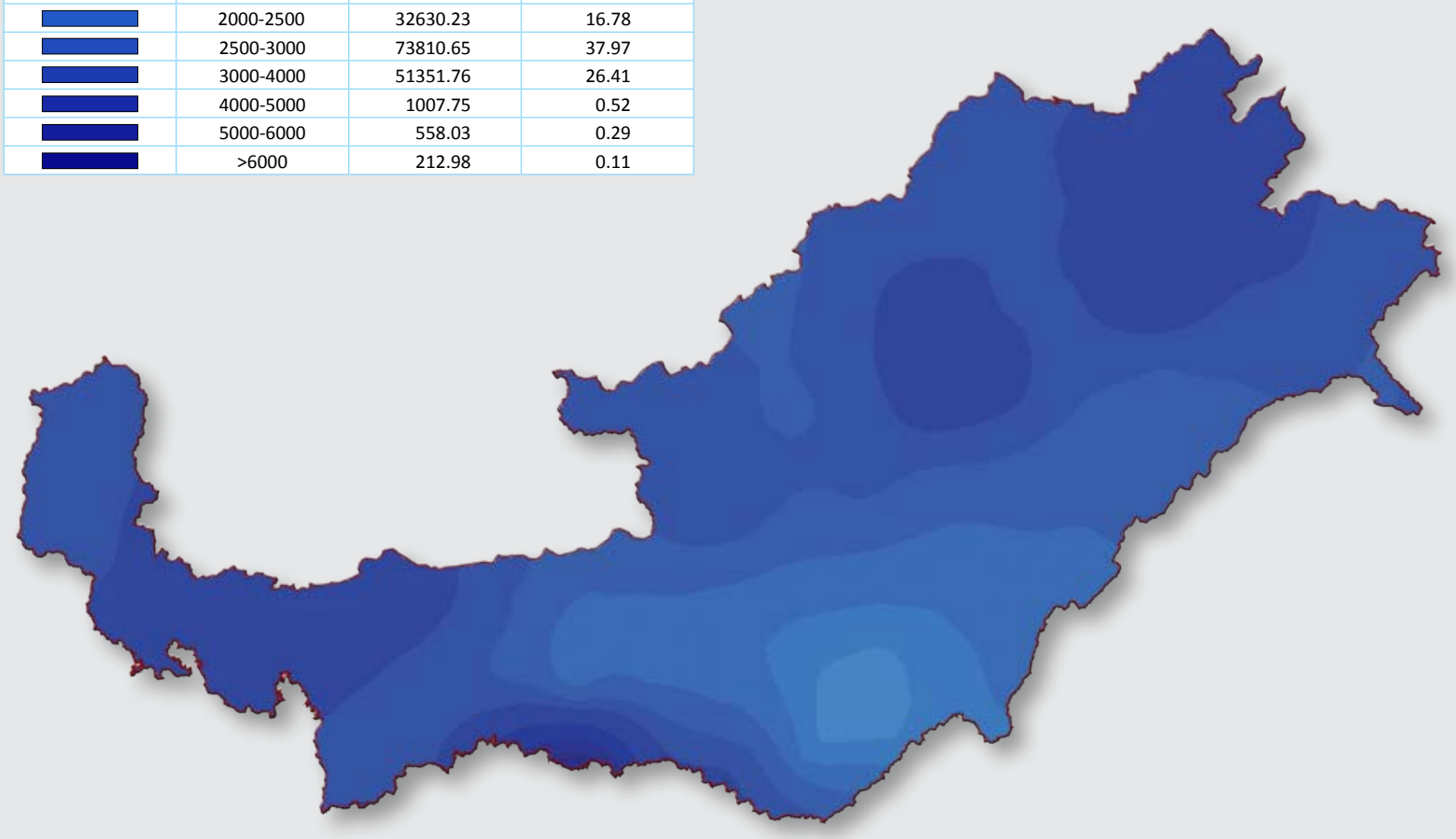
Elevation Zone Map

Symbol	Elevation (m)	Area (Sq. km)	% of Total Area
	10-50	12652.14	6.51
	50-100	33336.92	17.15
	100-200	27506.95	14.15
	200-300	9395.54	4.83
	300-400	6830.18	3.51
	400-500	5632.02	2.90
	500-750	12474.23	6.42
	750-1000	11422.02	5.88
	1000-1500	17728.88	9.12
	1500-2000	13803.78	7.10
	2000-3000	19510.02	10.04
	3000-4000	14454.62	7.44
	4000-5000	7697.08	3.96
	5000-6000	1795.26	0.92
	>6000	173.36	0.09



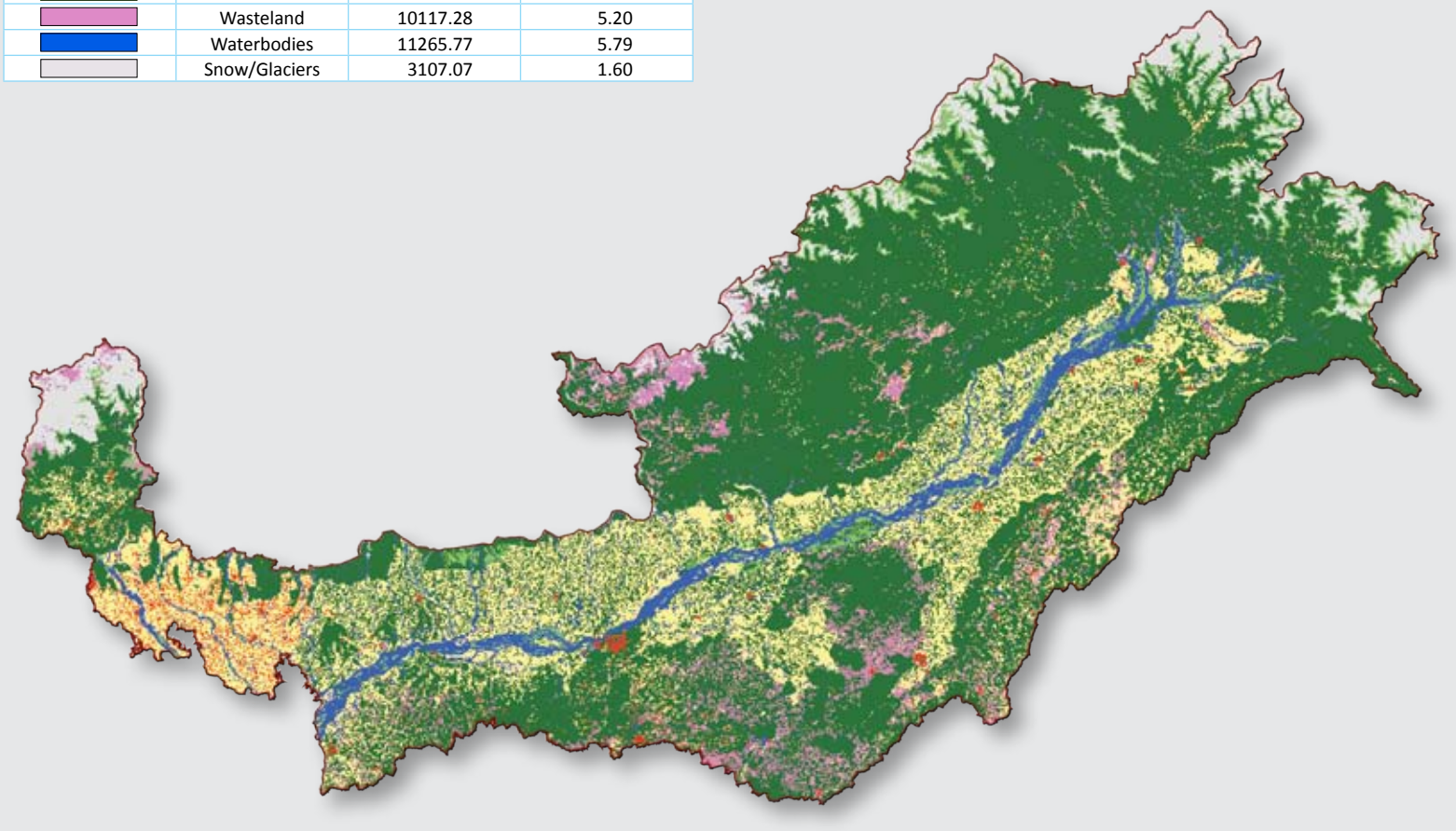
Average Annual Rainfall (1971-2005)

Symbol	Rainfall (mm)	Area (Sq. km)	% of Total Area
	1200-1400	3124.43	1.61
	1400-1600	8588.73	4.42
	1600-2000	23128.44	11.90
	2000-2500	32630.23	16.78
	2500-3000	73810.65	37.97
	3000-4000	51351.76	26.41
	4000-5000	1007.75	0.52
	5000-6000	558.03	0.29
	>6000	212.98	0.11

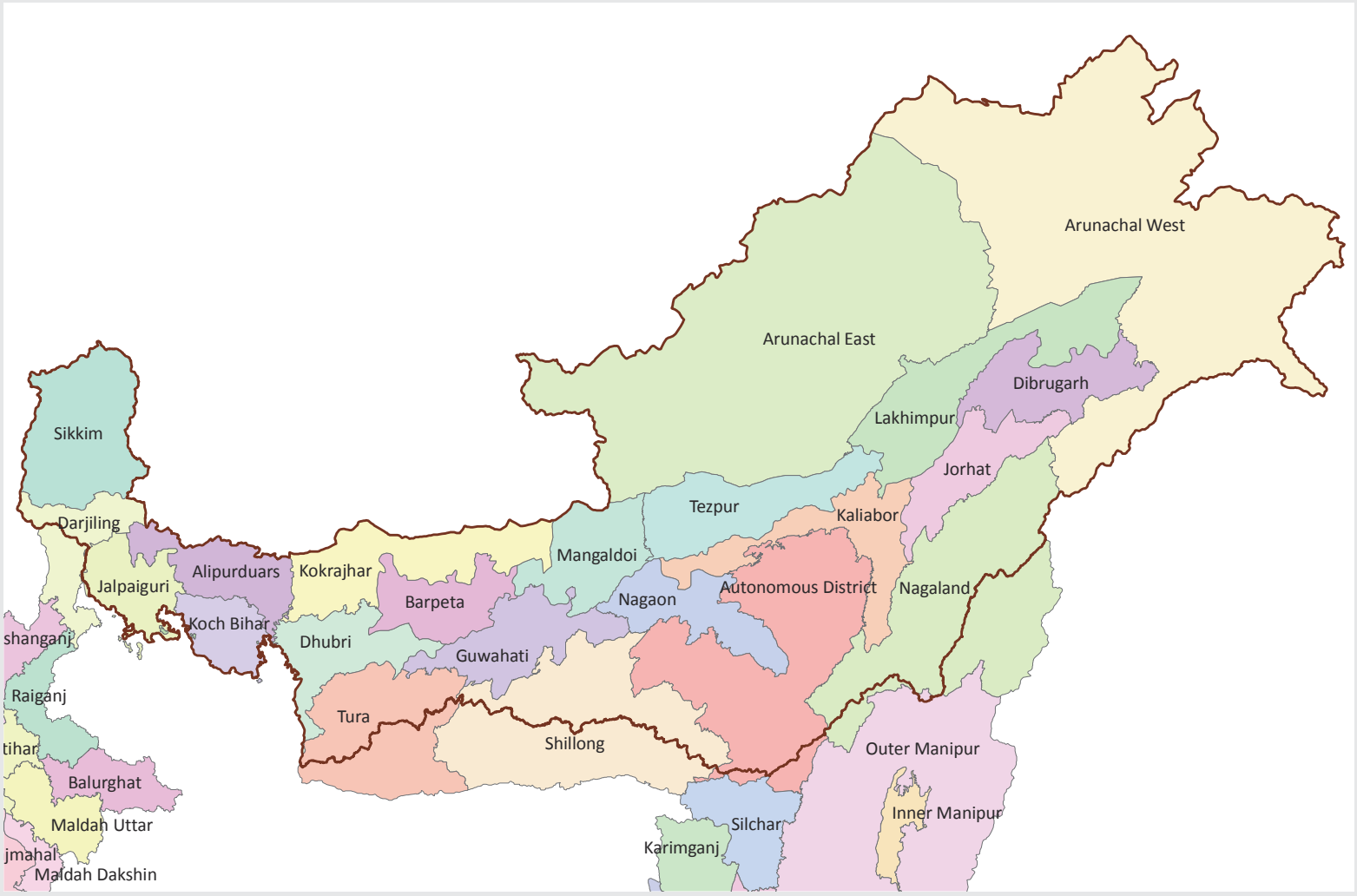


Land Use / Land Cover (2005-06)

Symbol	Category	Area (Sq. km)	% of Total Area
	Built Up Land	3162.58	1.63
	Agricultural	50374.57	25.91
	Forest	107854.27	55.48
	Grassland	8531.46	4.39
	Wasteland	10117.28	5.20
	Waterbodies	11265.77	5.79
	Snow/Glaciers	3107.07	1.60



Parliamentary Constituencies (2009)



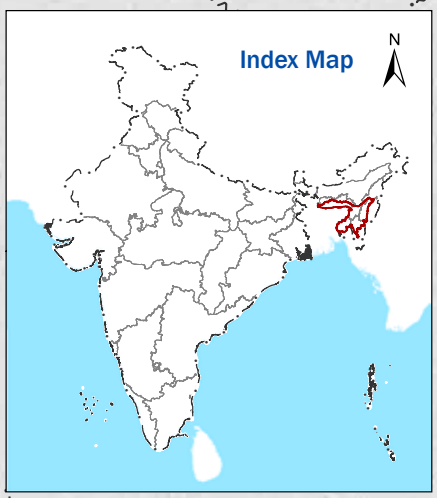
BARAK AND OTHERS

89° E 90° E 91° E

26° N

25° N

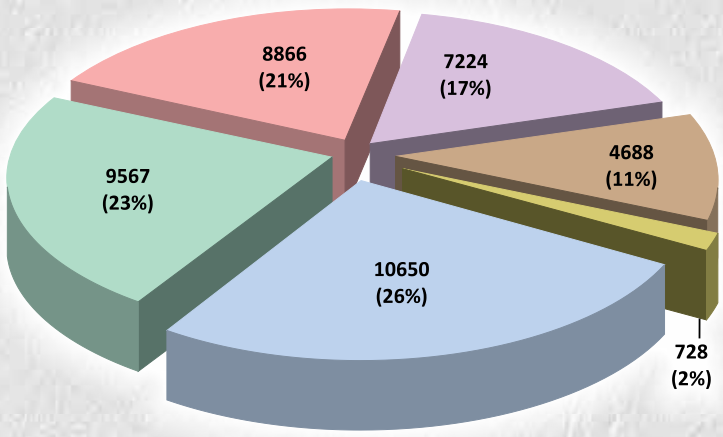
24° N



Ranga
Someshwari
Jadukata
Kynski
Someshwari
Bhugai
MEGHALAYA
Dimapara
Sibbari

BANGLADESH

State Wise Basin Area (Sq.km.)



Agartala
Haora
Gajaria
Sonamura

Legend

- Major City
- State Capital
- Dam / Barrage / Weir
- River
- Reservoir
- Basin Boundary
- State Boundary
- International Boundary

Major CWC Sites

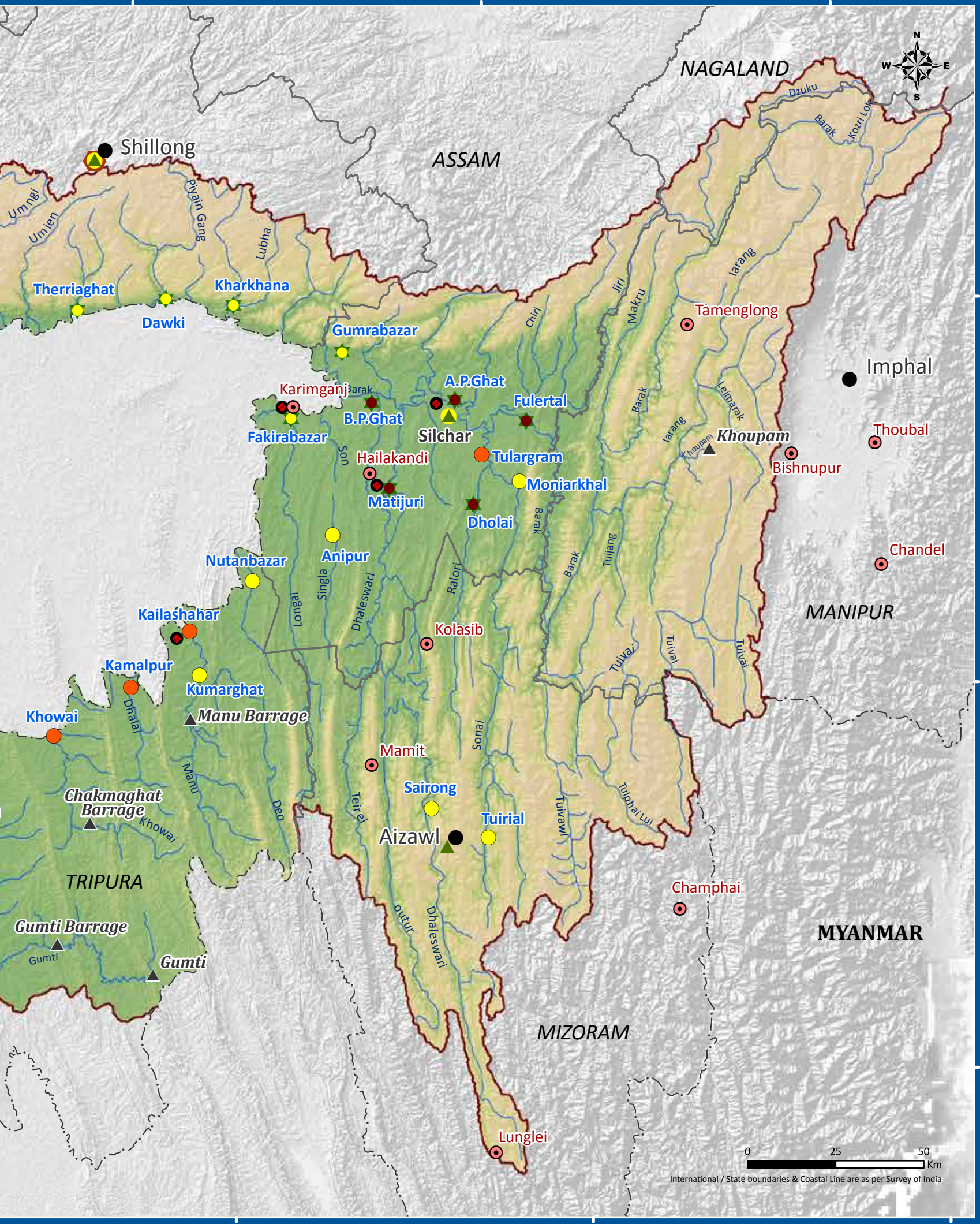
- Flood Forecasting Station
- Gauge, Discharge Station
- Gauge, Discharge, Sediment Station
- Gauge, Discharge, Water Quality Station
- Gauge, Discharge, Sediment, Water Quality Station

CWC Office

- Divisional Office
- Circle Office / Divisional Office
- CWC Chief Engineer / Circle Office / Divisional Office

Elevation

High
Low

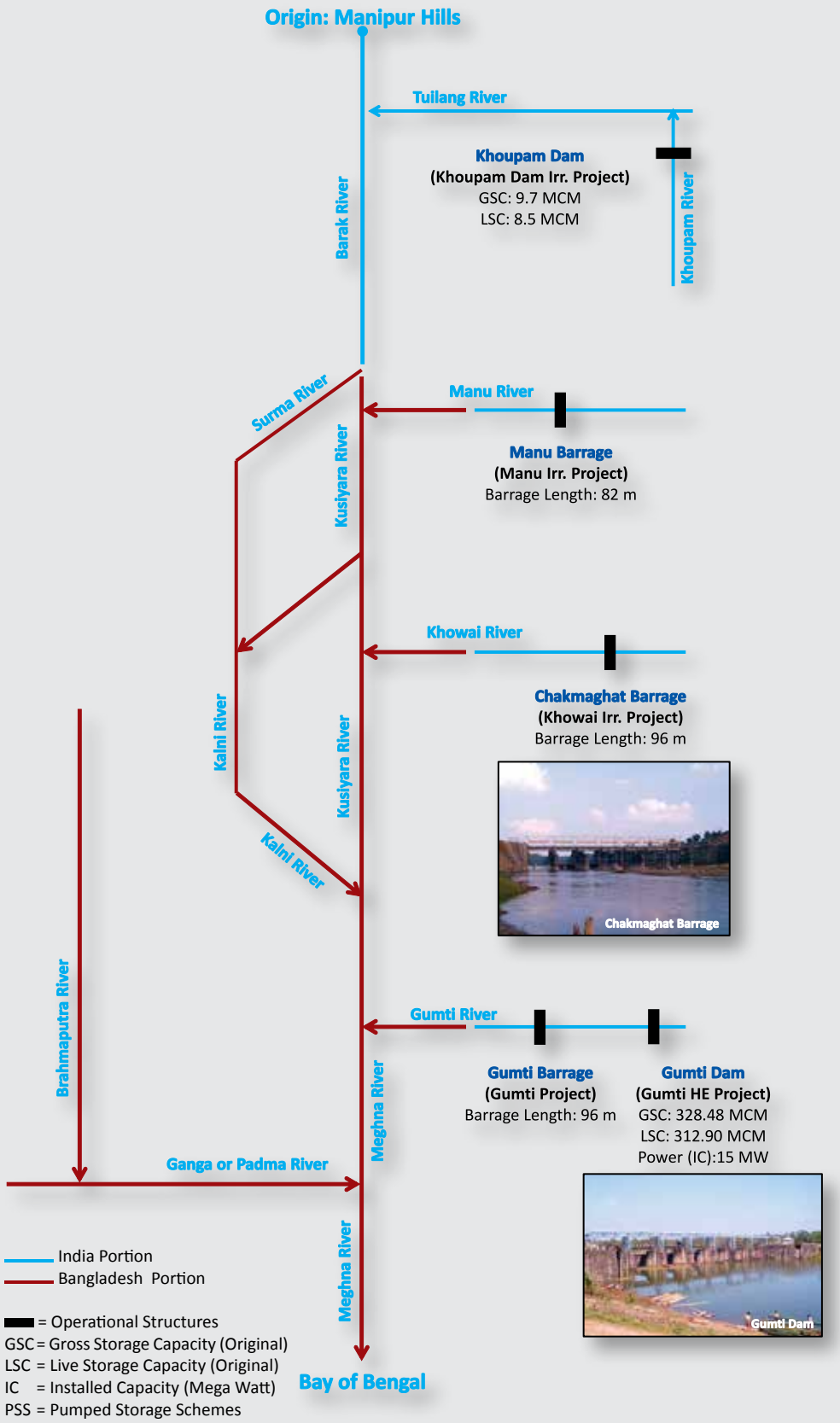

92° E
93° E
94° E
25° N
24° N
23° N
NAGALAND
ASSAM
MANIPUR
TRIPURA
MIZORAM
MYANMAR
N
W
E
S
Shillong
Umngi
Umien
Piyain Gang
Lubha
Therriaghat
Dawki
Kharkhana
Gumrabazar
Karimganj
Barak
A.P.Ghat
Fulertal
B.P.Ghat
Fakirabazar
Silchar
Son
Hailakandi
Tulargram
Moniarkhal
Matijuri
Dholai
Barak
Anipur
Nutanbazar
Longai
Singla
Dhaleswari
Ralori
Barak
Tuijang
Kailashahar
Kolasib
Kamalpur
Kumarghat
Tuivai
Tuivai
Tuivai
Khowai
Manu Barrage
Dhalai
Manu
Deo
Mamit
Sonai
Chakmaghat Barrage
Khowai
Teirei
Sairong
Aizawl
Tuirial
Tuivawl
Tuiphai Lui
Gumti Barrage
Gumti
Gumti
outur
Dhaleswari
Lunglei
Chiri
Jiri
Makru
Barak
Jarang
Tamenglong
Imphal
Leimarak
Jarang
Khoupam
Khoupam
Thoubal
Bishnupur
Dzuku
Barak
Kozri Lok
Chandel
Champhai
0
25
50
Km
International / State boundaries & Coastal Line are as per Survey of India

The basin covers parts of India, Bangladesh and Myanmar. In India it spreads over states of Meghalaya, Manipur, Mizoram, Assam, Tripura and Nagaland having an area of 41,723 Sq.km which is nearly 1.38% of the total geographical area of the country. The basin extends between 89°50' to 94°0' east longitudes and 22°44' to 25°58' north latitudes with maximum length and width of 460 km and 350 km. It is bounded by the Barail range separating it from the Brahmaputra basin on the north, by the Naga and Lushai hills on the east and by Mizo hills and territory of Bangladesh on the south and west.

The Barak River rises from the Manipur hills, south of Mao in Senapati district of Manipur at an elevation of 2,331 m. It flows then along Nagaland-Manipur border through hilly terrains and enters Assam. It further enters Bangladesh where it is known by the name of the Surma and the Kushiyara and later called the Meghna before receiving the combined flow of the Ganga and the Brahmaputra. The length of the Barak River from its origin upto the border of Assam along the Kushiyara is 564 km. The principal tributaries of Barak joining from north bank are the Jiri, the Chiri, the Modhura, the Jatinga, the Harang, the Kalain and the Gumra whereas the Dhaleswari, the Singla, the Longai, the Sonai and the Katakhal joins from south bank.

The major part of basin is covered with forest accounting to 72.58% of the total area and only 1.92% of the basin is covered by water bodies. The basin spreads over 10 parliamentary constituencies (2009) comprising 3 of Assam, 2 of Tripura, 2 of Meghalaya, 1 each of Mizoram, Manipur and Nagaland.

River Flow Line Diagram



Salient Features of Barak and Others

Basin Extent	Longitude	89° 50' to 94° 0' E
	Latitude	22° 44' to 25° 58' N
Length of Barak River (Km)		564 (in India)
Catchment Area (Sq.km.)		41723
Average Water Resource Potential (MCM)		48360
Utilizable Surface Water Resource (MCM)		-
Live Storage Capacity of Completed Projects (MCM)		2326.92*
Live Storage Capacity of Projects Under Construction (MCM)		9353.64*
Total Live Storage Capacity of Projects (MCM)		11680.56*
No. of Hydrological Observation Stations		44
No. of Flood Forecasting Stations		5

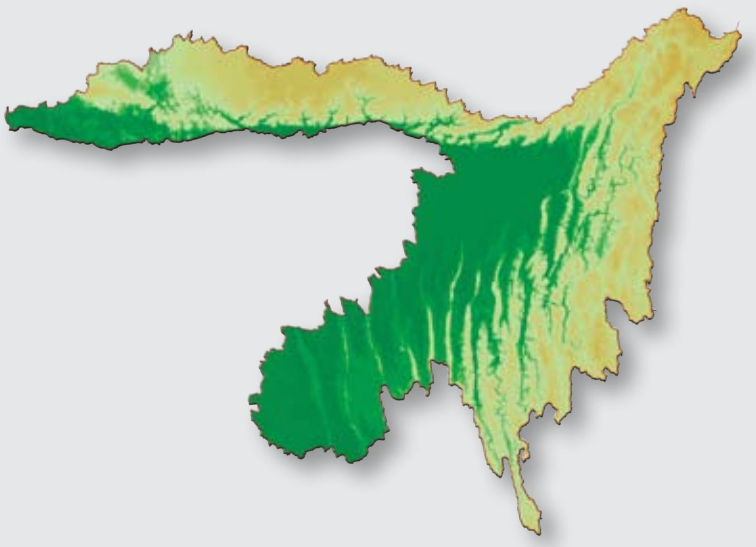
*Combined with Brahmaputra Basin

Major Water Resources Projects of Barak and Others

Name of Project	Associated Structures	Type	Status	Culturable Command Area (Th ha)	Ultimate Irrigation Potential (Th ha)
Khoupam Dam Irr. Project (MN)	Khoupam Dam	Medium	Completed	0.60	1.00
Manu Irr. Project (TR)	Manu Barrage	Medium	Ongoing	4.20	7.60
Khowai Irr. Project (TR)	Chakmaghat Barrage	Medium	Ongoing	4.52	9.32
Gumti Project (TR)	Gumti Barrage	Medium	Ongoing	4.49	9.80

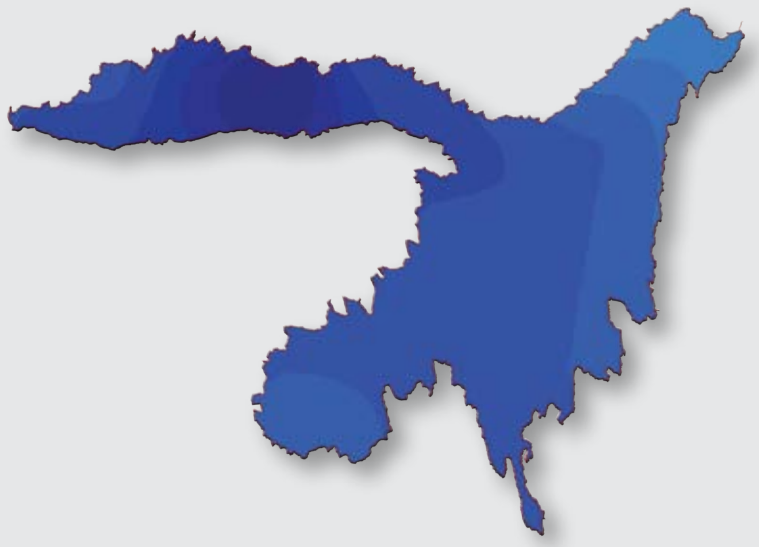
*Th. ha = Thousand Hectare, MW = Mega Watt, MCM = Million Cubic Meter

Elevation Zone Map



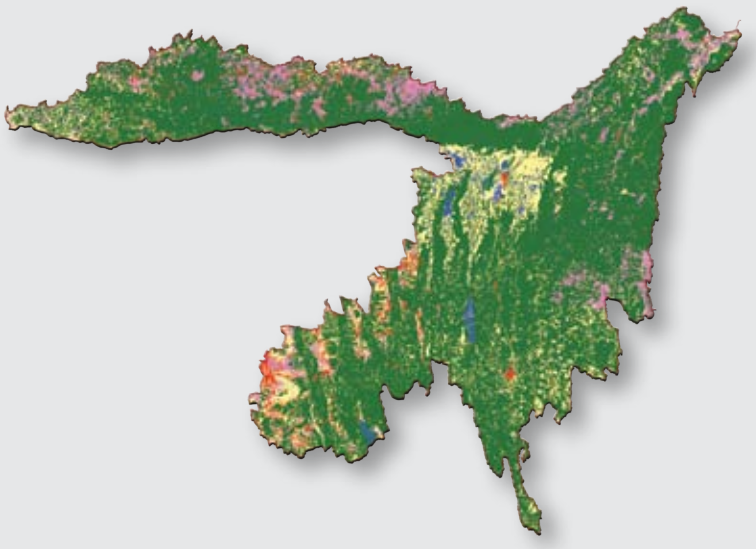
Symbol	Elevation (m)	Area (Sq. km)	% of Total Area
	5-10	8.78	0.02
	10-50	6039.97	14.48
	50-100	5490.55	13.16
	100-200	5162.21	12.37
	200-300	2511.08	6.02
	300-400	2398.68	5.75
	400-500	2374.52	5.69
	500-750	5363.78	12.86
	750-1000	4430.72	10.62
	1000-1500	5401.00	12.94
	1500-2000	2193.94	5.26
	2000-3000	347.77	0.83

Average Annual Rainfall (1971-2005)



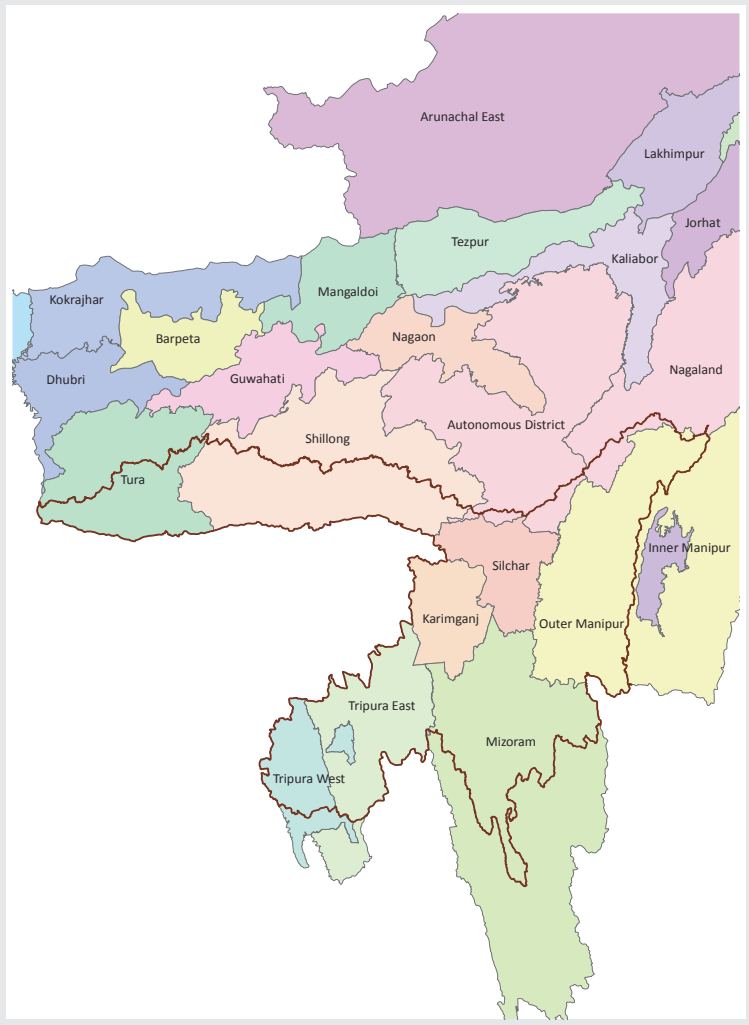
Symbol	Rainfall (mm)	Area (Sq. km)	% of Total Area
	1400-1600	1507.38	3.61
	1600-2000	1514.84	3.63
	2000-2500	9659.74	23.15
	2500-3000	18499.26	44.36
	3000-4000	5171.50	12.39
	4000-5000	1741.14	4.17
	5000-6000	1633.36	3.91
	>6000	1995.78	4.78

Land Use / Land Cover (2005-06)

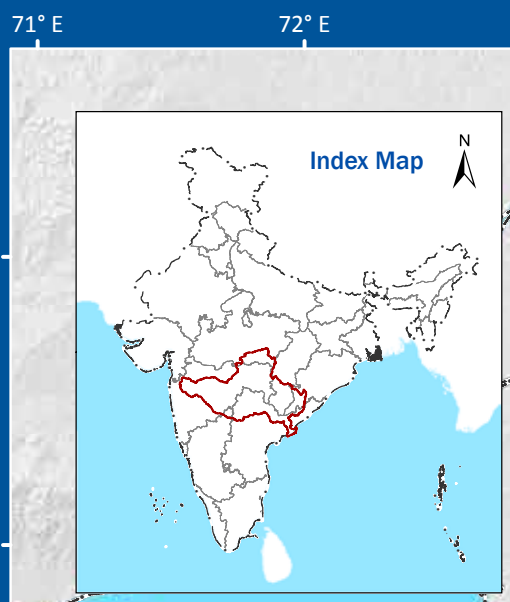


Symbol	Category	Area (Sq. km)	% of Total Area
	Built Up Land	1247.12	2.99
	Agricultural	6233.75	14.94
	Forest	30283.82	72.58
	Grassland	18.92	0.05
	Wasteland	3138.19	7.52
	Waterbodies	801.20	1.92

Parliamentary Constituencies (2009)



GODAVARI BASIN



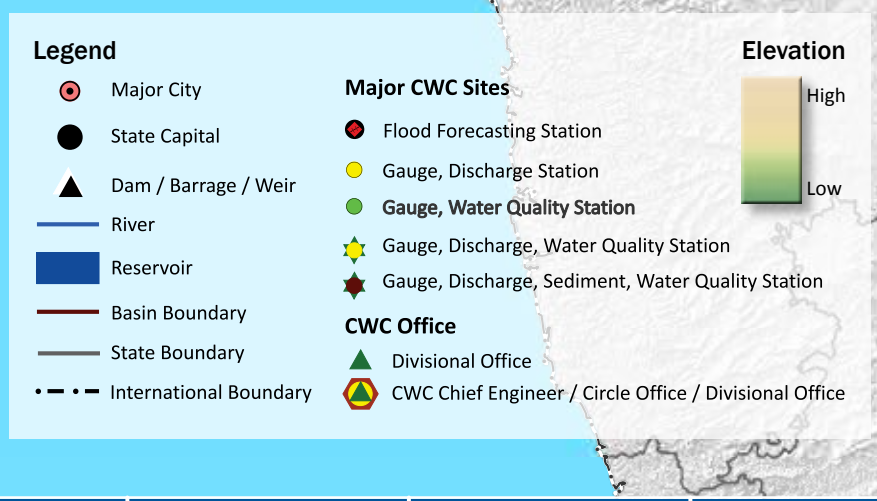
71° E 72° E 73° E 74° E 75° E 76° E 77° E

22° N 21° N 20° N 19° N 18° N 17° N 16° N

GUJARAT
MADHYA PRADESH
MAHARASHTRA
KARNATAKA
Arabian Sea

Bharuch
Jalgaon
Daman
Silvassa
Pune
Ahmadnagar
Solapur

Karanjwan
Kadwa
Gangapur
Godavari
Nandur Madmeshwer Weir
Mukane
Darna
Kopergoon
Aurangabad
Purna
Penganga
Kanergaon
Upper Ghatghar
Pravara
Ozar Weir
Bhandardara
Shivna
Yeldari
Dudhana
Siddeshwar
Jayakwadi
Pachegaon
Mula
Zari
Dhalegaon
Sindphana
Majalgaon
Gangakhed
G.R.Bridge
Manjra
Saigaon
Terna
Lower Terna
Karanja




78° E
79° E
80° E
81° E
82° E
83° E
22° N
21° N
20° N
19° N
18° N
17° N
16° N
N
S
E
W
Upper Wainganga
Keolari
Pench
Dhuti Weir
Wainganga
Kanhan
Kumhari
Ramakona
Totladoh
Bawanthadi
Rajegaon
Son
Kamthikhairy
Bawanthadi (U/C)
Bagh
Satrapur
Upper Wardha
Wardha
Nagpur
Bhandara
Pujari Tola
Sirpur (Bagh)
Amravati
Chulband
Ghosi
Khurd
Salebardi
Lower Wunna
Vena
Pauni
Itiadoh
CHHATTISGARH
Hivra
Nandgaon
Sam
Wairagarh
Aran
Mangrul
Rajoli
Kathani
Arunavati
Arunavati
Kuni
Wardha
ODISHA
Penganga
P.G. Bridge
Bamni
Isapur
Balharsha
Ashti
Bande
Kothi
Kiwaibalenga
Adilabad
Sirpur
Nibra
Cherribeda
Upper Indravathi
Kaddam
Peddavagu
Sonarpal
Amabal
Kosagumda
Nanded
Bhatpalli
Pranhita
Kaddam
Godavari
Indravati
Ind ravati
Chindnar
Nowrangpur
Yelli
Sriram Sagar
Kaleswaram
Tekra
Jagdalpur
Murthahandi
Godavari
Tumnar
Da ntewara
Pathagudem
Upper Kolab
Gandlapet
Mancherial
Bijapur
Peddavagu
Maner
Somanpally
Perur
Saradaput
Degloor
Lower Manair
Potteru
Barrage
Machkund
Machkund
Potteru
Manjra
Nizam Sagar
Eturunagaram
Godavari
Balimela
Potteru
Sabari
Sileru
Guntawada Weir
Manjra
Dummagudem
Donkarai
Singur
Kinnersani
Konta
Lower Sileru Forbay
ANDHRA PRADESH
Sangam
(Murredu)
Kunavaram
Hyderabad
Bhadrachalam
Polavaram
Rajamundri (GR Bridge)
Sir Arthur Cotton
Barrage
Dowalaiswaram
Yanam
(PUDUCHERRY)
Godavari
Bay of Bengal
Guntur
0
50
100
Km
International / State boundaries & Coastal Line are as per Survey of India
Bilaspur
Raipur

The Godavari basin extends over states of Maharashtra, Andhra Pradesh, Chhattisgarh and Odisha in addition to smaller parts in Madhya Pradesh, Karnataka and Union territory of Puducherry having a total area of 3,12,812 Sq.km with a maximum length and width of about 995 km and 583 km. It lies between 73°24' to 83°4' east longitudes and 16°19' to 22°34' north latitudes and accounts for nearly 9.5% of the total geographical area of the country. The basin is bounded by Satmala hills, the Ajanta range and the Mahadeo hills on the north, by the Eastern Ghats on the south and the east and by the Western Ghats on the west.

The Godavari River rises from Trimbakeshwar in the Nashik district of Maharashtra about 80 km from the Arabian Sea at an elevation of 1,067 m. The total length of Godavari from its origin to outfall into the Bay of Bengal is 1,465 km. Its principal tributaries joining from right are the Pravara and the Manjra whereas the Purna, the Penganga, the Wardha, the Wainganga, the Indravati and the Kolab joins from left.

The major part of basin is covered with agricultural land accounting to 59.57% of the total area and 3.6% of the basin is covered by water bodies. The basin spreads over 51 parliamentary constituencies (2009) comprising 21 of Maharashtra, 18 of Andhra Pradesh, 4 of Madhya Pradesh, 3 each of Chhattisgarh and Odisha and 1 each of Karnataka and Puducherry.

Salient Features of Godavari Basin

Basin Extent	Longitude	73° 24' to 83° 4' E
	Latitude	16° 19' to 22° 34' N
Length of Godavari River (Km)		1465
Catchment Area (Sq.km.)		312812
Average Water Resource Potential (MCM)		110540
Utilizable Surface Water Resource (MCM)		76300
Live Storage Capacity of Completed Projects (MCM)		25124.60
Live Storage Capacity of Projects Under Construction (MCM)		6205.79
Total Live Storage Capacity of Projects (MCM)		31330.39
No. of Hydrological Observation Stations		75
No. of Flood Forecasting Stations		18

Major Water Resources Projects of Godavari Basin

Name of Project	Associated Structures	Type	Status	Culturable Command Area (Th ha)	Ultimate Irrigation Potential (Th ha)	Power (MW)
Godavari Canal Irr. Project (MH)	Darna Dam, Nandur Madhameshwar Weir	Major	Completed	48.34	25.87	
Upper Godavari Project (MH)	Karanjwan Dam	Major	Ongoing	84.56	71.62	3
Nandur Madhameshwar Irr. Project – A & N (MH)	Darna Dam, Nandur Madhameshwar Weir	Major	Ongoing	54.44	45.12	
Pravara Project (MH)	Bhandardara Dam, Ozar Weir	Major	Completed	62.98	23.07	44
Mula Irr. Project (MH)	Mula Dam	Major	Completed	118.2	85.2	
Pench Irr. Project (MH)	Totladoh Dam, Kamthikhairy Dam	Major	Completed	119.07	104.46	
Jayakwadi Project Stage-I & II (MH)	Jayakwadi Dam	Major	Completed	325.37	268.37	12
Potteru Irr. Project (OD)	Potteru Barrage	Major	Completed	61.0	109.88	
Purna Project (MH)	Yeldari Dam, Siddeshwar Dam	Major	Completed	64.0	57.99	22.5
Kaddam Narayan Reddy Irr. Project (AP)	Kaddam Dam	Major	Completed	23.43	23.43	
Singur Project (AP)	Singur Dam	Major	Completed	23.51	16.0	15
Nizamsagar Project (AP)	Nizamsagar Dam	Major	Completed	111.29	93.61	10
Sriram Sagar Project Stage-I & II (AP)	Sriram Sagar Dam, Kaddam Dam	Major	Completed	394.77	393.93	36
Bawanthadi Irr. Project (MP, MH)	Bawanthadi Dam	Major	Ongoing	48.848	57.18	
Gosi khurd Irr. Project (MH)	Gosi khurd Dam	Major	Ongoing	199.2	250.79	
Upper Penganga Irr. Project (MH)	Isapur Dam	Major	Ongoing	139.43	134.28	
Upper Wardha Irr. Project (MH)	Upper Wardha Dam	Major	Completed	83.3	80.25	
Upper Wainganga Irr. Project (MP)	Upper Wainganga Dam	Major	Completed	81.9	105.3	
Upper Indravati Project (Incl. Lift) (OD)	Upper Indravati Dam	Major	Ongoing	134.78	227.62	600
Upper Kolab Project (OD)	Upper Kolab Dam	Major	Completed	47.7	87.70	320
Godavari Delta Irr. Project (AP)	Sir Arthur Cotton Barrage	Major	Completed	415.8	415.8	
Tadipudi Lift Irrigation Scheme (AP)	Sir Arthur Cotton Barrage	Major	Ongoing	83.59	83.35	

*Th. ha = Thousand Hectare, MW = Mega Watt, MCM = Million Cubic Meter

River Flow Line Diagram

Origin: Trimbakeshwar, District Nashik, Maharashtra

Darna Dam
(Godavari Canal Irr. Project,
Nandur Madhameshwar Irr. Project)
GSC: 215.9 MCM
LSC: 202.4 MCM

Darna River

Karanjwan Dam
(Upper Godavari Project)
GSC:175.6 MCM
LSC:166.2 MCM
Power (IC): 3 MW

Kadwa River

Nandur Madhameshwar Weir
(Nandur Madhameshwar Irr. Project,
Godavari Canal Irr. Project)
Weir Length: 1103 m

Upper Ghatghar Dam
(Ghatghar HE Project)
GSC: 5.82 MCM
LSC: 5.14 MCM
Power (IC): 250 MW

Bhandardara Dam
(Pravara Irr. Project)
GSC: 312.6 MCM
LSC: 304.1 MCM
Power (IC): 44 MW

Ozar Weir
(Pravara Irr. Project)
Weir Length: 303.28 m

Inter-basin transfers

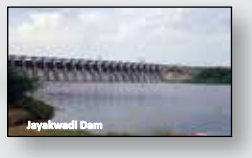
WFR Tapi to Tadri Lower Ghatghar Dam

Pravara River

Mula River

Mula Dam
(Mula Irr. Project)
GSC: 738.9 MCM
LSC: 609.4 MCM

Jayakwadi Dam
(Jayakwadi Project Stage-I & II)
GSC: 2909.0 MCM
LSC: 2170.0 MCM
Power (IC)-: 12 MW (PSS)



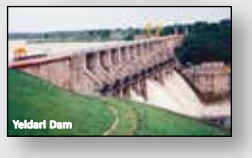
Nizamsagar Dam
(Nizamsagar Project)
GSC: 504.4 MCM
LSC: 478.5 MCM
Power (IC): 10 MW

Godavari River

Siddeshwar Dam
(Purna Irr. Project)
GSC: 250.9 MCM
LSC: 80.9 MCM

Yeldari Dam
(Purna Irr. Project)
GSC: 934.3 MCM
LSC: 809.7 MCM
Power (IC): 22.5 MW

Purna River



Manjra River

Singur Dam
(Singur Project)
GSC: 850.7 MCM
LSC: 566.8 MCM
Power (IC): 15 MW

Sriram Sagar Dam
(Sriram Sagar Project
Stage-I & II)
GSC: 3172.0 MCM
LSC: 2555.0 MCM
Power (IC): 36 MW

Kaddam Dam
(Kaddam Narayan Reddy Irr. Project,
Sri Ram Sagar Project)
GSC: 215.8 MCM
LSC: 116.6 MCM

Kaddam River

Kamthikhairy Dam
(Pench Irr. Project)
GSC: 230.0 MCM
LSC: 180.0 MCM

Pench River

Totladoh Dam
(Pench HE Project- MP,MH)
(Pench Irr. Project)
GSC: 1241.0 MCM
LSC: 1091.0 MCM
Power (IC): 160 MW

Kanhan River

Bawanthadi Dam (MP, MH)
(Bawanthadi Irr. Project)
GSC: 280.2 MCM
LSC: 217.3 MCM

Bawanthadi River

Pranhita River

Wainganga River

Gosi khurd Dam
(Gosi khurd Irr. Project)
GSC: 1146.1 MCM
LSC: 740.2 MCM

Upper Wainganga Dam
(Upper Wainganga Irr. Project)
GSC: 507.0 MCM
LSC: 410.0 MCM

Wardha River

Penganga River

Isapur Dam
(Upper Penganga Irr. Project)
GSC: 1241.5 MCM
LSC: 928.3 MCM

Godavari River

Upper Wardha Dam
(Upper Wardha Irr. Project)
GSC: 786.5 MCM
LSC: 614.8 MCM

Indravati River

Upper Indravati Dam
(Upper Indravati Project)
GSC: 2300.0 MCM
LSC: 1485.0 MCM
Power (IC): 600 MW

Inter- basin transfers

Mahanadi Basin

Sabari River

Kolab River

Upper Kolab Dam
(Upper Kolab Project)
GSC: 1215.0 MCM
LSC: 935.0 MCM
Power (IC): 320 MW

Potteru River

Potteru Barrage
(Potteru Irr. Project)
Barrage Length: 97.97 m

Machkund Dam (Jalaput)
(Machkund HE Project – AP,OD)
GSC: 970.6 MCM
LSC: 892.6 MCM
Power (IC): 120 MW

Tail Race

Sileru River

Sileru River

Machkund River

Sir Arthur Cotton Barrage
(Godavari Delta Irr. Project,
Tadipudi Lift Irr. Project)
Barrage Length: 3599 m

Lower Sileru Forbay Dam
(Lower Sileru HE Project)
Power (IC): 460 MW

Donkarai Dam
(Donkarai HE Project)
GSC: 470.0 MCM
LSC: 380.0 MCM
Power (IC): 25 MW

Guntawada Weir
(Upper Sileru HE Project)
Weir Length: 624.8 m
Power (IC): 240 MW

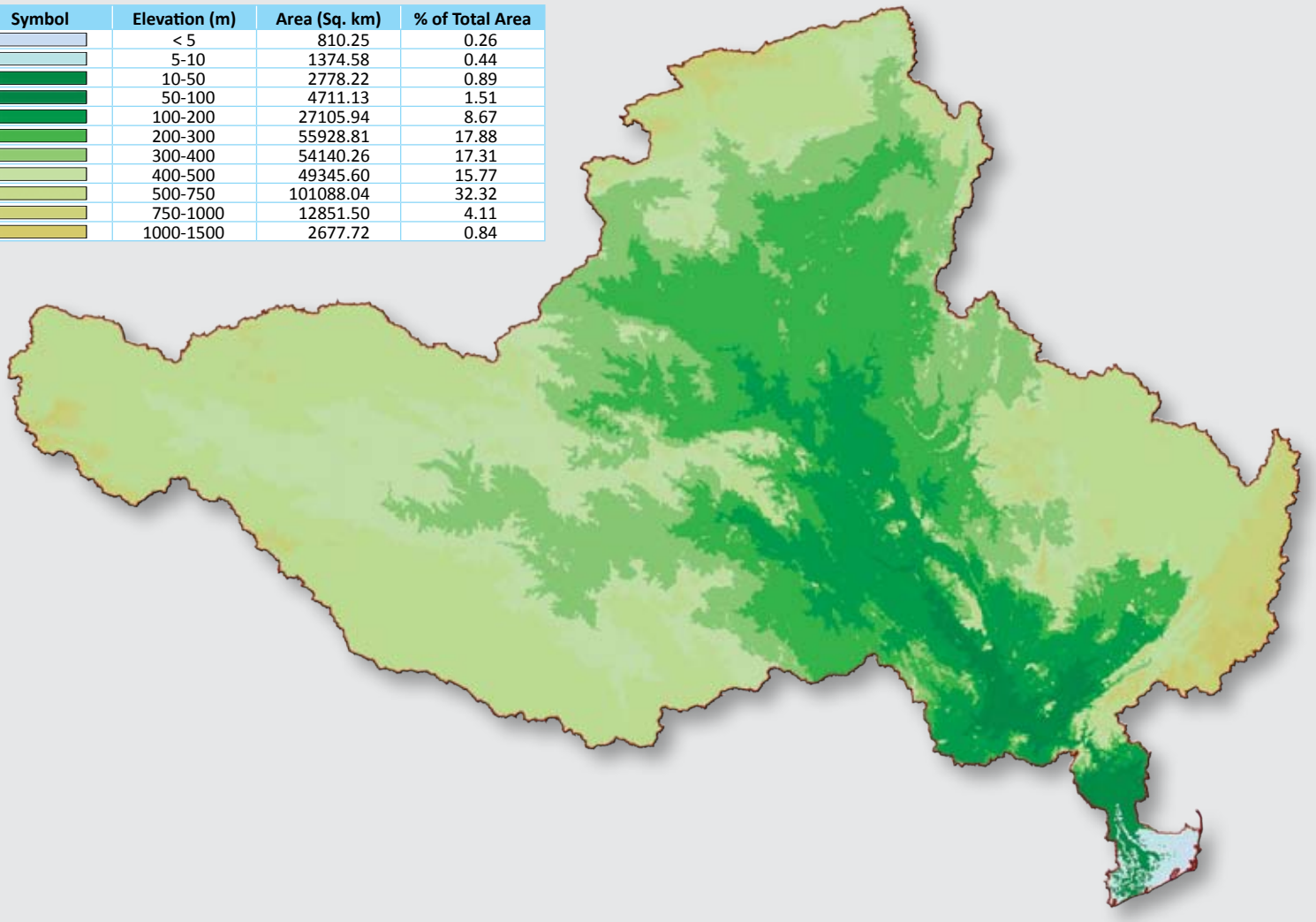
Balimela Dam
(Balimela HE Project)
GSC: 3610.0 MCM
LSC: 2676.0 MCM
Power (IC): 510 MW

Bay of Bengal

= Operational Structures
GSC = Gross Storage Capacity (Original)
LSC = Live Storage Capacity (Original)
IC = Installed Capacity (Mega Watt)
PSS = Pumped Storage Schemes

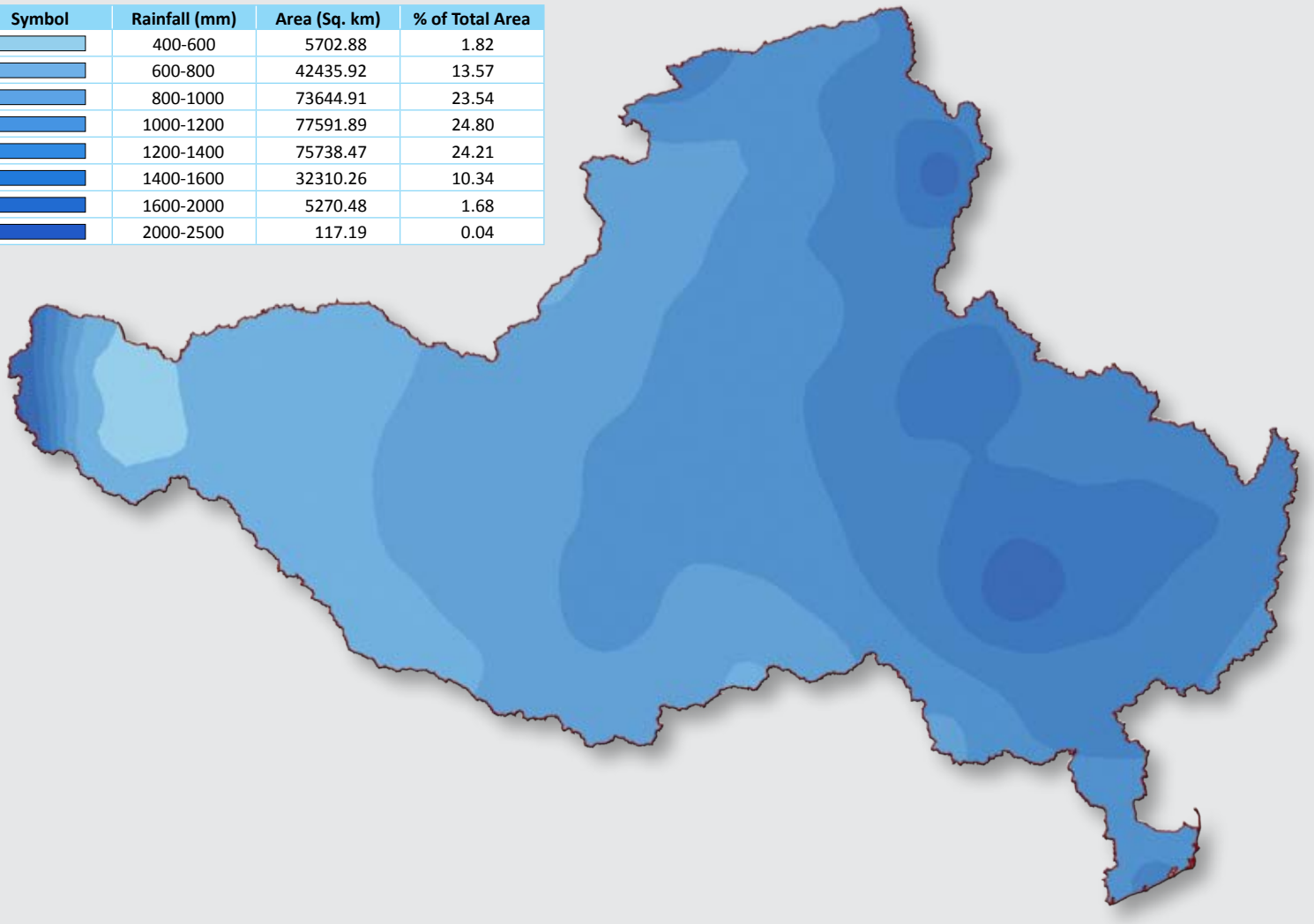
Elevation Zone Map

Symbol	Elevation (m)	Area (Sq. km)	% of Total Area
	< 5	810.25	0.26
	5-10	1374.58	0.44
	10-50	2778.22	0.89
	50-100	4711.13	1.51
	100-200	27105.94	8.67
	200-300	55928.81	17.88
	300-400	54140.26	17.31
	400-500	49345.60	15.77
	500-750	101088.04	32.32
	750-1000	12851.50	4.11
	1000-1500	2677.72	0.84



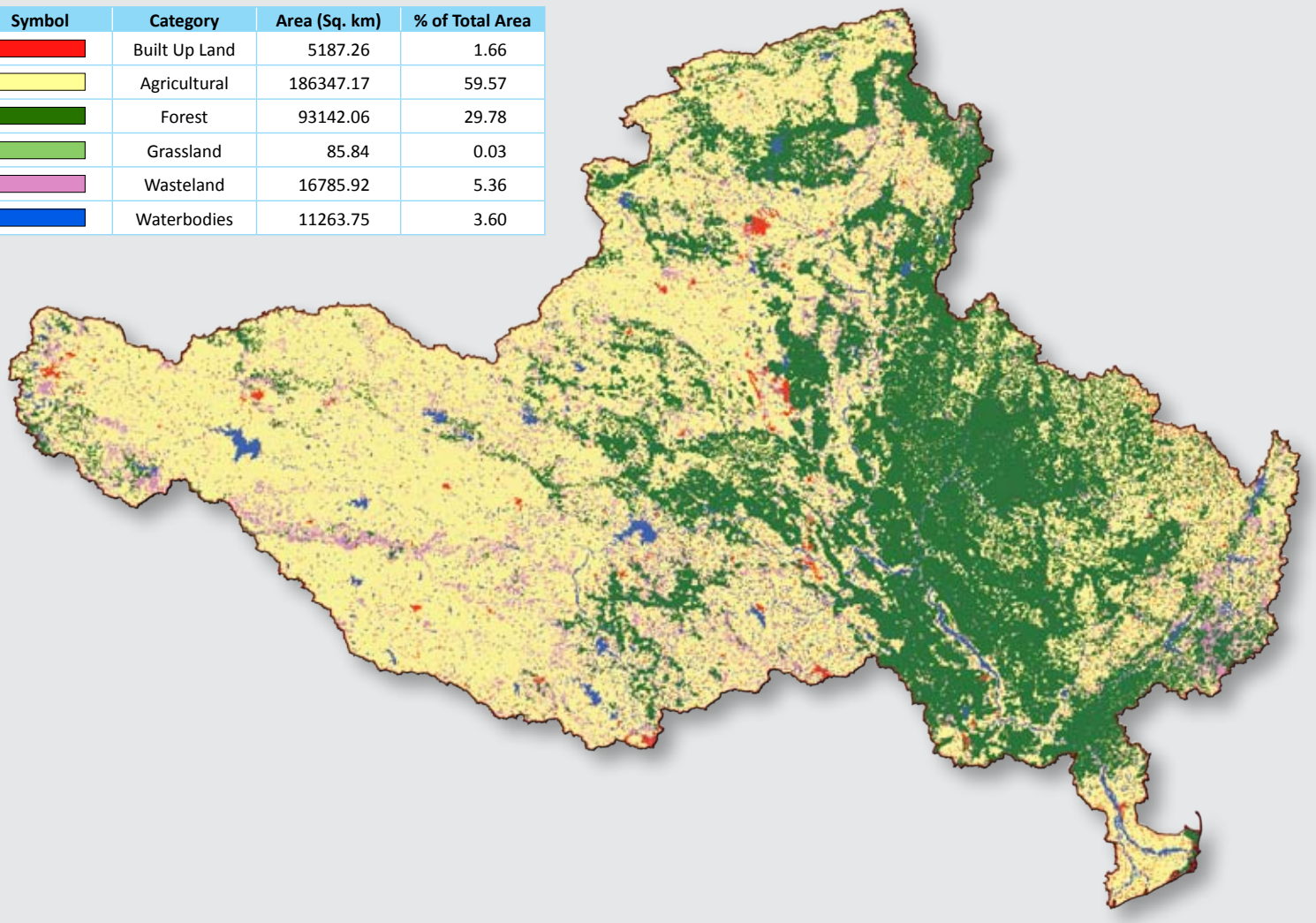
Average Annual Rainfall (1971-2005)

Symbol	Rainfall (mm)	Area (Sq. km)	% of Total Area
	400-600	5702.88	1.82
	600-800	42435.92	13.57
	800-1000	73644.91	23.54
	1000-1200	77591.89	24.80
	1200-1400	75738.47	24.21
	1400-1600	32310.26	10.34
	1600-2000	5270.48	1.68
	2000-2500	117.19	0.04

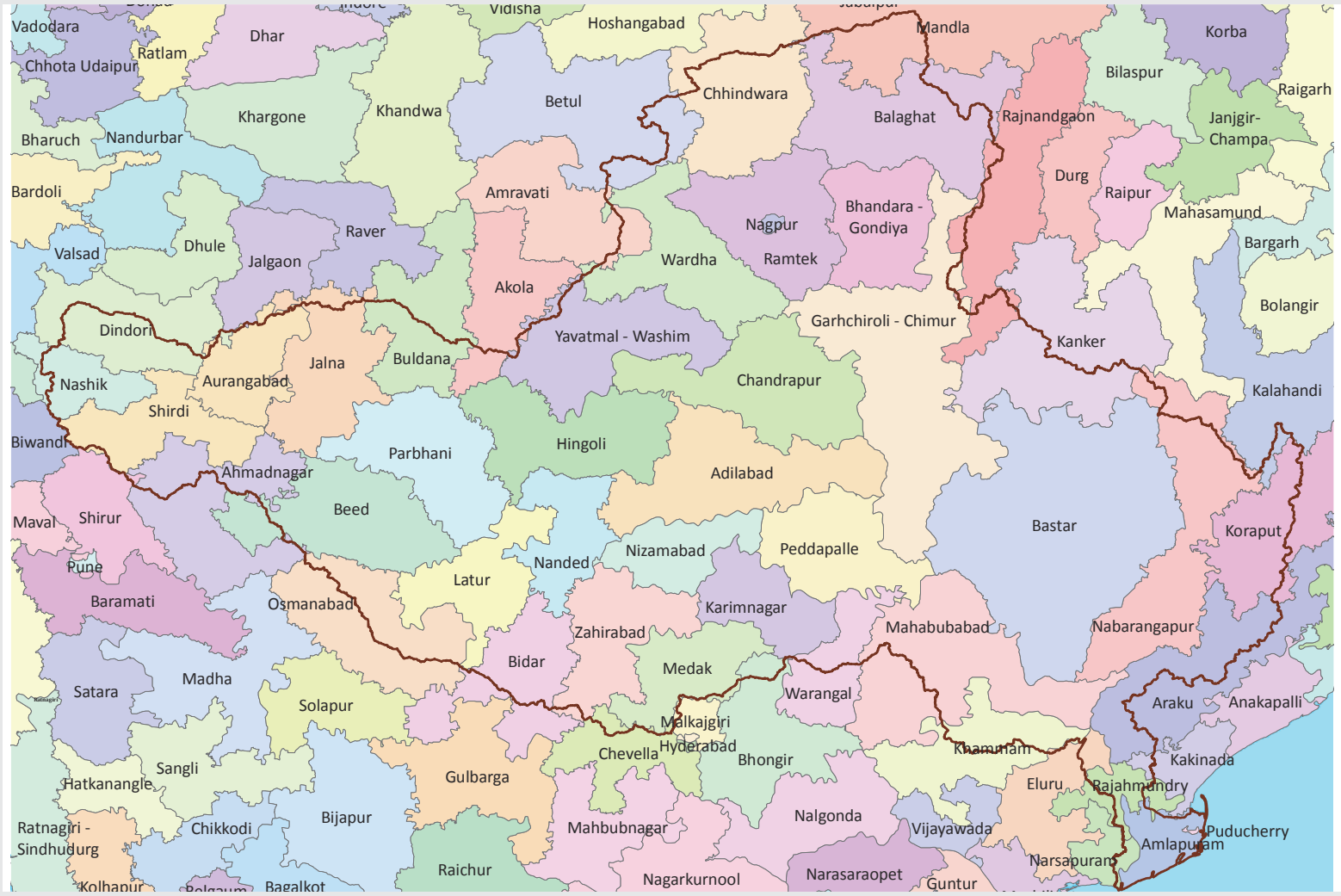


Land Use / Land Cover (2005-06)

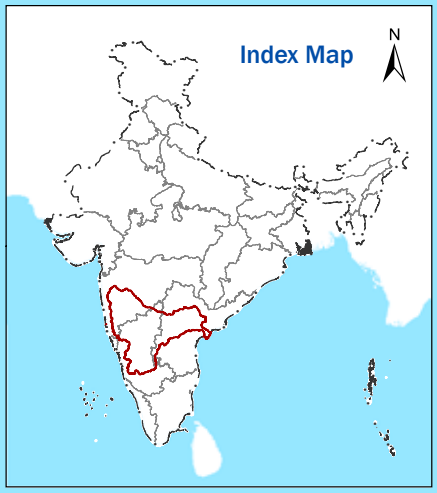
Symbol	Category	Area (Sq. km)	% of Total Area
	Built Up Land	5187.26	1.66
	Agricultural	186347.17	59.57
	Forest	93142.06	29.78
	Grassland	85.84	0.03
	Wasteland	16785.92	5.36
	Waterbodies	11263.75	3.60



Parliamentary Constituencies (2009)

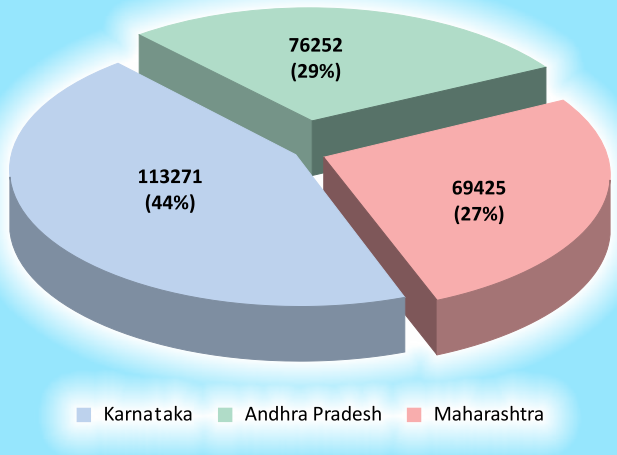


KRISHNA BASIN



Arabian Sea

State Wise Basin Area (Sq.km.)



Legend

- Major City
- State Capital
- Dam / Barrage / Weir
- River
- Reservoir
- Basin Boundary
- State Boundary
- International Boundary

Major CWC Sites

- Flood Forecasting Station
- Gauge Station
- **Gauge, Water Quality Station**
- Gauge, Discharge Station
- Gauge, Discharge, Water Quality Station
- Gauge, Discharge, Sediment, Water Quality Station

CWC Office

- Divisional Office
- CWC Chief Engineer / Circle Office / Divisional Office

Elevation

High

Low

76° E
77° E
78° E
79° E
80° E
81° E
19° N
18° N
17° N
16° N
15° N
14° N
N
W
E
S
MAHARASHTRA
Nizamabad
Hingani Pangaon
Wadakbal
Takli
Bornala
Awarja
Benithora
Bennithora
Mullamari
Jeewangi
Kagna
Deongaon Bridge
Malkhed
Kagna
Bhima
pur
Don
Yadgir
Mahbubnagar
Talikot
Huvinhedgi
Krishna
Almatti
Krishna
Jurala
Narayanapura
Priyadarshini
K.Agraharam
Krishna
Srisailam
Rajoli Banda
Mantralayam
Bawapuram
Hindri
chguda
T. Ramapuram
Oollennur
Sunkesula Anicut
Hire
Tungabhadra
halli
Chinna Hagari
dahalli
Vedavati
Vanivilas Sagar
nnur
Hoovinahole
Swarnamukhi
Vedavati
Kellodu
KARNATAKA
Hyderabad
Musi
Paleru
Akeru
Munneru
Polampalli
Kongal
Halia
Musi
Paleru Bridge
Wyra
Madhira
Halia
Nagarjuna Sagar
Keesara
Vijayawada
Wadenapalli
Prakasam Barrage
Damercharla
Krishna
ANDHRA PRADESH
Cuddapah
Nellore
Bay of Bengal
0
50
100
Km
International / State boundaries & Coastal Line are as per Survey of India
C.31

The Krishna Basin extends over Andhra Pradesh, Maharashtra and Karnataka having a total area of 2,58,948 Sq.km which is nearly 8% of the total geographical area of the country. The basin has a maximum length and width of about 701 km and 672 km and lies between 73°17' to 81°9' east longitudes and 13°10' to 19°22' north latitudes. It is bounded by Balaghat range on the north, by the Eastern Ghats on the south and the east and by the Western Ghats on the west.

The Krishna River rises from the Western Ghats near Jor village of Satara district of Maharashtra at an altitude of 1,337 m just north of Mahabaleshwar. The total length of river from origin to its outfall into the Bay of Bengal is 1,400 km. Its principal tributaries joining from right are the Ghatprabha, the Malprabha and the Tungabhadra whereas those joining from left are the Bhima, the Musi and the Munneru are joining the river from left.

The major part of basin is covered with agricultural land accounting to 75.86% of the total area and 4.07% of the basin is covered by water bodies. The basin spreads over 56 parliamentary constituencies (2009) comprising 23 of Andhra Pradesh, 18 of Karnataka, and 15 of Maharashtra.

Salient Features of Krishna Basin

Basin Extent	Longitude	73° 17' to 81° 9' E
	Latitude	13° 10' to 19° 22' N
Length of Krishna River (Km)		1400
Catchment Area (Sq.km.)		258948
Average Water Resource Potential (MCM)		78120
Utilizable Surface Water Resource (MCM)		58000
Live Storage Capacity of Completed Projects (MCM)		41803.98
Live Storage Capacity of Projects Under Construction (MCM)		7743.54
Total Live Storage Capacity of Projects (MCM)		49547.52
No. of Hydrological Observation Stations		52
No. of Flood Forecasting Stations		9

Major Water Resources Projects of Krishna Basin

Name of Project	Associated Structures	Type	Status	Culturable Command Area (Th ha)	Ultimate Irrigation Potential (Th ha)	Power (MW)
Krishna Major Irr. Project (MH)	Dhom Dam	Major	Completed	74.00	74.00	
Hippargi Irr. Project (KA)	Hippargi Barrage	Major	Ongoing	59.69	59.69	
Ghatprabha Stage-I ,II & III (KA)	Hidkal Dam	Major	Completed	317.50	331.0	32
Upper Krishna Project Stage I (KA)	Almatti Dam, Narayanapura Dam	Major	Ongoing	424.30	458.89	301.6
Upper Krishna Project Stage II (KA)	Almatti Dam, Narayanapura Dam	Major	Ongoing	197.12	226.69	
Malaprabha Irr. Project (KA)	Malprabha Dam	Major	Completed	196.13	196.13	
Tungabhadra RB High Level Canal Stage – I & II (AP) and Tungabhadra RB High level Canal (KA)	Tungabhadra Dam	Major	Stage I - Completed Stage II - Ongoing	214.27	214.27	127.30 (Out of this 72 MW is shared by AP &KA)
Tungabhadra RB Low Level Canal (KA, AP)	Tungabhadra Dam	Major	Completed	98.60	98.60	
Tungabhadra LB Low Level Canal (KA)	Tungabhadra Dam	Major	Completed	244.20	244.20	
Khadakwasla Irr. Project (MH)	Khadakwasla Dam	Major	Completed	101.69	62.15	16
Bhima Project (MH)	Ujjani Dam	Major	Completed	183.0	259.54	12
Jurala Project (AP)	Jurala Dam (Priyadarshini)	Major	Completed	41.26	41.3	234
Bhadra Project (KA)	Bhadra Dam	Major	Completed	105.57	105.57	39.2
Srisailam RBC Project (AP)	Srisailam Dam	Major	Ongoing	76.89	100.870	770
Srisailam LBC Project (AP)	Srisailam Dam	Major	Completed	109.25	109.25	900
Telugu Ganga Project (AP, TN)	Srisailam Dam	Major	Completed	233.0	233.0	
Nagarjunasagar Project (AP)	Nagarjuna Sagar Dam	Major	Completed	868	868	965.6
Krishna Delta System (AP)	Prakasam Barrage	Major	Completed	529	529	

*Th. ha = Thousand Hectare, MW = Mega Watt, MCM = Million Cubic Meter

River Flow Line Diagram

Origin: Mahabaleshwar, District Satara, Maharashtra

Krishna River

Koyna Dam
(Koyna HE Project)
GSC: 2797.4 MCM
LSC: 2677.6 MCM
Power (IC): 1956 MW

WFR Tapi to Tadri
Kolkewadi Dam

Inter-Basin Transfer

Koyna River

Hidkal Dam
(Ghatprabha Stage-I , II & III)
GSC: 1444.0 MCM
LSC: 1387.0 MCM
Power (IC): 32 MW

Ghatprabha River

Malprabha Dam
(Malaprabha Irr. Project)
GSC: 1068 MCM
LSC: 972 MCM

Malprabha River

Tungabhadra Dam (KA,AP)
(Tungabhadra RB High Level Canal, Tungabhadra RB Low Level Canal Tungabhadra LB Low Level Canal, Stabilization of Command of Kurnool Cuddapah Canal, Rajolibanda)
GSC: 3751.0 MCM
LSC: 3718.34 MCM
Power (IC): 127.30 MW

Tungabhadra River

Bhadra River

TBHLC Project

Bhadra Dam
(Bhadra Project)
GSC: 2025.9 MCM
LSC: 1785 MCM
Power (IC): 39.2 MW

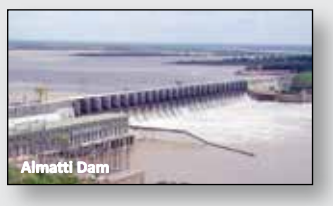
Telugu Ganga Project

Pennar Basin

Prakasam Barrage
(Krishna Delta System)
Barrage Length: 1232 m

Dhom Dam
(Krishna Major Irr. Project)
GSC: 382.22 MCM
LSC: 331.05 MCM

Hippargi Barrage
(Hippargi Irr. Project)
Barrage Length: 5460 m
(with earthen bunds)



Almatti Dam
(Upper Krishna Project Stage-I & II)
GSC: 3439.7 MCM
LSC: 3104.7 MCM
Power (IC): 290 MW

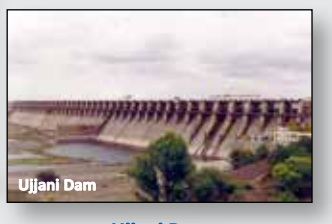
Narayanapura Dam
(Upper Krishna Project Stage-I & II)
GSC: 1073.27 MCM
LSC: 867.89 MCM
Power (IC): 11.6 MW

Mutha River

Mula River

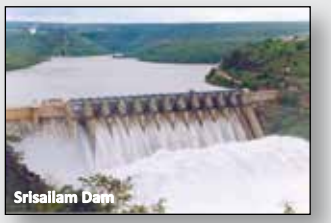
Khadakwasla Dam
(Khadakwasla Irr. Project)
GSC: 86.0 MCM
LSC: 56.0 MCM
Power (IC): 16 MW

Bhima River

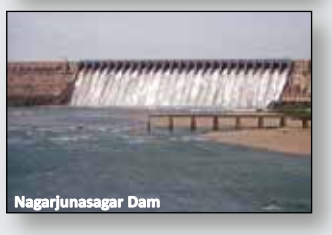


Ujjani Dam
(Bhima Project)
GSC: 3320.0 MCM
LSC: 1521.0 MCM
Power (IC): 12 MW (PSS)

Jurala Dam
(Priyadarshini)
(Jurala Project)
GSC: 338.1 MCM
LSC: 192.3 MCM
Power (IC): 234 MW



Srisailam Dam
(Srisailam RBC & LBC Project)
GSC: 8722.0 MCM
LSC: 7165.83 MCM
Power (IC): 770 MW+ 900 MW (PSS)

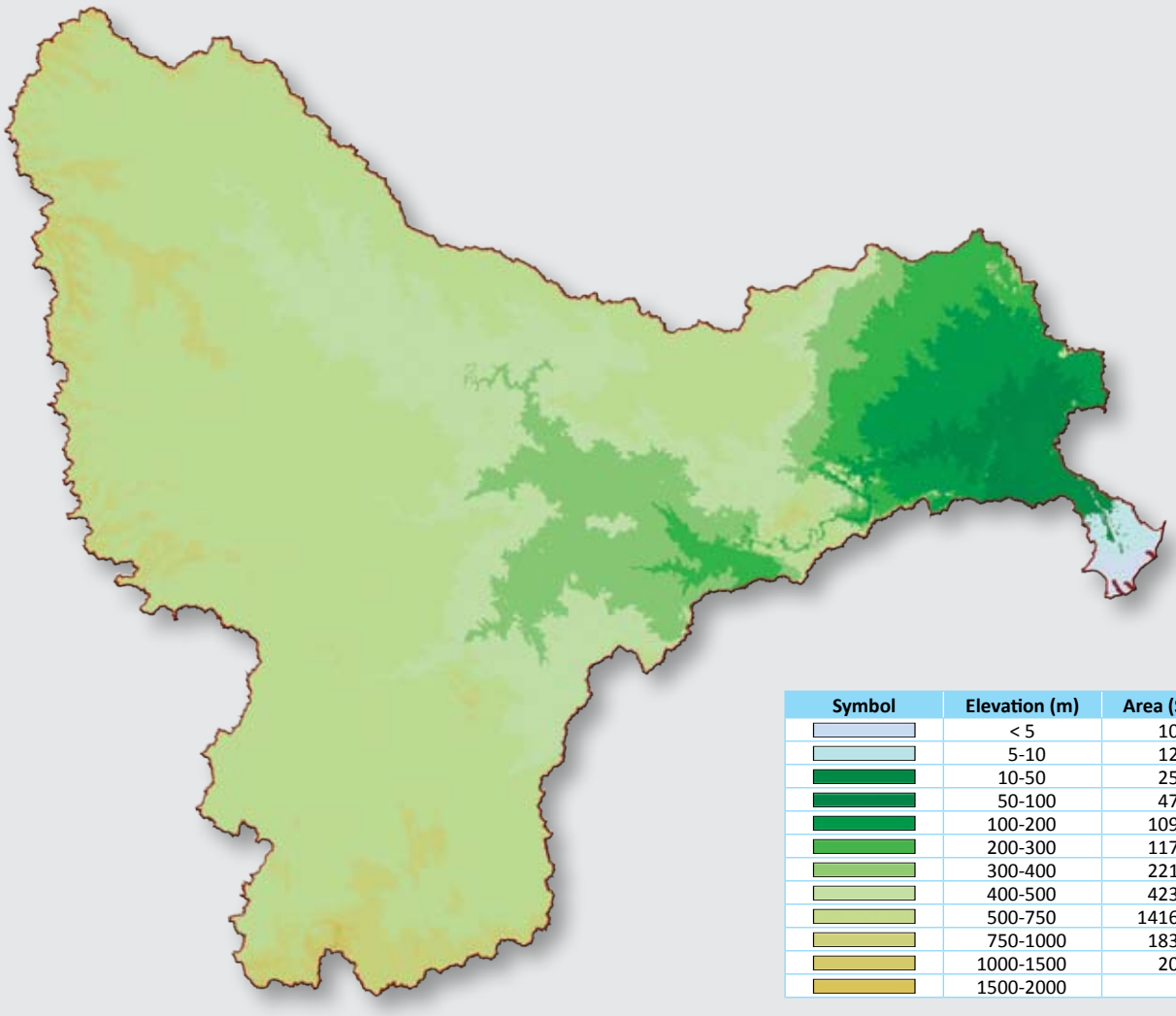


Nagarjuna Sagar Dam
(Nagarjunasagar Project)
GSC:11553 MCM
LSC: 6840 MCM
Power (IC): 260 MW + 705.6 MW (PSS)

Bay of Bengal

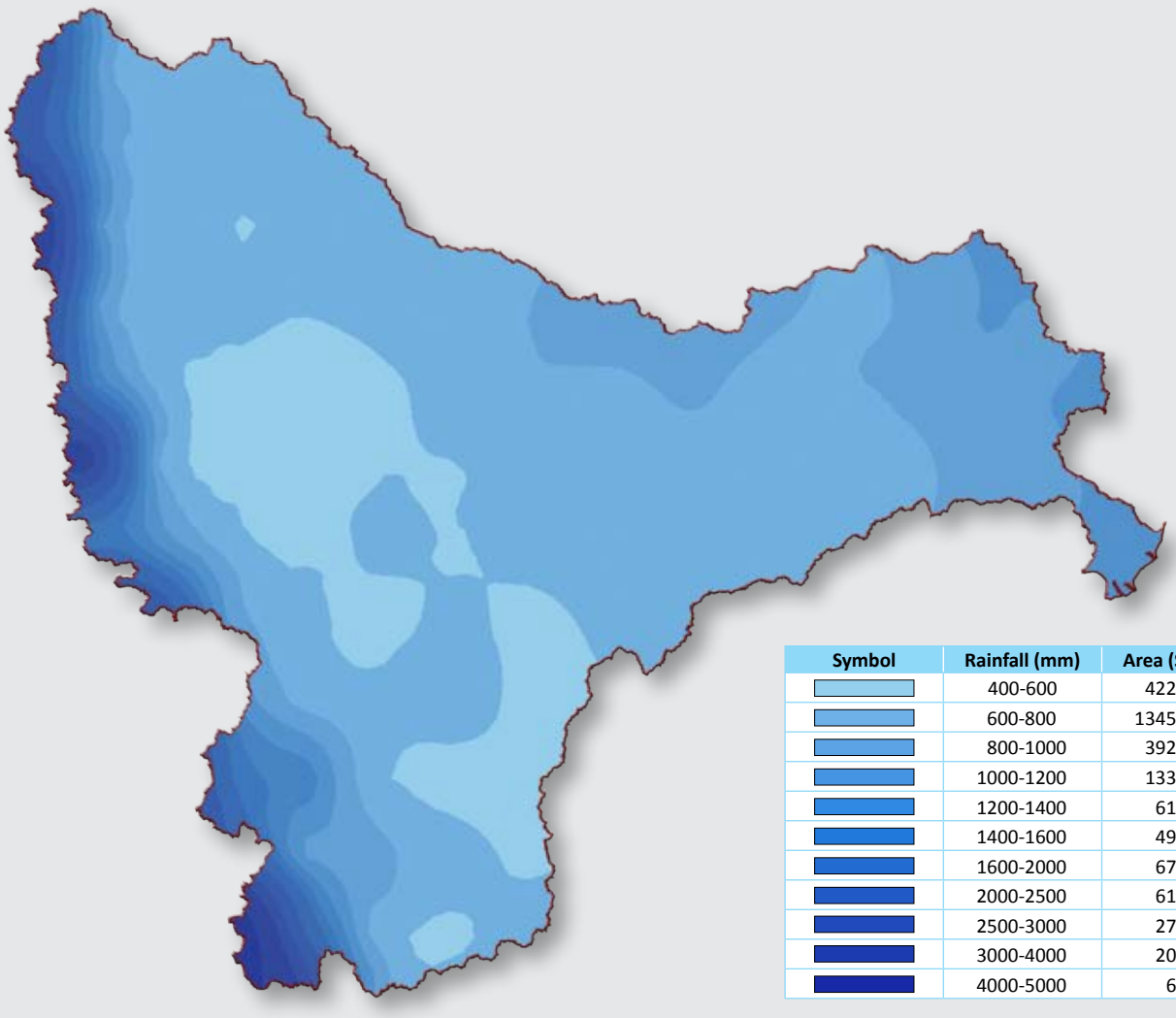
= Operational Structures
GSC = Gross Storage Capacity (Original)
LSC = Live Storage Capacity (Original)
IC = Installed Capacity (Mega Watt)
PSS = Pumped Storage Schemes

Elevation Zone Map



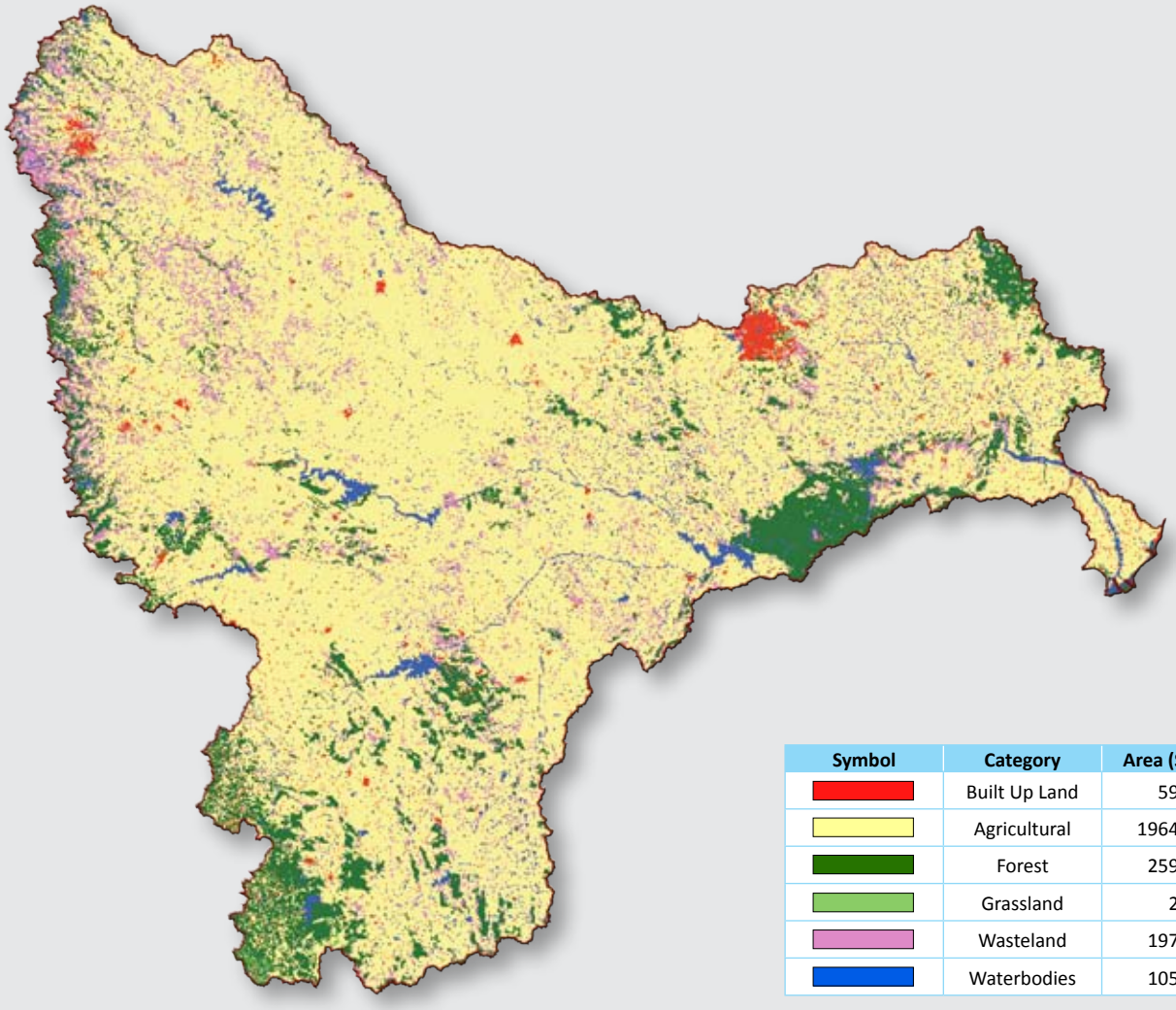
Symbol	Elevation (m)	Area (Sq. km)	% of Total Area
	< 5	1057	0.41
	5-10	1235	0.48
	10-50	2539.88	0.98
	50-100	4703.20	1.82
	100-200	10996.29	4.25
	200-300	11776.93	4.55
	300-400	22153.55	8.56
	400-500	42362.64	16.36
	500-750	141635.72	54.70
	750-1000	18344.96	7.08
	1000-1500	2089.03	0.81
	1500-2000	54.04	0.02

Average Annual Rainfall (1971-2005)



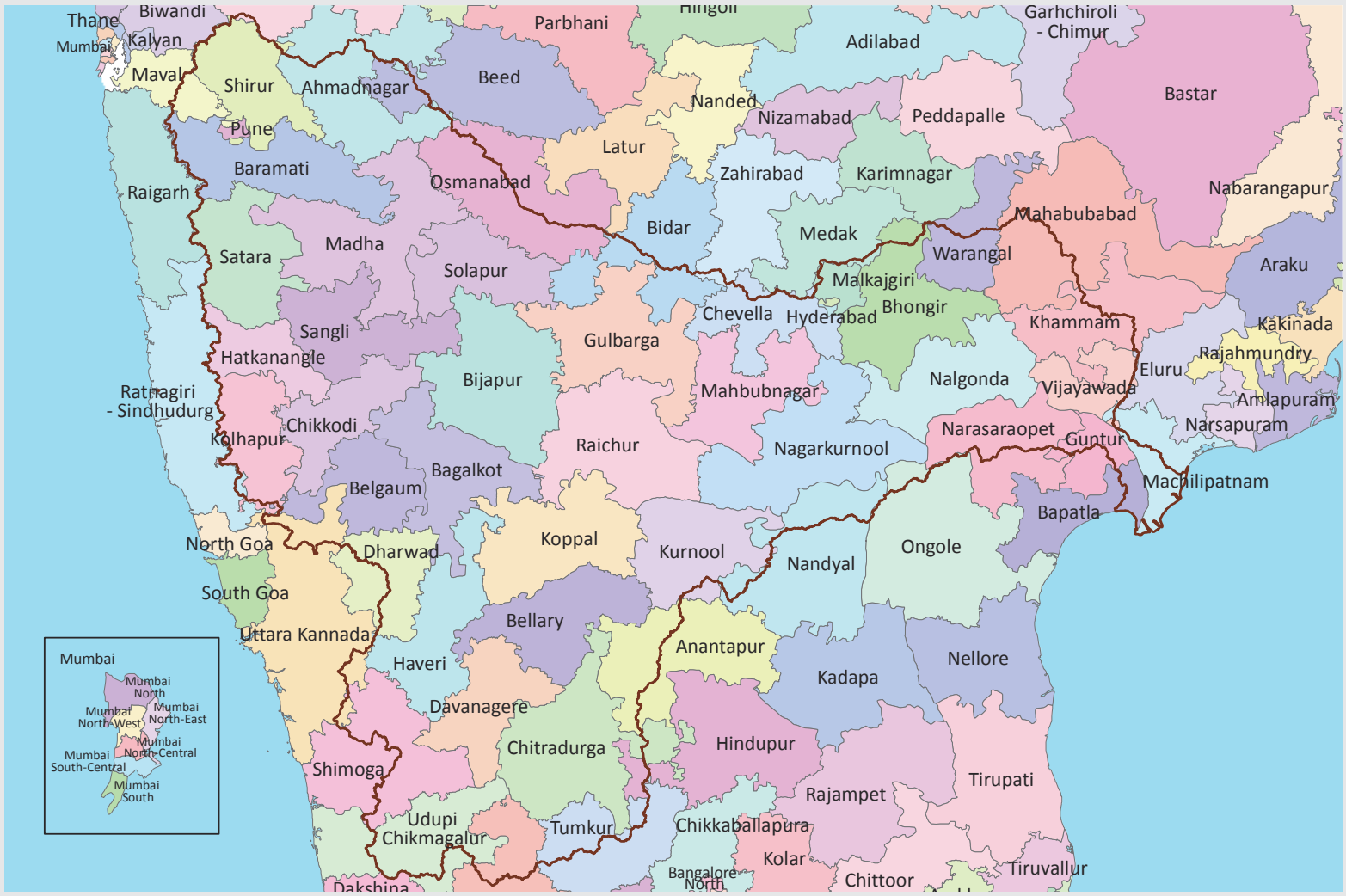
Symbol	Rainfall (mm)	Area (Sq. km)	% of Total Area
	400-600	42261.09	16.32
	600-800	134560.81	51.96
	800-1000	39219.11	15.15
	1000-1200	13321.59	5.14
	1200-1400	6118.23	2.36
	1400-1600	4978.22	1.92
	1600-2000	6757.12	2.61
	2000-2500	6196.21	2.39
	2500-3000	2740.19	1.06
	3000-4000	2095.65	0.81
	4000-5000	699.77	0.27

Land Use / Land Cover (2005-06)

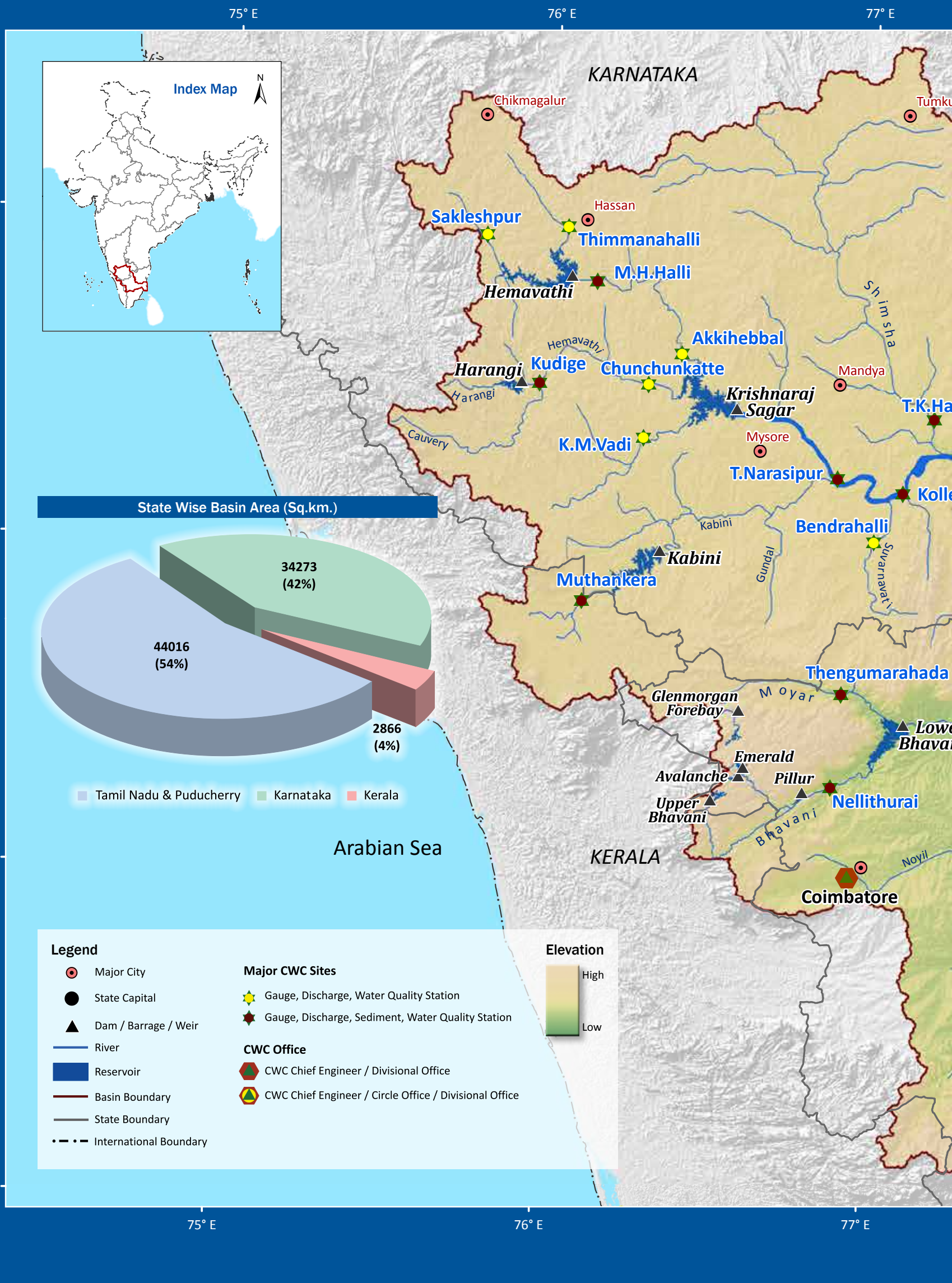


Symbol	Category	Area (Sq. km)	% of Total Area
	Built Up Land	5931.50	2.29
	Agricultural	196434.14	75.86
	Forest	25986.84	10.04
	Grassland	273.54	0.11
	Wasteland	19781.85	7.64
	Waterbodies	10540.13	4.07

Parliamentary Constituencies (2009)



CAUVERY BASIN



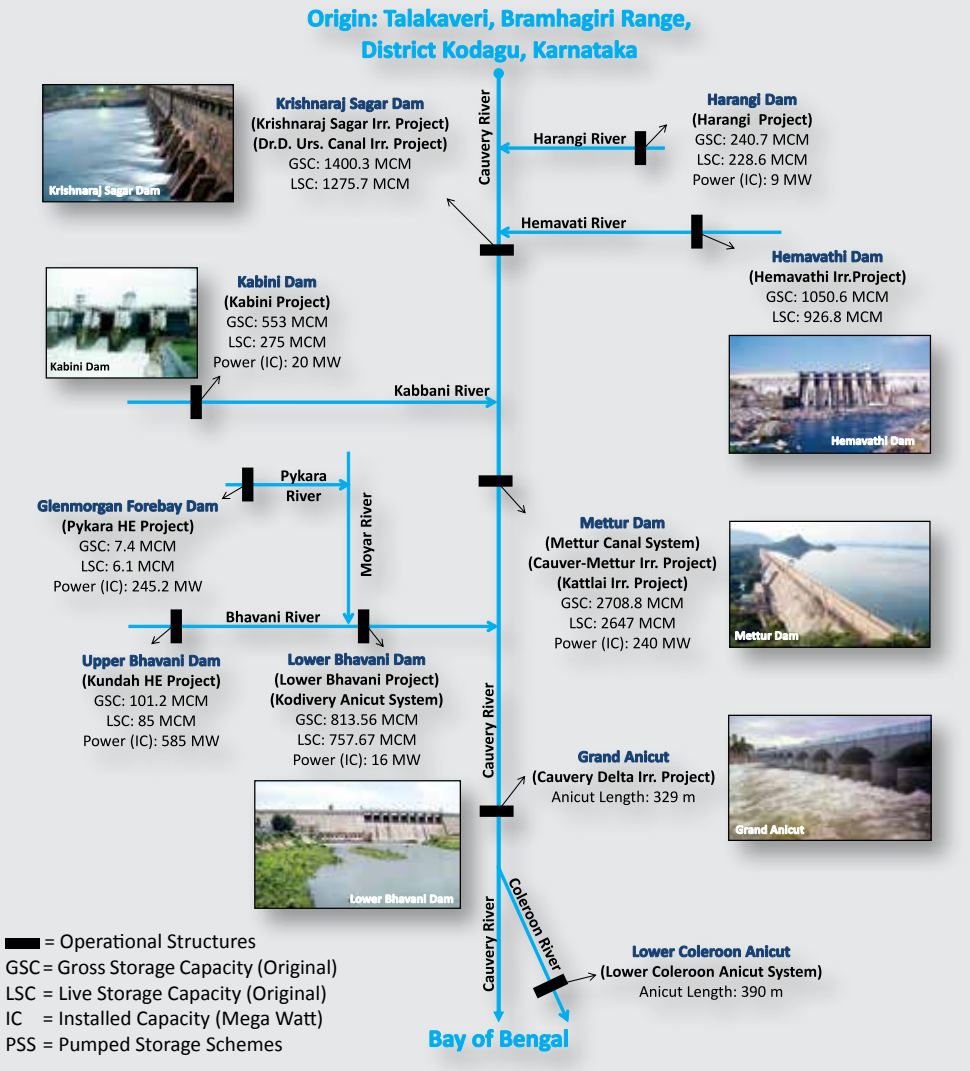
78° E
79° E
80° E
13° N
12° N
11° N
N
W
E
S
ANDHRA PRADESH
TAMIL NADU
PUDUCHERRY
Bay of Bengal
Bangalore
Ar-kavati
T. Bekuppe
Arkavathy
Biligundulu
Hogenakkal
Thoppur
Kudlur
Mettur
Cauvery
Salem
Savandapur
Sevanur
Thevur
Urachikottai
Erode
Kodumudi
Namakkal
E-managalam
Karur
Musiri
Nalammaranpatti
Amravati
Amaravati
Nanganji
Kodavanar
Dindigul
Perambalur
Ariyalur
Lower Coleroon Anicut
Coleroon
Grand Anicut
Cauvery
Thanjavur
Nallthur
Peralam
Annavasal
Thengudi
Menangudi
Porakudi
Gopurajapuram
Thiruvarur
0
25
50
Km
International / State boundaries & Coastal Line are as per Survey of India
C.37

The Cauvery basin extends over states of Tamil Nadu, Karnataka, Kerala and Union Territory of Puducherry draining an area of 81,155 Sq.km which is nearly 2.7% of the total geographical area of the country with a maximum length and width of about 560 km and 245 km. It lies between 75°27' to 79°54' east longitudes and 10°9' to 13°30' north latitudes. It is bounded by the Western Ghats on the west, by the Eastern Ghats on the east and the south and by the ridges separating it from Krishna basin and Pennar basin on the north.

The Cauvery River is one of the major rivers of the peninsula. It rises at an elevation of 1,341 m at Talakaveri on the Brahmagiri range near Cherangala village of Kodagu district of Karnataka. The total length of the river from origin to outfall is 800 km. Its important tributaries joining from left are the Harangi, the Hemavati, the Shimsha and the Arkavati whereas the Lakshmantirtha, the Kabbani, the Suvarnavati, the Bhavani, the Noyil and the Amaravati joins from right. The river drains into the Bay of Bengal.

The major part of basin is covered with agricultural land accounting to 66.21% of the total area and 4.09% of the basin is covered by water bodies. The basin spreads over 33 parliamentary constituencies (2009) comprising 18 of Tamil Nadu, 11 of Karnataka, 3 of Kerala and 1 of Puducherry.

River Flow Line Diagram



Salient Features of Cauvery Basin

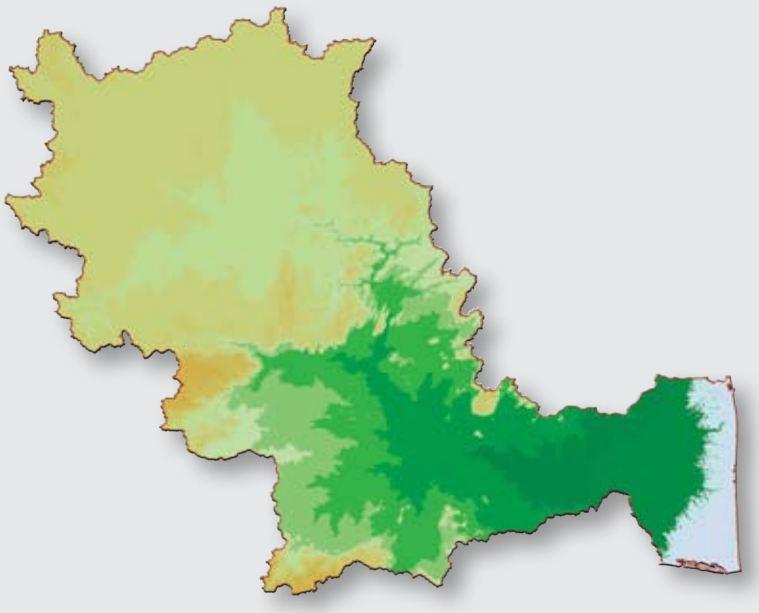
Basin Extent Longitude	75° 27' to 79° 54' E
Latitude	10° 9' to 13° 30' N
Length of Cauvery River (Km)	800
Catchment Area (Sq.km.)	81155
Average Water Resource Potential (MCM)	21358
Utilizable Surface Water Resource (MCM)	19000
Live Storage Capacity of Completed Projects (MCM)	8597.2
Live Storage Capacity of Projects Under Construction (MCM)	269.82
Total Live Storage Capacity of Projects (MCM)	8867.02
No. of Hydrological Observation Stations	34
No. of Flood Forecasting Stations	0

Major Water Resources Projects of Cauvery Basin

Name of Project	Associated Structures	Type	Status	Culturable Command Area (Th ha)	Ultimate Irrigation Potential (Th ha)	Power (MW)
Harangi Project (KA)	Harangi Dam	Major	Completed	54.82	53.54	9
Hemavathi Irr.Project (KA)	Hemavathi Dam	Major	Ongoing	283.29	283.58	
Krishnaraj Sagar Irr. Project (KA)	Krishnaraj Sagar Dam	Major	Completed	79.31	79.31	
Dr.D. Urs. Canal Irr. Project (KA)	Krishnaraj Sagar Dam	Major	Completed		32.88	
Kabini Project (KA)	Kabini Dam	Major	Completed	87.89	81.90	20
Mettur Canal System (TN)	Mettur Dam	Major	Completed	18.21	18.21	
Cauvery-Mettur Irr. Project (TN)	Mettur Dam	Major	Completed	130.55	130.55	240
Kattlai Irr. Project (TN)	Mettur Dam	Major	Completed	49.45	49.45	
Lower Bhavani Irr. Project (TN)	Lower Bhavani Dam	Major	Completed	83.77	83.77	
Kodivery Anicut System (TN)	Lower Bhavani Dam	Major	Completed	19.83	19.83	16
Cauvery Delta Irr. Project (TN, PY)	Grand Anicut	Major	Completed	504.64	504.64	
Lower Coleroon Anicut System (TN)	Lower Coleroon Anicut	Major	Completed	66.00	66.00	
Kundah HE Complex (TN)	Avalanche, Emerald, Kundha Palam, Pegumbahallah Forebay, Pillur, Upper Bhavani, Porithimond, Parson's valley Dam & Nirallapallam Weir	Major	Completed	-	-	585

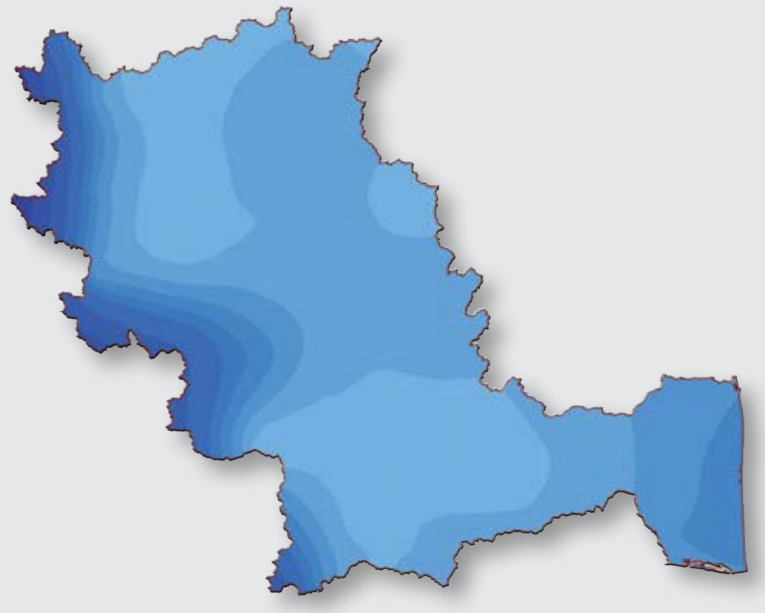
*Th. ha = Thousand Hectare, MW = Mega Watt, MCM = Million Cubic Meter

Elevation Zone Map



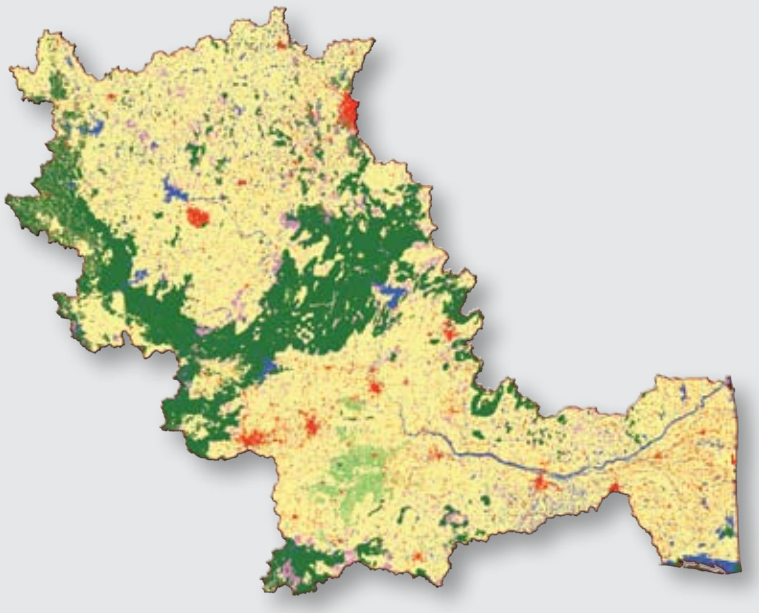
Symbol	Elevation (m)	Area (Sq. km)	% of Total Area
	< 5	2058.03	2.54
	5-10	1444.14	1.78
	10-50	4120.77	5.08
	50-100	3297.20	4.06
	100-200	7202.59	8.88
	200-300	8903.69	10.97
	300-400	6957.78	8.57
	400-500	2837.79	3.50
	500-750	12718.66	15.67
	750-1000	25890.97	31.90
	1000-1500	3938.50	4.85
	1500-2000	975.24	1.20
	2000-3000	809.63	1.00

Average Annual Rainfall (1971-2005)



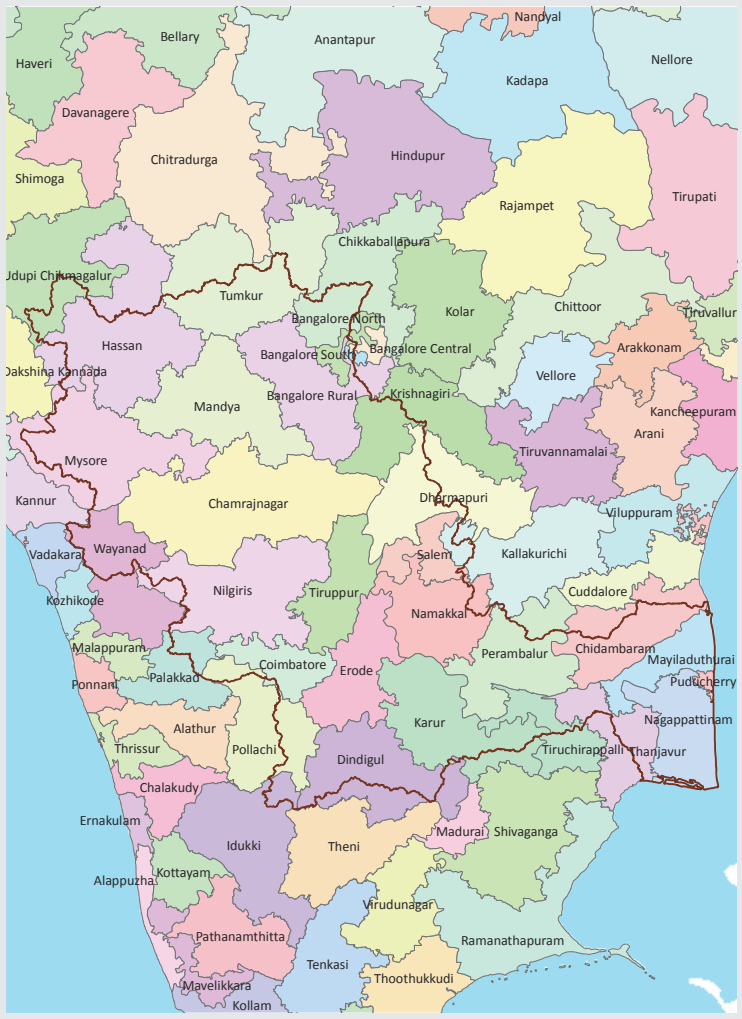
Symbol	Rainfall (mm)	Area (Sq. km)	% of Total Area
	600-800	24247.84	29.88
	800-1000	32471.31	40.01
	1000-1200	9216.18	11.36
	1200-1400	5664.54	6.98
	1400-1600	2422.55	2.99
	1600-2000	3748.45	4.62
	2000-2500	2408.66	2.96
	2500-3000	748.84	0.92
	3000-4000	226.64	0.28

Land Use / Land Cover (2005-06)



Symbol	Category	Area (Sq. km)	% of Total Area
	Built Up Land	3256.37	4.01
	Agricultural	53736.30	66.21
	Forest	16636.66	20.50
	Grassland	1075.80	1.33
	Wasteland	3133.94	3.86
	Waterbodies	3315.92	4.09

Parliamentary Constituencies (2009)



SUBERNAREKHA BASIN

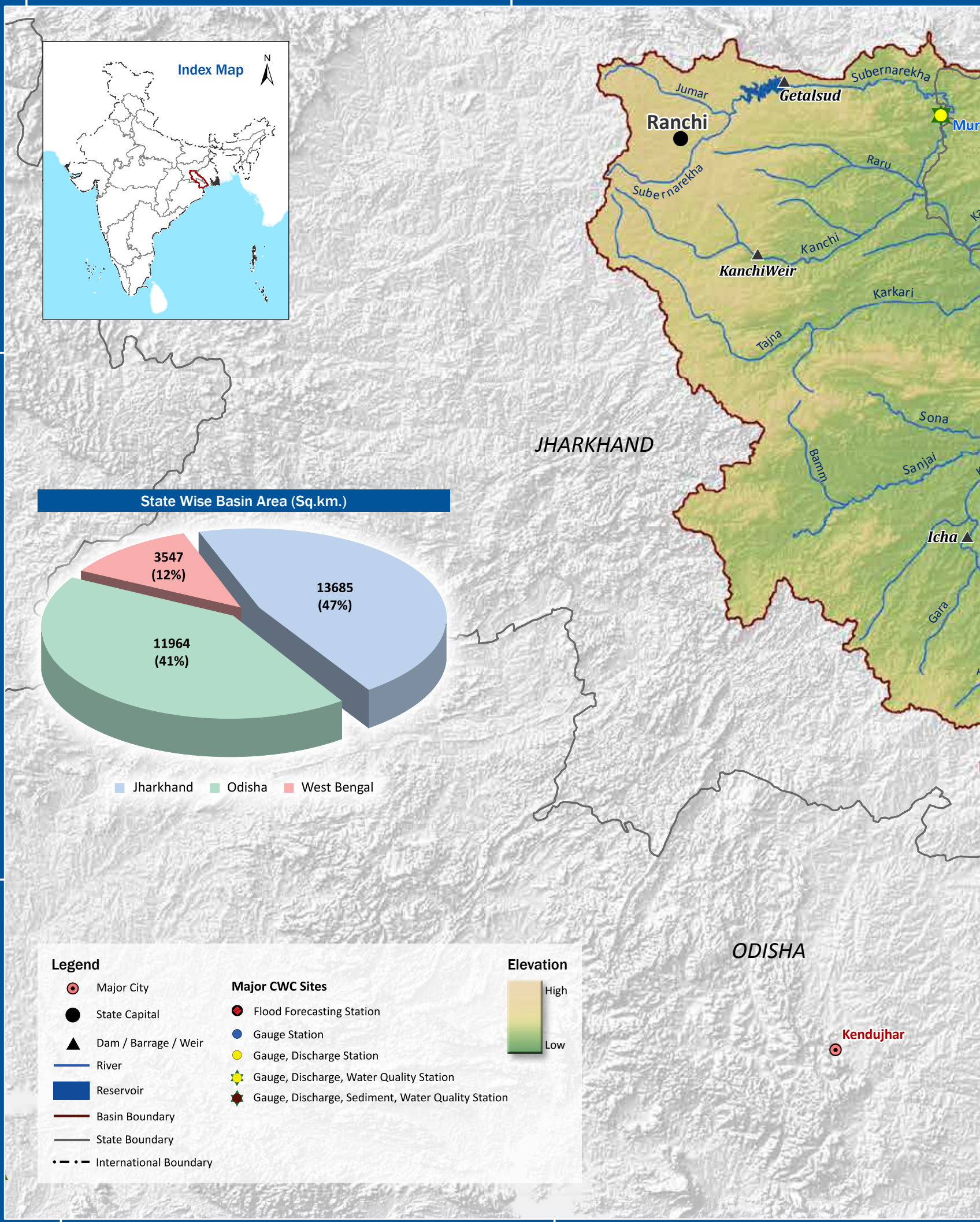
84° E

85° E

23° N

22° N

State Wise Basin Area (Sq.km.)



Legend

- Major City
- State Capital
- Dam / Barrage / Weir
- River
- Reservoir
- Basin Boundary
- State Boundary
- International Boundary

Major CWC Sites

- Flood Forecasting Station
- Gauge Station
- Gauge, Discharge Station
- Gauge, Discharge, Water Quality Station
- Gauge, Discharge, Sediment, Water Quality Station

Elevation

High

Low

86° E

87° E

23° N

22° N

N

W

E

S

PuruliaPSSDam

Sobha

Chandil

Subernarekha

Adityapur

Jamshedpur

Kharkai Barrage

Garra

Galudih Barrage

Murahir

Ghatsila

WEST BENGAL

Dulung

Medinipur

Subernarekha

Kharkai

Fekoghat

Jamsholaghat

Bankbal

Katranalla

Bankabal

Chandanpur

Kanu

Khadkhi

Subernarekha Barrage

Burhabalang

Haladia

Jambhira

Baura

Mahanti

Chipat

Jamira

Manri

Palpala

Baripada

Rajghat

Balimunduli

Sanjo

Gangahar

Burhabalang

Jamira

Panchpara

Subernarekha

Jaypur

Sone

Govindpur

N.H.5 Road Bridge

Kalo

Kala

Baleshwar

Sunei

Mandagan

Kantiachara

BAY OF BENGAL

0 25 50 Km

International / State boundaries & Coastal Line are as per Survey of India

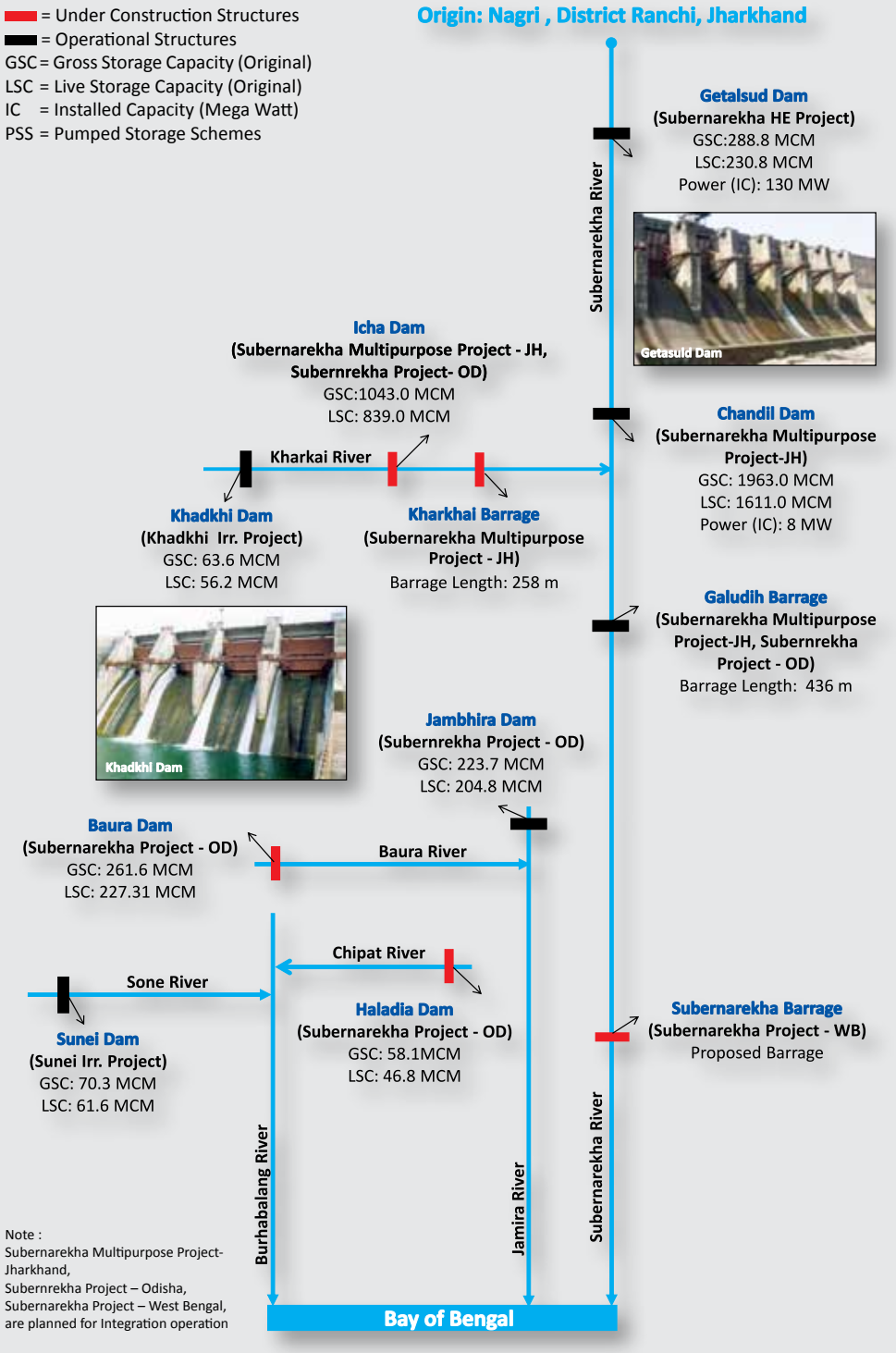
C.41

The Subernarekha basin extends over States of Jharkhand, Odisha and comparatively smaller part in West Bengal having a total area of 29,196 Sq.km with a maximum length and width of about 297 km and 119 km. It lies between 85°8' to 87°32' east longitudes and 21°15' to 23°34' north latitudes. Situated in the north-east corner of the Peninsular India, the basin is bounded by the Chhotanagpur plateau on the north and the west, by the ridges separating it from Baitarani basin on the south, by the Bay of Bengal on the south-east and by the Kasai Valley of Kangsabati River on the east.

The Subernarekha and the Burhabalang forms the major river systems in the basin. The Subernarekha River rises near Nagri village in the Ranchi District of Jharkhand at an elevation of 600 m. It flows for a length of 395 km before outfalling into the Bay of Bengal. Its principal tributaries joining from right are the Kanchi, the Karkari and the Kharkai. The Burhabalang rises from south of Similipal village in the Mayurbhanj district of Odisha at an elevation of about 800 m and flows for a length of 164 km and drains into the Bay of Bengal.

The major part of basin is covered with agricultural land accounting to 53.76% of the total area and 2.39% of the basin is covered by water bodies. The basin spreads over 13 parliamentary constituencies (2009) comprising 5 of Jharkhand and 4 each of Odisha and West Bengal.

River Flow Line Diagram



Salient Features of Subernarekha Basin

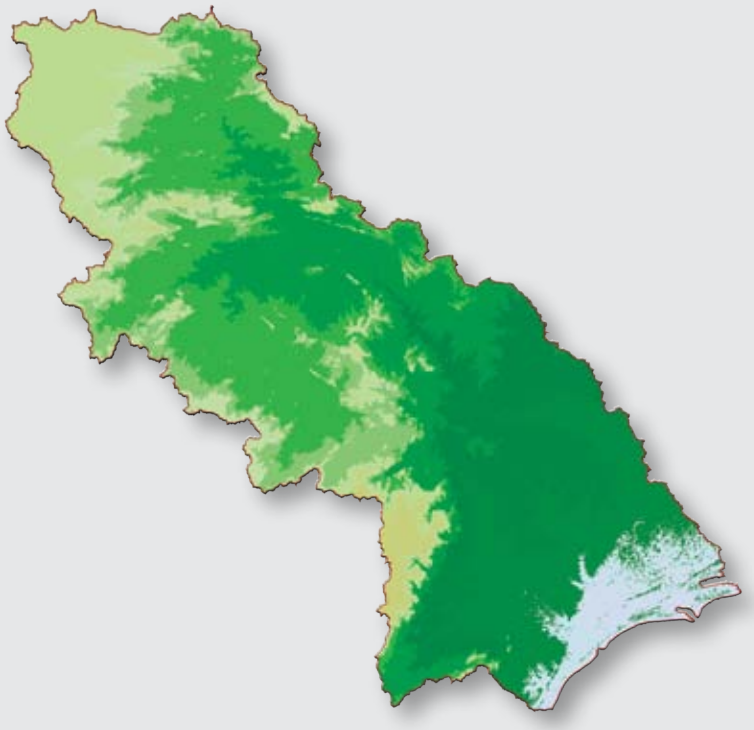
Basin Extent	Longitude	85° 8' to 87° 32' E
	Latitude	21° 15' to 23° 34' N
Length of River (Km)		Subernarekha – 395 Burhabalang – 164
Catchment Area (Sq.km.)		29196
Average Water Resource Potential (MCM)		12370
Utilizable Surface Water Resource (MCM)		6800
Live Storage Capacity of Completed Projects (MCM)		672.02
Live Storage Capacity of Projects Under Construction (MCM)		1650.19
Total Live Storage Capacity of Projects (MCM)		2322.21
No. of Hydrological Observation Stations		12
No. of Flood Forecasting Stations		2

Major Water Resources Projects of Subernarekha Basin

Name of Project	Associated Structures	Type	Status	Culturable Command Area (Th ha)	Ultimate Irrigation Potential (Th ha)	Power (MW)
Subernarekha Multipurpose Project (JH)	Chandil Dam, Galudih Barrage, Kharkhai Barrage, Icha Dam	Major	Ongoing	154.8	236.85	8
Subernarekha Project (OD)	Icha Dam, Galudih Barrage, Jambhira Dam, Baura Dam, Haladia Dam	Major	Ongoing	109.627	187.462	
Subernarekha Irr. Project (WB)	Subernarekha Barrage	Major	Proposed	110.20	130.0	
Khadkhi Irr. Project (OD)	Khadkhi Dam	Medium	Completed	7.99	11.71	
Sunei Irr. Project (OD)	Sunei Dam	Major	Completed	10.96	15.20	

*Th. ha = Thousand Hectare, MW = Mega Watt, MCM = Million Cubic Meter

Elevation Zone Map



Symbol	Elevation (m)	Area (Sq. km)	% of Total Area
	< 5	901.74	3.09
	5-10	852.66	2.92
	10-50	3838.89	13.15
	50-100	4000.33	13.70
	100-200	4636.81	15.88
	200-300	6586.52	22.56
	300-400	2904.88	9.95
	400-500	1670.44	5.72
	500-750	3255.08	11.15
	750-1000	524.07	1.80
	1000-1500	24.59	0.08

Average Annual Rainfall (1971-2005)

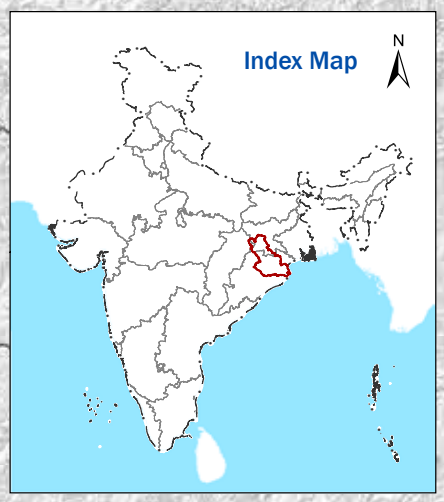
Symbol	Rainfall (mm)	Area (Sq. km)	% of Total Area
	1000-1200	403.54	1.38
	1200-1400	13869.42	47.50
	1400-1600	4493.15	15.39
	1600-2000	10429.90	35.73

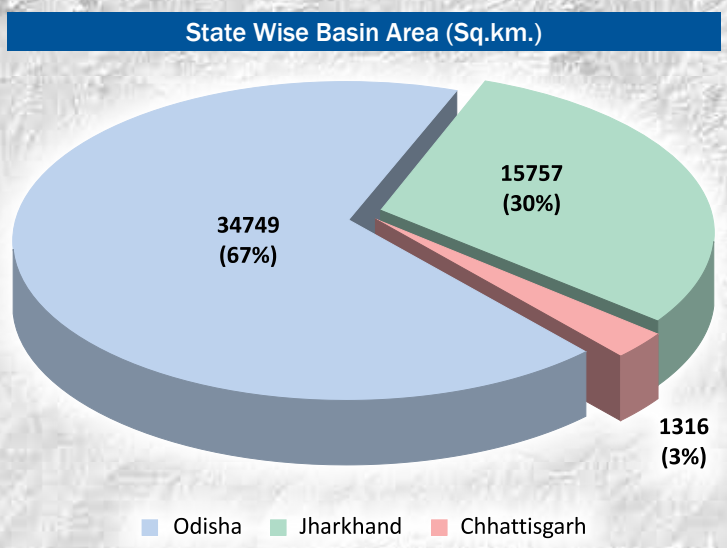
Land Use / Land Cover (2005-06)

Symbol	Category	Area (Sq. km)	% of Total Area
	Built Up Land	2429.14	8.32
	Agricultural	15696.76	53.76
	Forest	8394.62	28.75
	Grassland	0.78	0.01
	Wasteland	1977.39	6.77
	Waterbodies	697.32	2.39

Parliamentary Constituencies (2009)

BRAHMANI AND BAITARNI BASIN





82° E 83° E 84° E

23° N 22° N 21° N

CHHATTISGARH

ODISHA

Lohardaga
Banki
Khatwa
Gumla
Lawa or Laua
Sankh
Jashpur
Karo
Tilga
Lurgi
Sundargarh
Barjoo
Jharsuguda
Sambalpur
Burla

Legend

- Major City
- State Capital
- Dam / Barrage / Weir
- River
- Reservoir
- Basin Boundary
- State Boundary
- International Boundary

Major CWC Sites

- Flood Forecasting Station
- Gauge Station
- Gauge, Discharge Station
- Gauge, Water Quality Station
- Gauge, Discharge, Sediment, Water Quality Station

CWC Office

- Divisional Office
- CWC Chief Engineer / Circle Office / Divisional Office

Elevation

High

Low

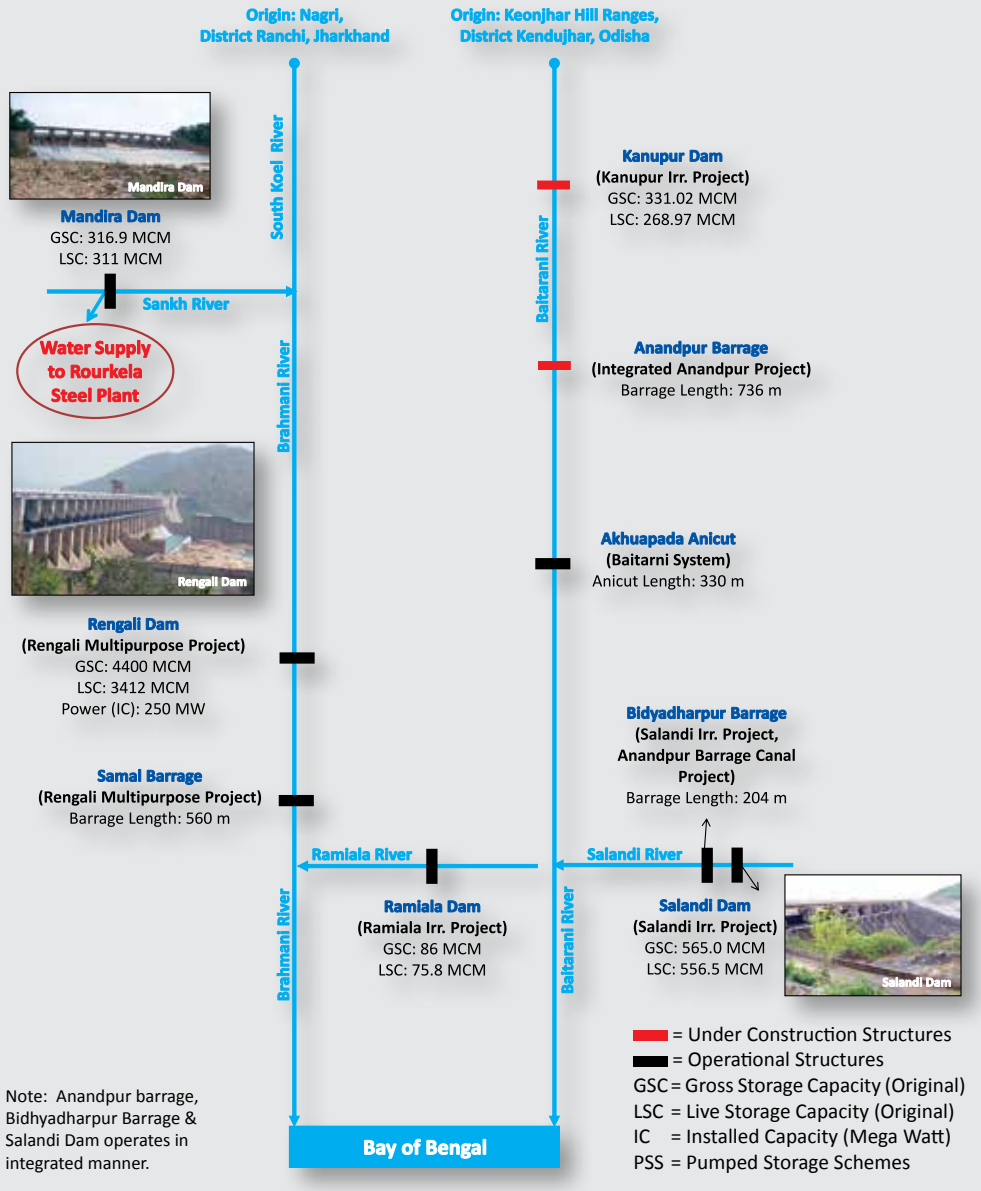
85° E
86° E
87° E
23° N
22° N
21° N
Ranchi
JHARKHAND
WEST BENGAL
Bay of Bengal
Kans
Baras
Karo
Banal
South Koel
Deo
Karo
Deo
Jaraikela
South Koel
Mandira
Panposh
Brahmani
Kanupur
Champua
Chandri
Khairi
Amrud
Gomlai
Baitarani
Aradi
Mermeda
Deo
Deo
Rukura
Korapani
Monalda
Kendujhar
Kanjhari
Swampatana
Keonjhar
Baleshwar
Narajkola
Sapua
Musal
Baitarani
Salandi
Bidyadharpur Barrage
Rengali
Tikra
Bamakol
Anandpur Barrage U/C
Kusal
Ramiala
Bhadrak
Samal Barrage
Ramaial
Reb
Salandi
Matai
Akhuapada Anicut
Talcher
Altuma
Jenapur
Baitarani
Jajapur
Nayagarh
Nagra
Brahmani
Khorsua
Baitarani
Dhenkanal
Indupur
Brahmani
Bhubaneswar
N
W
E
S
0
25
50
Km
International / State boundaries & Coastal Line are as per Survey of India
C.45

The basin consisting of Brahmani and Baitarni extends over states of Odisha, Jharkhand and Chhattisgarh having an area of 51,822 Sq.km which is nearly 1.7% of the total geographical area of the country with a maximum length and width of 403 km and 193 km. It lies between 83°55' to 87°3' east longitudes and 20°28' to 23°38' north latitudes. The basin is bounded by the Chhotanagpur Plateau on the north, by the ridge separating it from Mahanadi basin on the west and the south and by the Bay of Bengal on the east. The Brahmani sub basin covers 39,033 Sq.km and has a long sausage shape. The Baitarni sub basin extends over 12,789 Sq.km and is roughly circular in shape.

The Brahmani, known as South Koel in its upper reaches, rises near Nagri village in Ranchi district of Jharkhand at an elevation of about 600 m. The river has a total length of 799 km. In its tail reach, the river is known as Maipura. The Baitarni River rises near Dumuria village in the hill ranges of Kendujhar district of Odisha at an elevation of about 900 m and has a length of about 355 km. The river is known as Dhamra in its lower reaches. The important tributaries of Brahmani joining it from left are the Karo, and the Sankh whereas the Tikra joins from right. The main tributaries of Baitarni joining from left are the Salandi and the Matai. Brahmani and Baitarni form common delta area before outfalling into the Bay of Bengal.

The major part of basin is covered with agricultural land accounting to 52.04% of the total area and 2.95% of the basin is covered by water bodies. The basin spreads over 16 parliamentary constituencies (2009) comprising 10 of Odisha, 4 of Jharkhand, and 2 of Chhattisgarh.

River Flow Line Diagram



Note: Anandpur barrage, Bidhyadharpur Barrage & Salandi Dam operates in integrated manner.

Salient Features of Brahmani and Baitarni Basin

Basin Extent	Longitude	83° 55' to 87° 3' E
	Latitude	20° 28' to 23° 38' N
Length of River (Km)		Brahmani – 799 Baitarni – 355
Catchment Area (Sq.km.)		51822
Average Water Resource Potential (MCM)		28480
Utilizable Surface Water Resource (MCM)		18300
Live Storage Capacity of Completed Projects (MCM)		4648.09
Live Storage Capacity of Projects Under Construction (MCM)		875.60
Total Live storage capacity of Projects (MCM)		5523.69
No. of Hydrological Observation Stations		15
No. of Flood Forecasting Stations		3

Major Water Resources Projects of Baitarni Sub-Basin

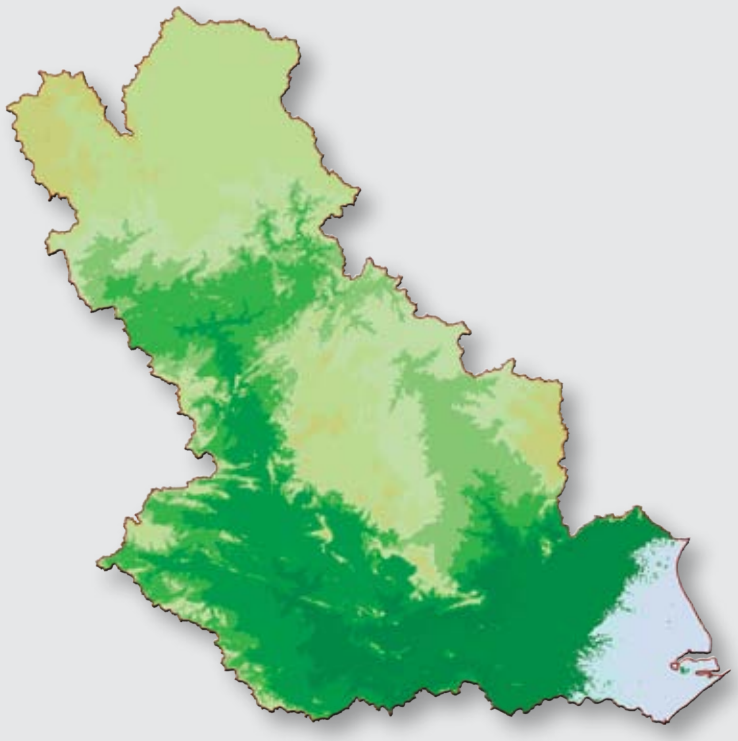
Name of Project	Associated Structures	Type	Status	Culturable Command Area (Th ha)	Ultimate Irrigation Potential (Th ha)	Power (MW)
Kanupur Irr. Project (OD)	Kanupur Dam	Major	Ongoing	29.59	47.71	
Anandpur Barrage Canal Project (OD)	Bidyadharpur Barrage	Major	Completed	35.13	35.13	
Baitarni System (OD)	Akhuapada Anicut	Major	Completed	32.77	34.34	
Integrated Anandpur Barrage Project (OD) – Old Anandpur Project included as ERM	Anandpur Barrage	Major	Ongoing	65.87	62.59 + 25.45 (Stabiliza-tion)	
Salandi Irr. Project (OD)	Salandi Dam, Bidyadharpur Barrage	Major	Completed	45.73	57.59	

Major Water Resources Projects of Brahmani Sub-Basin

Name of Project	Associated Structures	Type	Status	Culturable Command Area (Th ha)	Ultimate Irrigation Potential (Th ha)	Power (MW)
Rengali Multipurpose Project (OD)	Rengali Dam, Samal Barrage	Major	Ongoing	235.50	423.60	250
Ramiala Irr. Project (OD)	Ramiala Dam	Medium	Completed	9.60	15.60	

*Th. ha = Thousand Hectare, MW = Mega Watt, MCM = Million Cubic Meter

Elevation Zone Map



Symbol	Elevation (m)	Area (Sq. km)	% of Total Area
	< 5	2111.46	4.07
	5-10	1074.88	2.07
	10-50	4227.90	8.16
	50-100	3193.50	6.16
	100-200	6989.44	13.49
	200-300	6632.59	12.81
	300-400	6643.69	12.82
	400-500	6689.90	12.91
	500-750	11511.45	22.21
	750-1000	2563.31	4.95
	1000-1500	183.88	0.35

Average Annual Rainfall (1971-2005)

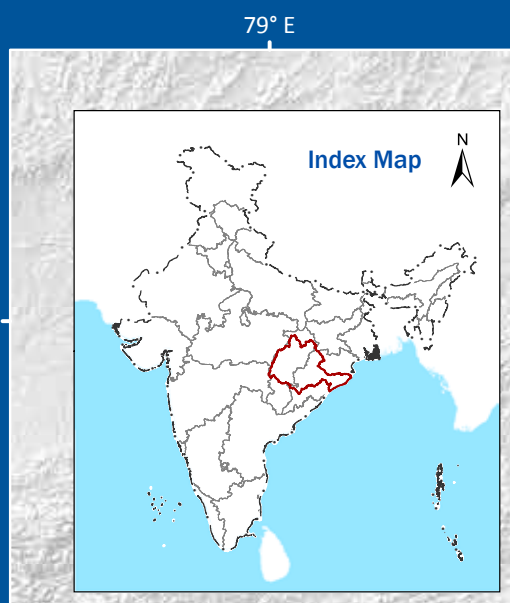
Symbol	Rainfall (mm)	Area (Sq. km)	% of Total Area
	1200-1400	13697.80	26.43
	1400-1600	33835.23	65.29
	1600-2000	4288.97	8.28

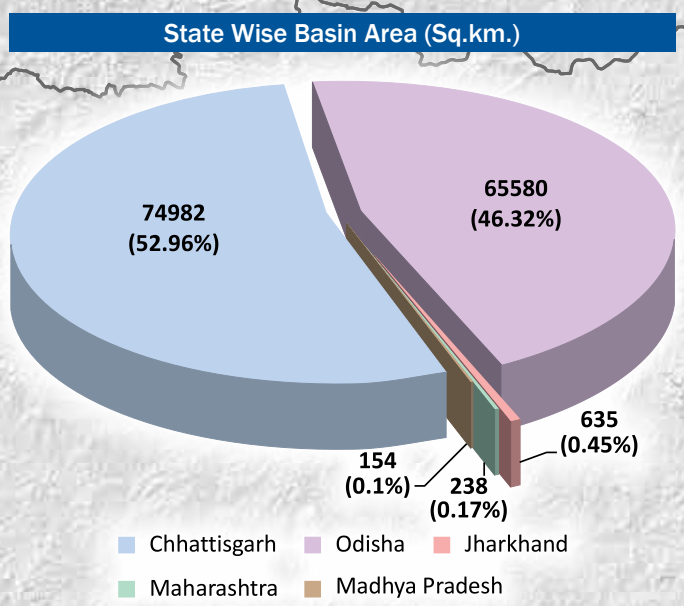
Land Use / Land Cover (2005-06)

Symbol	Category	Area (Sq. km)	% of Total Area
	Built Up Land	2395.95	4.62
	Agricultural	26966.96	52.04
	Forest	17811.93	34.36
	Grassland	0.79	0.01
	Wasteland	3117.16	6.02
	Waterbodies	1529.21	2.95

Parliamentary Constituencies (2009)

MAHANADI BASIN





79° E 80° E 81° E 82°

23° N 22° N 21° N 20° N 19° N

Jabalpur

MADHYA PRADESH

Manendragarh

Hasdeo

Minimata

Maniyari

Kharung

Arpa

Kurang

Maniari

Agar

Hanp

Ghatora

Andhiyarkore

Seonath

Jondhra

Simga

Rampur

Pathardhi

Mahanadi

Kodar

Kotni

RAIPUR

Shivnath Diversion Weir

Kharkhara

Tandula

Rajim

Baronda

Sukha

Jonk

Kharkhara

Mongra Barrage

Tandula

New Rudri Barrage

Pairi Weir

Pairi

Sikasar

Ravishankar

Murrum Silli

Mah anadi

Dudhawa

Sondur

MAHARASHTRA

CHHATTISGARH

Legend

- Major City
- State Capital
- Dam / Barrage / Weir
- River
- Reservoir
- Basin Boundary
- State Boundary
- International Boundary

Major CWC Sites

- Flood Forecasting Station
- Gauge, Discharge Station
- Gauge, Discharge, Water Quality Station
- Gauge, Discharge, Sediment, Water Quality Station

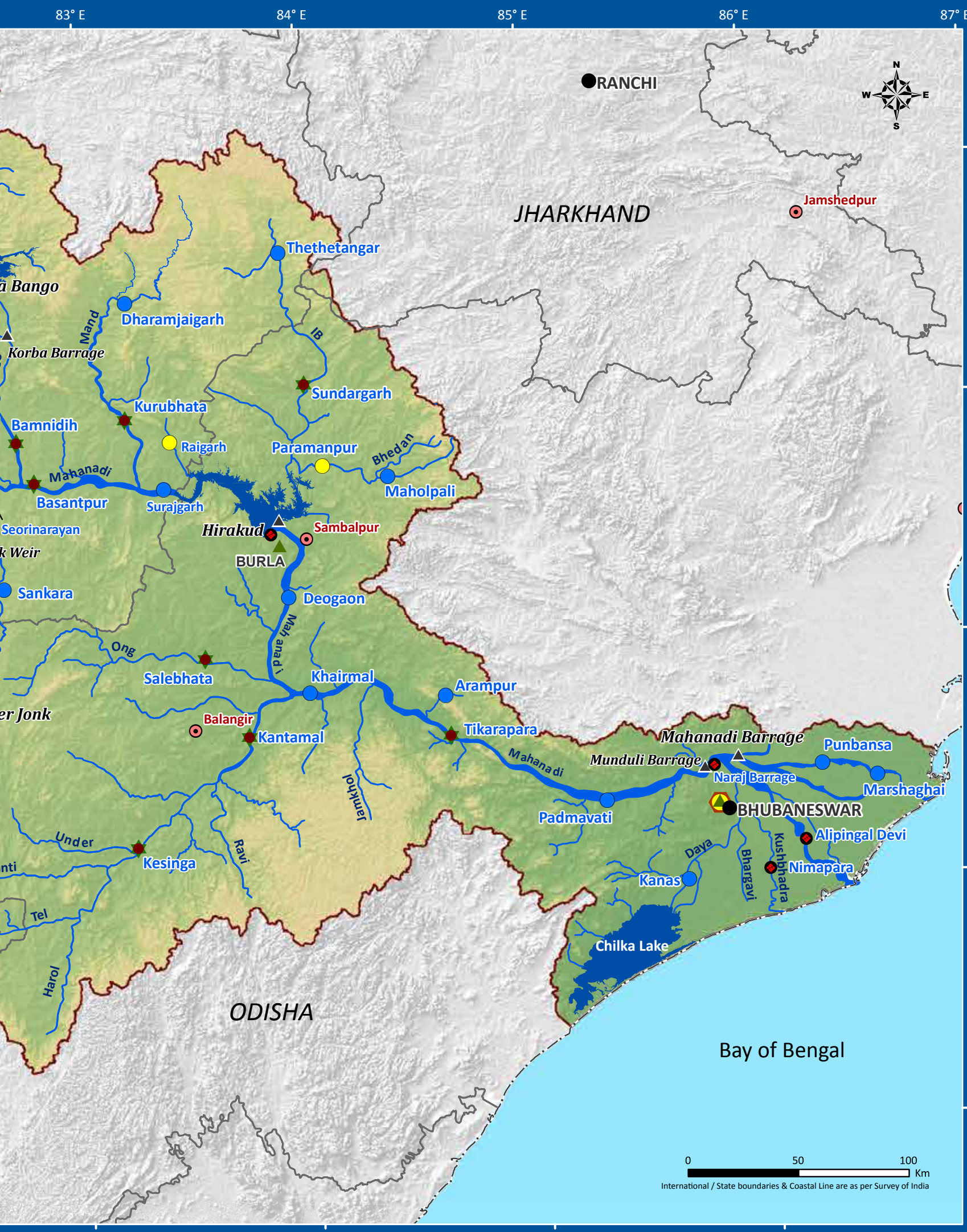
CWC Office

- Divisional Office
- CWC Chief Engineer / Circle Office / Divisional Office

Elevation

High

Low

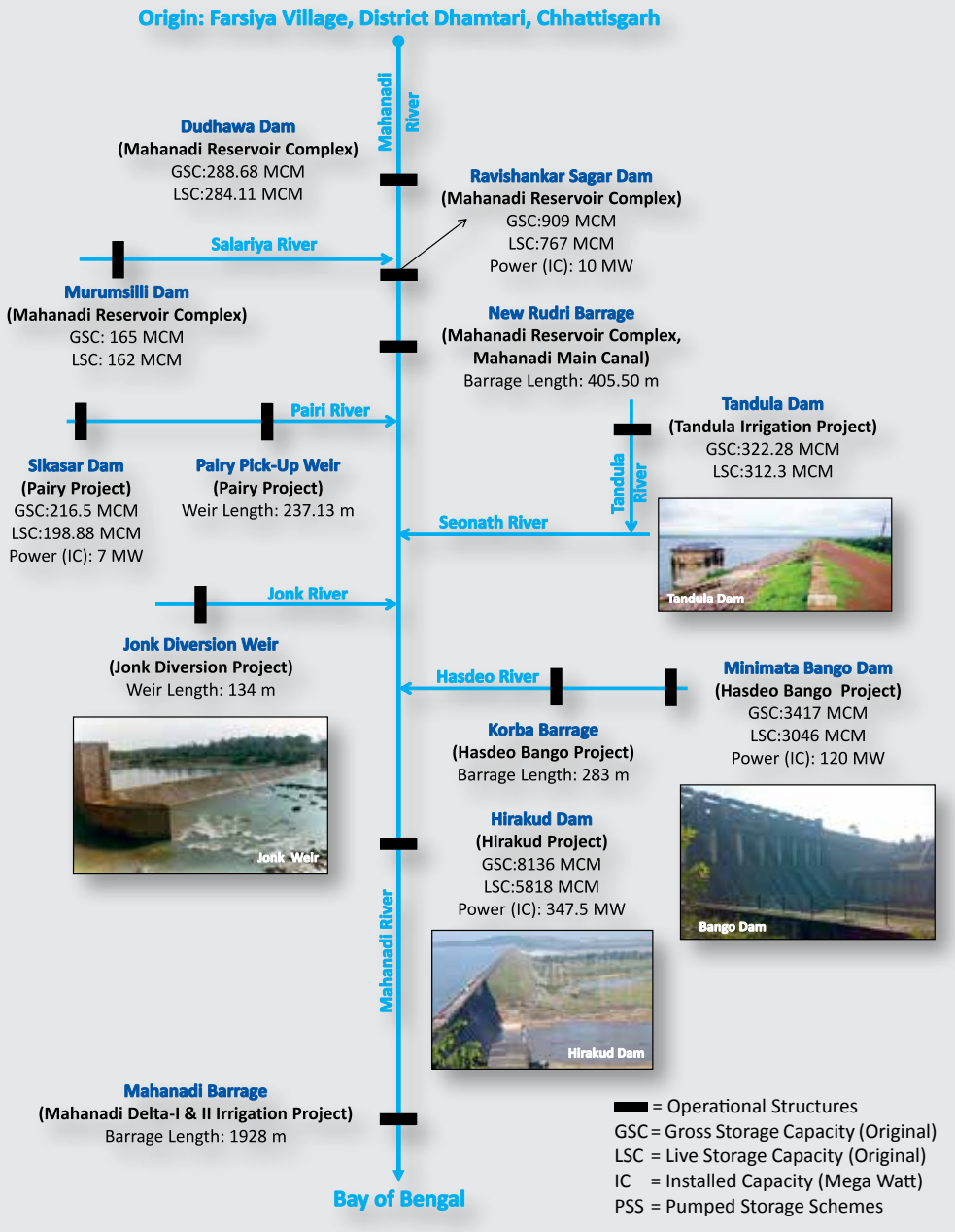

83° E
84° E
85° E
86° E
87° E
23° N
22° N
21° N
20° N
19° N
RANCHI
JHARKHAND
Jamshedpur
Thethetangar
Dharamjaigarh
Korba Barrage
Mand
IB
Sundargarh
Kurubhata
Bamnidih
Raigarh
Paramanpur
Bhedan
Maholpali
Mahanadi
Basantpur
Surajgarh
Seorinarayan
Hirakud
Sambalpur
BURLA
Sankara
Deogaon
Mahanadi
Ong
Salebhata
Khairmal
Arampur
Balangir
Kantamal
Tikarapara
Mahanadi Barrage
Munduli Barrage
Punbansa
Naraj Barrage
Marshaghai
Jamkhol
Padmavati
BHUBANESWAR
Alipingal Devi
Under
Ravi
Kesinga
Daya
Bhargavi
Kushbhadra
Nimapara
Kanas
Tel
Chilka Lake
Harol
ODISHA
Bay of Bengal
0
50
100
Km
International / State boundaries & Coastal Line are as per Survey of India

The Mahanadi basin extends over states of Chhattisgarh and Odisha and comparatively smaller portions of Jharkhand, Maharashtra and Madhya Pradesh, draining an area of 1,41,589 Sq.km which is nearly 4.3% of the total geographical area of the country. The geographical extent of the basin lies between 80°28' and 86°43' east longitudes and 19°8' and 23°32' north latitudes. The basin has maximum length and width of 587 km and 400 km. It is bounded by the Central India hills on the north, by the Eastern Ghats on the south and east and by the Maikala range on the west.

The Mahanadi is one of the major rivers of the country and among the peninsular rivers, in water potential and flood producing capacity, it ranks second to the Godavari. It originates from a pool, 6 km from Farsiya village of Dhamtari district of Chhattisgarh. The total length of the river from origin to its outfall into the Bay of Bengal is 851 km. The Seonath, the Hasdeo, the Mand and the Ib joins Mahanadi from left whereas the Ong, the Tel and the Jonk joins it from right. Six other small streams between the Mahanadi and the Rushikulya draining directly into the Chilka Lake also forms the part of the basin.

The major part of basin is covered with agricultural land accounting to 54.27% of the total area and 4.45% of the basin is covered by water bodies. The basin spreads over 27 parliamentary constituencies (2009) comprising 13 of Odisha, 11 of Chhattisgarh, and 1 each of Maharashtra, Jharkhand and Madhya Pradesh.

River Flow Line Diagram



Salient Features of Mahanadi Basin

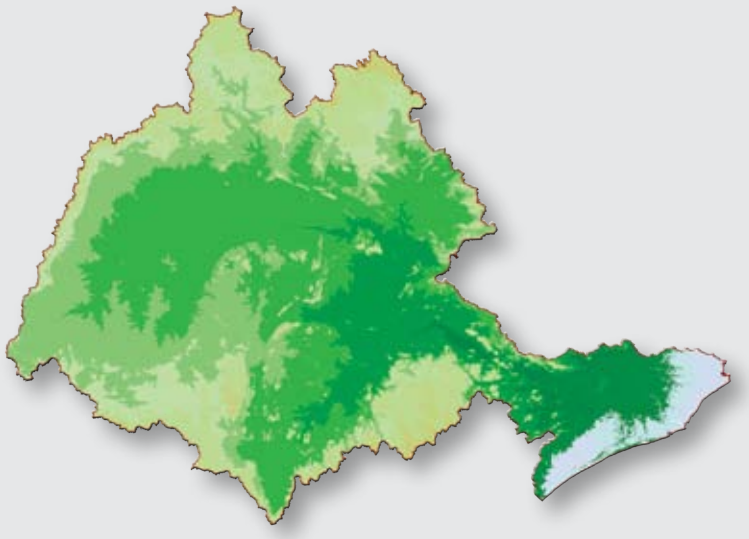
Basin Extent	Longitude	80° 28' to 86° 43' E
	Latitude	19° 8' to 23° 32' N
Length of Mahanadi River (Km)		851
Catchment Area (Sq.km.)		141589
Average Water Resource Potential (MCM)		66880
Utilizable Surface Water Resource (MCM)		50000
Live Storage Capacity of Completed Projects (MCM)		12334.80
Live Storage Capacity of Projects Under Construction (MCM)		1873
Total Live Storage Capacity of Projects (MCM)		14207.80
No. of Hydrological Observation Stations		39
No. of Flood Forecasting Stations		4

Major Water Resources Projects of Mahanadi Basin

Name of Project	Associated Structures	Type	Status	Culturable Command Area (Th ha)	Ultimate Irrigation Potential (Th ha)	Power (MW)
Mahanadi Main Canal (CG)	New Rudri Barrage	Major	Completed	85	85	
Mahanadi Reservoir Complex (CG)	Ravishankar Sagar Dam, Dudhawa Dam, Murumsilli Dam, New Rudri Barrage	Major	Completed	301	264.31	10
Tandula Irr. Project (CG)	Tandula Dam	Major	Completed	246.30	84	
Pairy Project (CG)	Sikasar Dam, Pairy Pick-Up Weir	Major	Completed	39.60	72.84	7
Jonk Diversion Project (CG)	Jonk Diversion Weir	Major	Completed	15.5	14.57	
Hasdeo Bango Project (CG)	Minimata Bango Dam, Korba Barrage	Major	Completed	285	434	120
Hirakud Project (OD)	Hirakud Dam	Major	Completed	157.81	261.26	347.5
Mahanadi Delta-I & II Irr. Project (OD)	Mahanadi Barrage	Major	Completed	303	593	

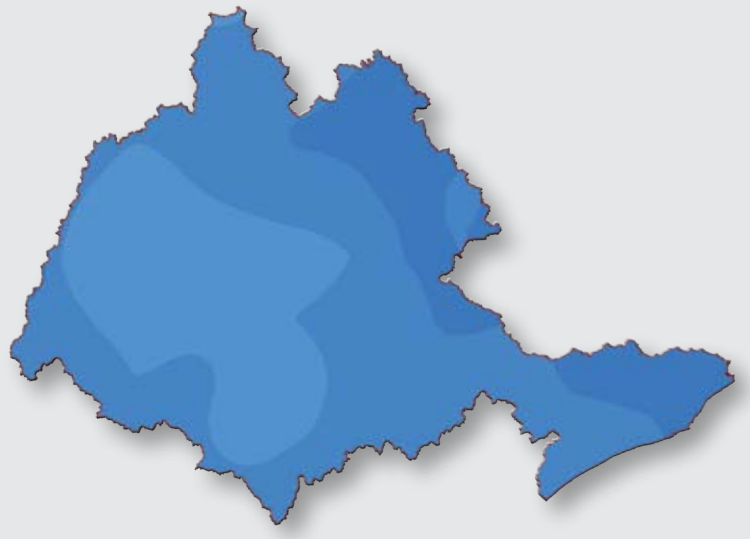
*Th. ha = Thousand Hectare, MW = Mega Watt, MCM = Million Cubic Meter

Elevation Zone Map



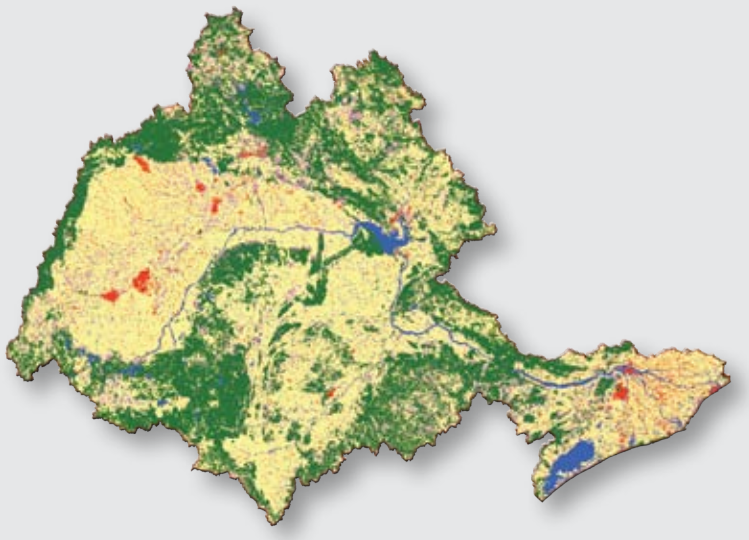
Symbol	Elevation (m)	Area (Sq. km)	% of Total Area
	< 5	2834.10	2.00
	5-10	2970.44	2.10
	10-50	5131.71	3.62
	50-100	3360.71	2.37
	100-200	14657.03	10.35
	200-300	44912.56	31.73
	300-400	31308.55	22.11
	400-500	14322.56	10.12
	500-750	18353.10	12.96
	750-1000	3403.39	2.40
	1000-1500	334.84	0.24

Average Annual Rainfall (1971-2005)



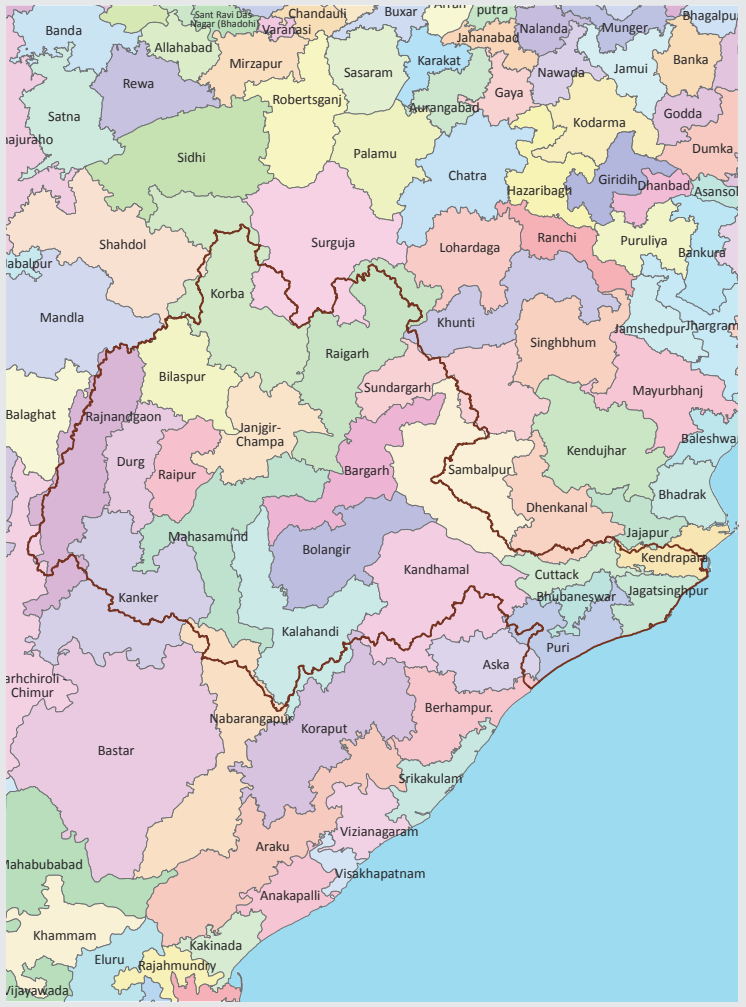
Symbol	Rainfall (mm)	Area (Sq. km)	% of Total Area
	1000-1200	42542.58	30.05
	1200-1400	73592.87	51.97
	1400-1600	25453.55	17.98

Land Use / Land Cover (2005-06)

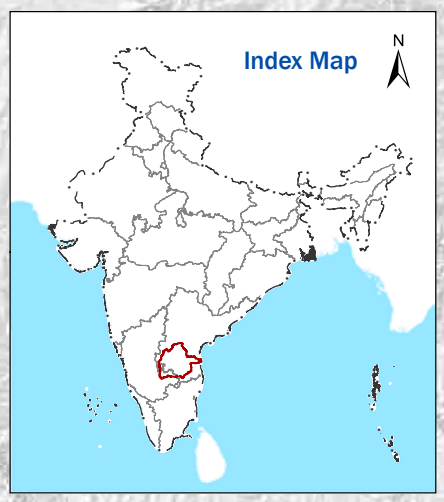


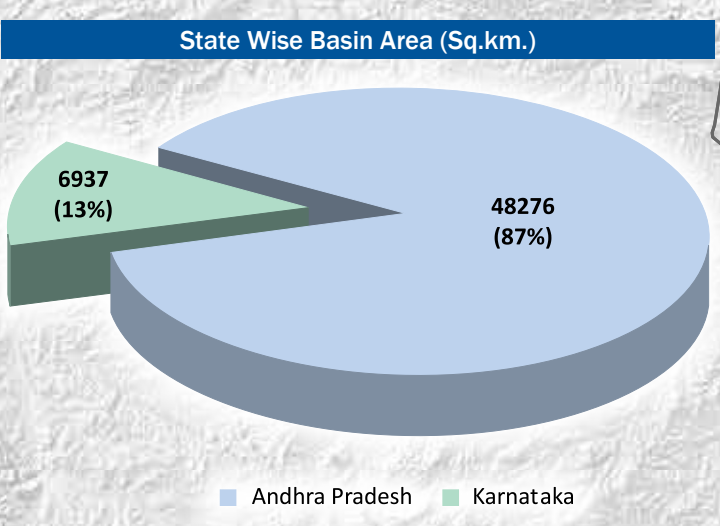
Symbol	Category	Area (Sq. km)	% of Total Area
	Built Up Land	4676.64	3.30
	Agricultural	76837.89	54.27
	Forest	46356.11	32.74
	Wasteland	7423.76	5.24
	Waterbodies	6294.60	4.45

Parliamentary Constituencies (2009)



PENNAR BASIN





76° E
77° E
15° N
14° N
KARNATAKA
ANDHRAPRADESH
Pennar
Mid Pennar
PABR
Anantapur
Upper Pennar
Nagalamedike
Chitravati
Jayamangali
Tumkur

Legend

- Major City
- State Capital
- Dam / Barrage / Weir
- River
- Reservoir
- Basin Boundary
- State Boundary
- International Boundary

Major CWC Sites

- Flood Forecasting Station
- Gauge, Discharge, Water Quality Station
- Gauge, Discharge, Sediment, Water Quality Station

Elevation

High
Low

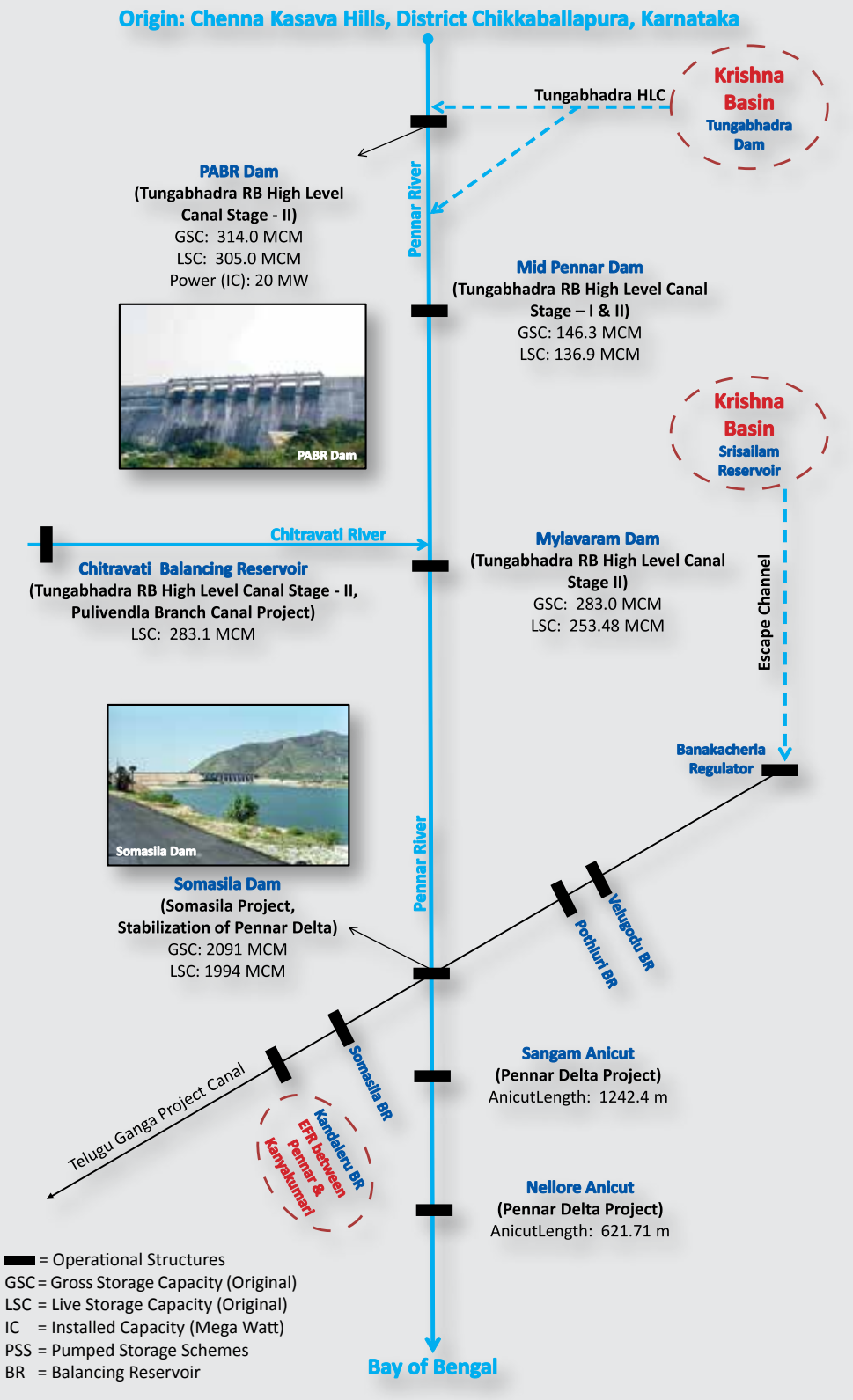
78° E
79° E
80° E
15° N
14° N
Kurnool
Kunderu
Kunderu
Surreru
Kunderu
Tadipattri
Mylavaram
Lower Sagileru
Sagileru
Pennar
Chitravati
Alladupalli
Nandipalli
Boggeru
ngavaram
athi eservoir
Kamalapuram
Chennur
Pennar
Sangam Anicut
Somasila
Cuddapah
Nellore
Nellore Anicut
Maduleru
Papagni
Cheyyeru
Papagni
Bahuda
Punaru
BAY OF BENGAL
N
W
E
S
0
25
50
Km
International / State boundaries & Coastal Line are as per Survey of India
C.53

Located in peninsular India, the Pennar basin extends over states of Andhra Pradesh and Karnataka having an area of 55,213 Sq.km with maximum length and width of 433 km and 266 km. The basin lies between 77°1' to 80°10' east longitudes and 13°18' to 15°49' north latitudes. The fan shaped basin is bounded by the Erramala range on the north, by the Nallamala and Velikonda ranges of the Eastern Ghats on the east, by the Nandidurg hills on the south and by the narrow ridge separating it from the Vedavati valley of the Krishna Basin on the west. The other hill ranges in the basin to the south of the river are the Seshachalam and Paliconda ranges.

The Pennar (also known as Uttara Pinakini) is one of the major rivers of the peninsula. The Pennar rises in the Chenna Kasava hill of the Nandidurg range, in Chikkaballapura district of Karnataka and flows towards east eventually draining into the Bay of Bengal. The total length of the river from origin to its outfall in the Bay of Bengal is 597 km. The principal tributaries of the river joining from left are the Jayamangali, the Kunderu and the Sagileru whereas the Chiravati, the Papagni and the Cheyyeru joins it from right.

The major part of basin is covered with agriculture accounting to 58.64% of the total area and only 4.97% of the basin is covered by water bodies. The basin spreads over 14 parliamentary constituencies (2009) comprising 10 of Andhra Pradesh and 4 of Karnataka.

River Flow Line Diagram



Salient Features of Pennar Basin

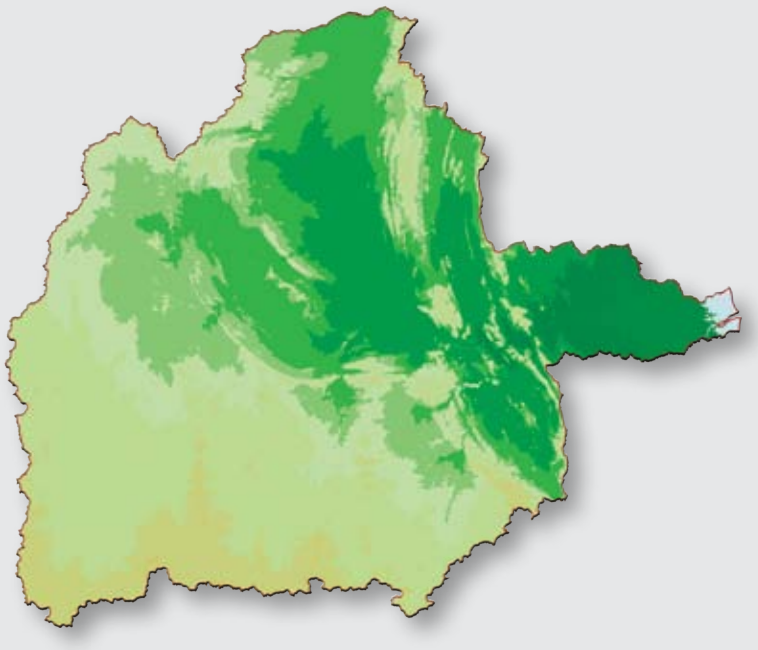
Basin Extent	Longitude	77° 1' to 80° 10' E
	Latitude	13° 18' to 15° 49' N
Length of Pennar River (Km)		597
Catchment Area (Sq.km.)		55213
Average Water Resource Potential (MCM)		6320
Utilizable Surface Water Resource (MCM)		6900
Live Storage Capacity of Completed Projects (MCM)		2649.40
Live Storage Capacity of Projects Under Construction (MCM)		2170.71
Total Live Storage Capacity of Projects (MCM)		4820.11
No. of Hydrological Observation Stations		8
No. of Flood Forecasting Stations		1

Major Water Resources Projects of Pennar Basin

Name of Project	Associated Structures	Type	Status	Culturable Command Area (Th ha)	Ultimate Irrigation Potential (Th ha)	Power (MW)
Tungabhadra RB High Level Canal Stage – I & II (AP)	PABR Dam, Mid Pennar Dam, Mylavaram Dam, Chitravati Balancing Reservoir	Major	Stage I - Completed Stage II - Ongoing	133.36	133.36	20
Pulivendla Branch Canal Project (AP)	Chitravati Balancing Reservoir	Major	Completed	24.70	24.28	
Somasila Project (AP)	Somasila Dam	Major	Completed	38.48	38.48	
Pennar Delta Project (AP)	Sangam Anicut, Nellore Anicut	Major	Completed	67.72	67.72	

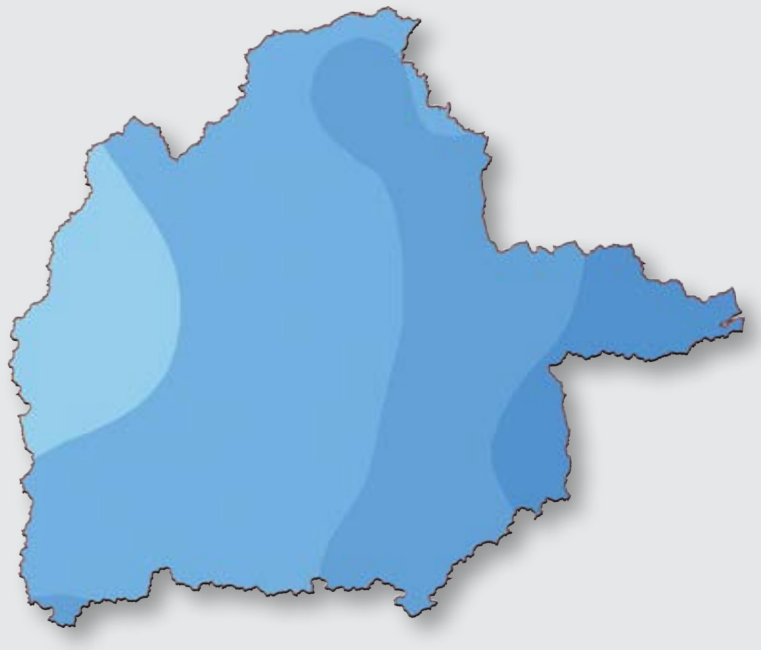
*Th. ha = Thousand Hectare, MW = Mega Watt, MCM = Million Cubic Meter

Elevation Zone Map



Symbol	Elevation (m)	Area (Sq. km)	% of Total Area
	< 5	88.90	0.16
	5-10	155.75	0.28
	10-50	1249.81	2.26
	50-100	1798.92	3.26
	100-200	7682.56	13.91
	200-300	9128.45	16.53
	300-400	8302.98	15.04
	400-500	7530.27	13.64
	500-750	14740.46	26.70
	750-1000	4381.96	7.94
	1000-1500	152.94	0.28

Average Annual Rainfall (1971-2005)

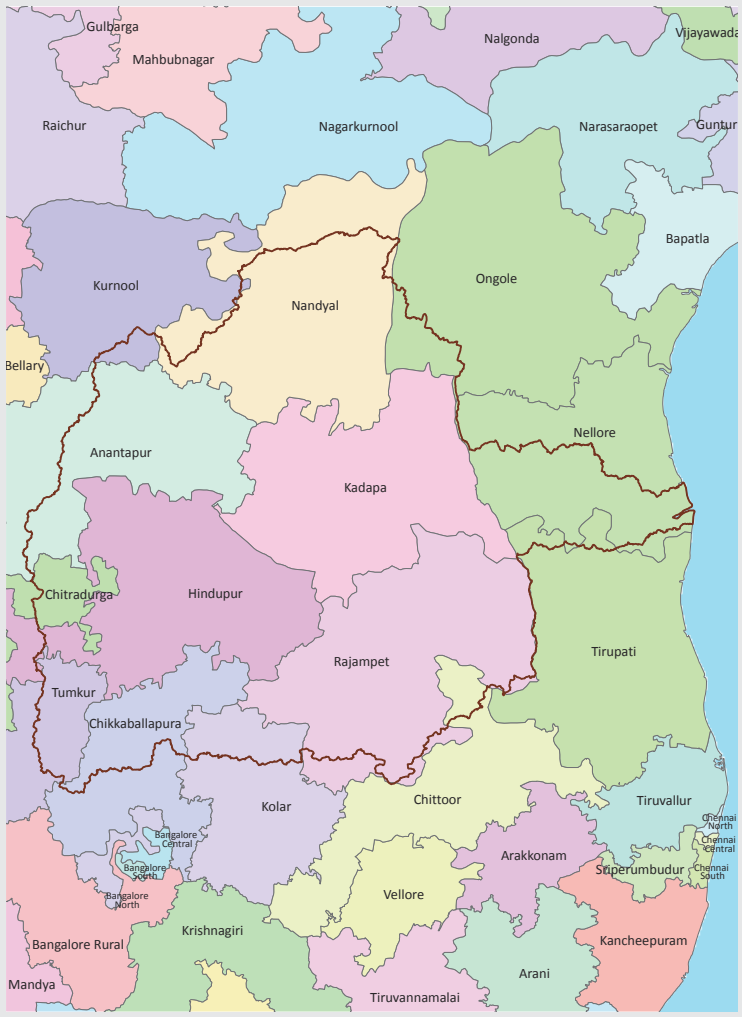


Symbol	Rainfall (mm)	Area (Sq. km)	% of Total Area
	400-600	6806.26	12.33
	600-800	28176.11	51.03
	800-1000	15507.36	28.09
	1000-1200	4723.27	8.55

Land Use / Land Cover (2005-06)

Symbol	Category	Area (Sq. km)	% of Total Area
	Built Up land	858.89	1.56
	Agricultural land	32375.93	58.64
	Forest	11244.91	20.37
	Wasteland	7990.70	14.47
	Waterbodies	2742.57	4.96

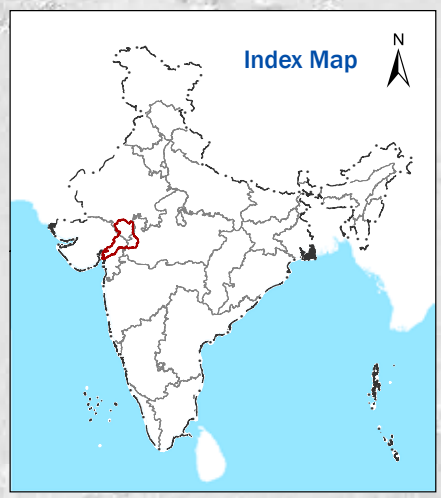
Parliamentary Constituencies (2009)



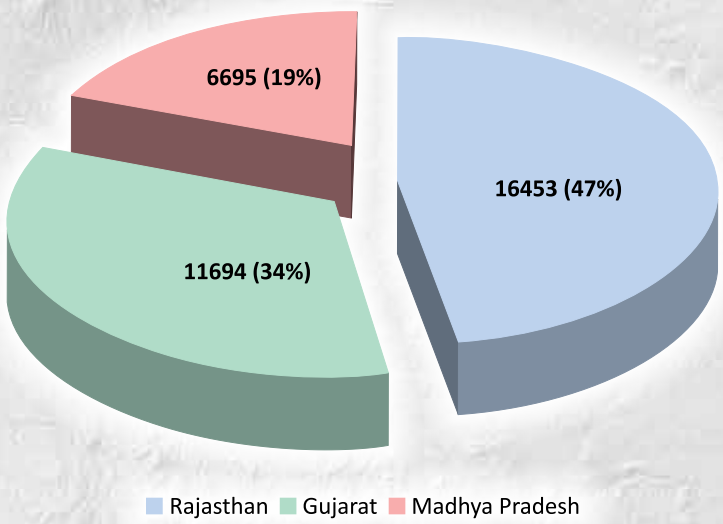
MAHI BASIN

71° E 72° E 73° E

24° N 23° N 22° N



State Wise Basin Area (Sq.km.)



GUJARAT

Gandhinagar

Legend

- Major City
- State Capital
- Dam / Barrage / Weir
- River
- Reservoir
- Basin Boundary
- State Boundary
- International Boundary

Major CWC Sites

- Flood Forecasting Station
- Gauge Station
- Gauge, Discharge Station
- Gauge, Discharge, Water Quality Station
- Gauge, Discharge, Sediment, Water Quality Station

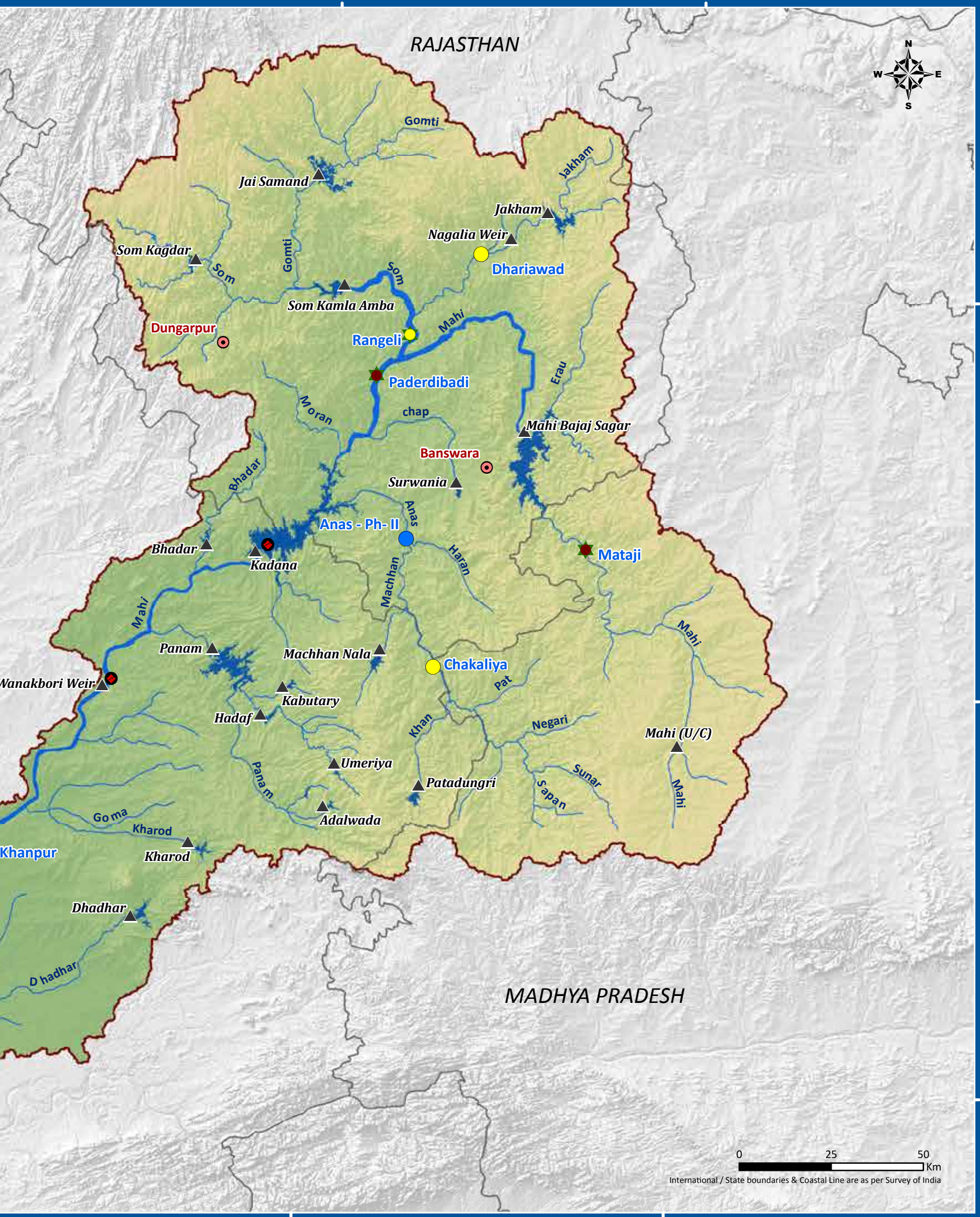
CWC Office

- CWC Chief Engineer / Circle Office / Divisional Office

Elevation

High

Low

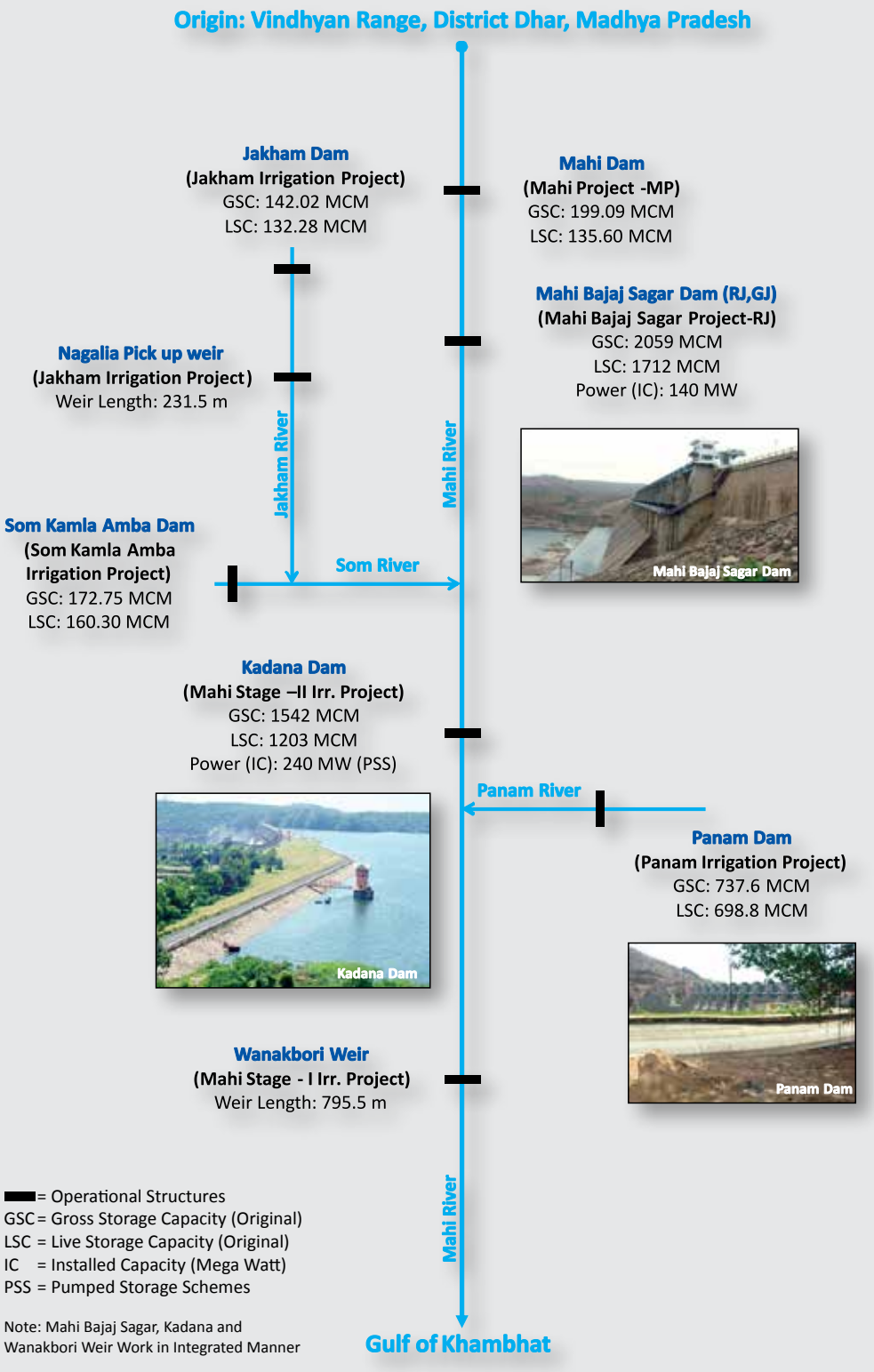

74° E
75° E
RAJASTHAN
N
W
E
S
24° N
23° N
22° N
Gomti
Jakham
Jai Samand
Jakham
Nagalia Weir
Dhariawad
Som Kagdar
Som
Gomti
Som
Som Kamla Amba
Mahi
Dungarpur
Rangeli
Paderdibadi
Erau
Moran
chap
Mahi Bajaj Sagar
Banswara
Bhadar
Surwania
Anas
Anas - Ph- II
Bhadar
Kadana
Haran
Mataji
Mahi
Panam
Machhan Nala
Chakaliya
Wanakbori Weir
Pat
Kabutary
Hadaf
Khan
Negari
Mahi (U/C)
Umeriya
Sunar
Patadungri
Sapan
Mahi
Panam
Goma
Kharod
Adalwada
Khanpur
Kharod
Dhadhar
D hadhar
MADHYA PRADESH
0
25
50
Km
International / State boundaries & Coastal Line are as per Survey of India
74° E
75° E

The Mahi basin extends over states of Madhya Pradesh, Rajasthan and Gujarat having total area of 34,842 Sq.km with a maximum length and width of about 330 km and 250 km. It lies between 72°21' to 75°19' east longitudes and 21°46' to 24°30' north latitudes. It is bounded by Aravalli hills on the north and the north-west, by Malwa Plateau on the east, by the Vindhyas on the south and by the Gulf of Khambhat on the west.

Mahi is one of the major interstate west flowing rivers of India. It originates from the northern slopes of Vindhyas at an altitude of 500 m near village Bhopawar, Sardarpur tehsil in Dhar district of Madhya Pradesh. The total length of Mahi is 583 km. The Som is its principal tributary which joins from right, and the Anas and the Panam joins the river from left. It drains into the Arabian Sea through the Gulf of Khambhat.

The major part of basin is covered with agricultural land accounting to 63.63% of the total area and 4.34% of the basin is covered by water bodies. The basin spreads over 11 parliamentary constituencies (2009) comprising 6 of Gujarat, 3 of Rajasthan, and 2 of Madhya Pradesh.

River Flow Line Diagram



Salient Features of Mahi Basin

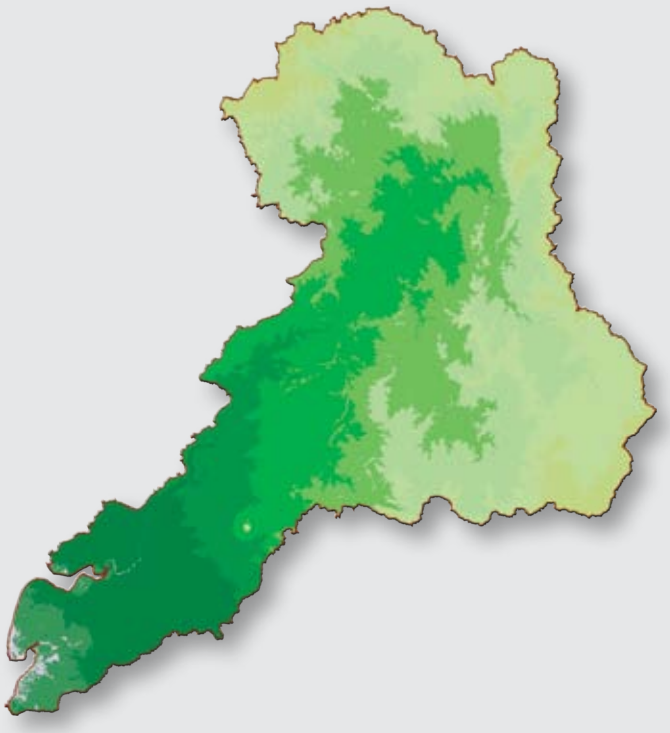
Basin Extent	Longitude	72° 21' to 75° 19' E
	Latitude	21° 46' to 24° 30' N
Length of Mahi River (Km)		583
Catchment Area (Sq.km.)		34842
Average Water Resource Potential (MCM)		11020
Utilizable Surface Water Resource (MCM)		3100
Live Storage Capacity of Completed Projects (MCM)		4722.6
Live Storage Capacity of Projects Under Construction (MCM)		261.43
Total Live Storage Capacity of Projects (MCM)		4984.03
No. of Hydrological Observation Stations		12
No. of Flood Forecasting Stations		2

Major Water Resources Projects of Mahi Basin

Name of Project	Associated Structures	Type	Status	Culturable Command Area (Th ha)	Ultimate Irrigation Potential (Th ha)	Power (MW)
Mahi Irrigation Project (MP)	Mahi Dam	Major	Ongoing	18.227	26.429	
Mahi Bajaj Sagar (RJ)	Mahi Bajaj Sagar Dam	Major	Completed	80.00	71.2	140
Jakham Irrigation Project (RJ)	Jhakham Dam, Nagalia Pickup Weir	Major	Completed	26.47	23.50	
Som Kamla Amba Irrigation Project (RJ)	Som Kamla Amba Dam	Major	Completed	17.72	18.79	
Mahi Stage II (Kadana) (GJ)	Kadana Dam	Major	Completed	20.78	16.56	240
Panam Irrigation Project (GJ)	Panam Dam	Major	Completed	41.11	49.37	
Mahi Stage I (Wanakbori) (GJ)	Wanakbori Weir	Major	Completed	212.69	260.40	

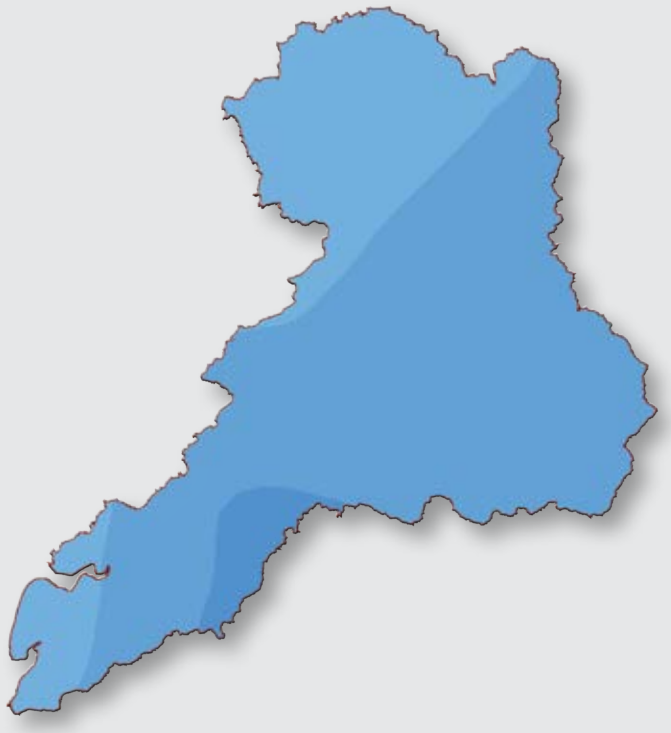
*Th. ha = Thousand Hectare, MW = Mega Watt, MCM = Million Cubic Meter

Elevation Zone Map



Symbol	Elevation (m)	Area (Sq. km)	% of Total Area
	< 5	289.19	0.83
	5-10	1073.13	3.08
	10-50	3755.97	10.78
	50-100	2254.28	6.47
	100-200	6268.08	17.99
	200-300	6721.02	19.29
	300-400	6372.60	18.29
	400-500	5717.57	16.41
	500-750	2344.87	6.73
	750-1000	45.29	0.13

Average Annual Rainfall (1971-2005)

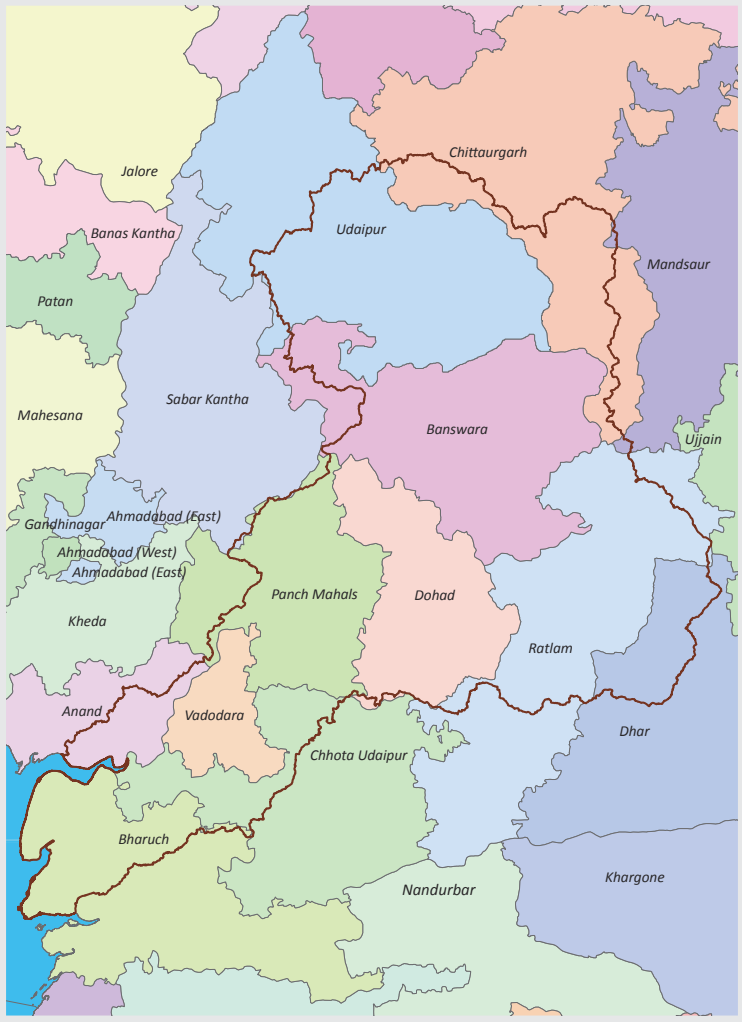


Symbol	Rainfall (mm)	Area (Sq. km)	% of Total Area
	600-800	9832.05	28.22
	800-1000	23477.53	67.38
	1000-1200	1532.42	4.40

Land Use / Land Cover (2005-06)

Symbol	Category	Area (Sq. km)	% of Total Area
	Built Up Land	435.49	1.25
	Agricultural	22170.41	63.63
	Forest	6719.36	19.29
	Grassland	80.73	0.23
	Wasteland	3923.09	11.26
	Waterbodies	1512.92	4.34

Parliamentary Constituencies (2009)



SABARMATI BASIN

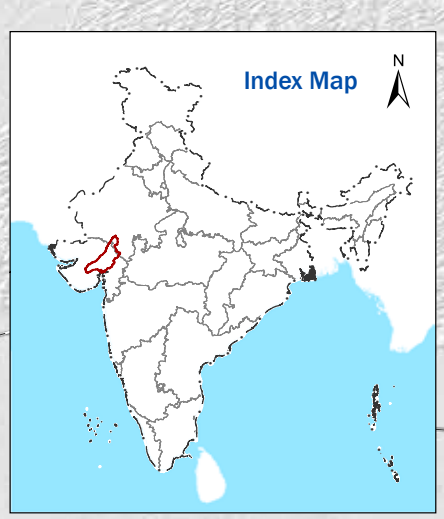
70° E

71° E

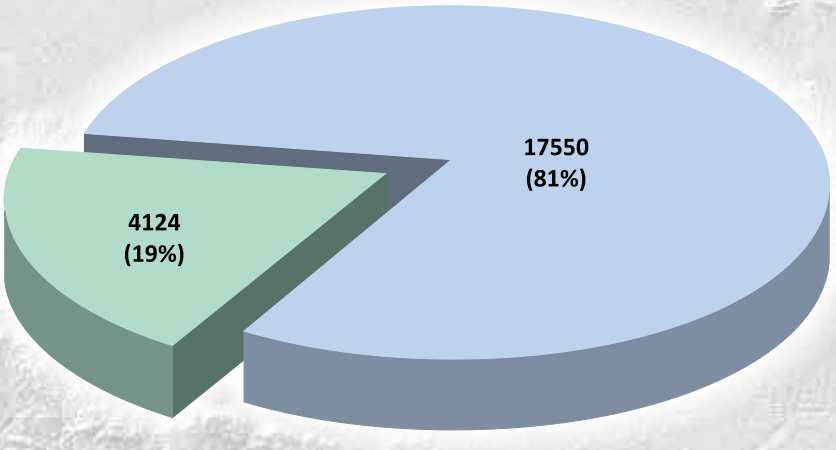
24° N

23° N

22° N



State Wise Basin Area (Sq.km.)



GUJARAT

Legend

- Major City
- State Capital
- Dam / Barrage / Weir
- River
- Reservoir
- Basin Boundary
- State Boundary
- International Boundary

Major CWC Sites

- Flood Forecasting Station
- Gauge Station
- Gauge, Discharge Station
- Gauge, Discharge, Water Quality Station
- Gauge, Discharge, Sediment, Water Quality Station

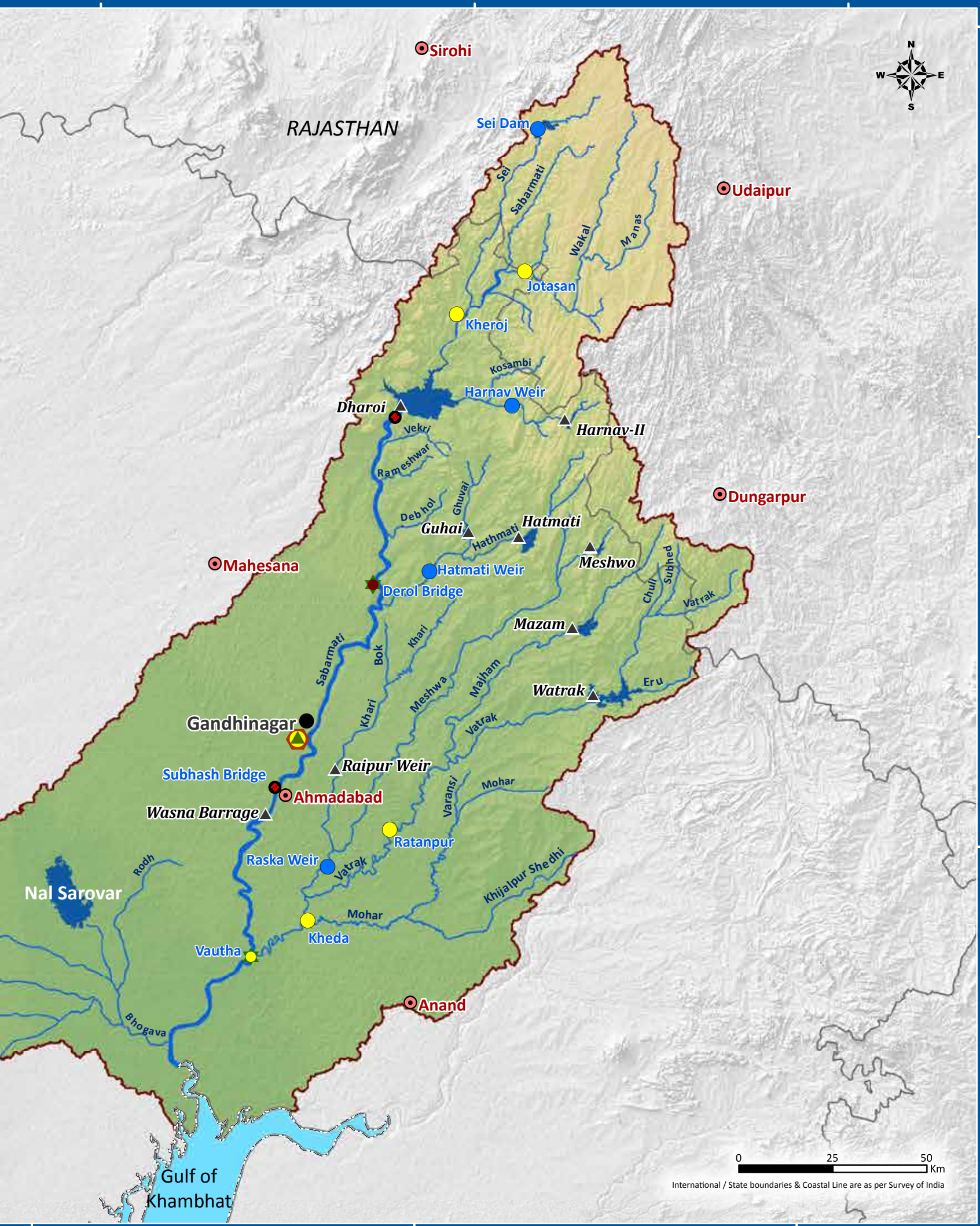
CWC Office

- CWC Chief Engineer / Circle Office / Divisional Office

Elevation

High

Low

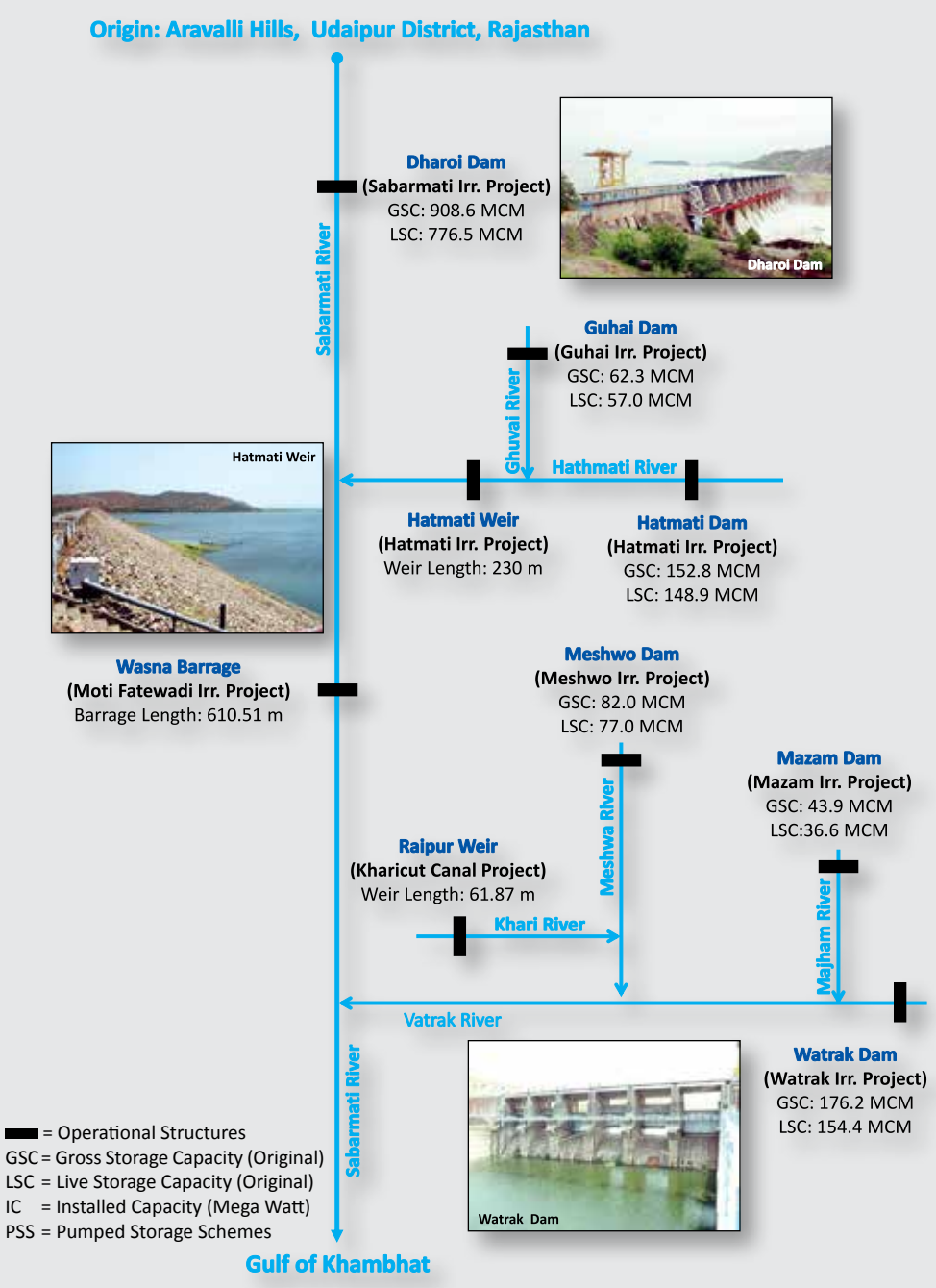

72° E
73° E
74° E
25° N
24° N
23° N
N
W
E
S
Sirohi
RAJASTHAN
Sei Dam
Udaipur
Sei
Sabarmati
Wakal
Manas
Jotasan
Kheroj
Kosambi
Harnav Weir
Dharoi
Harnav-II
Vekri
Rameshwar
Deb hol
Ghuvai
Dungarpur
Guhai
Hathmati
Hatmati
Meshwo
Mahesana
Hatmati Weir
Derol Bridge
Chuli
Subhed
Vatrak
Mazam
Sabarmati
Bok
Khari
Meshwa
Majham
Watrak
Eru
Gandhinagar
Khari
Vatrak
Raipur Weir
Subhash Bridge
Ahmadabad
Varansi
Mohar
Wasna Barrage
Ratanpur
Raska Weir
Vatrak
Khijalpur Shedhi
Nal Sarovar
Rodh
Mohar
Kheda
Vautha
Anand
Bhogava
Gulf of Khambhat
0
25
50
Km
International / State boundaries & Coastal Line are as per Survey of India

The Sabarmati basin extends over states of Rajasthan and Gujarat having an area of 21,674 Sq.km with maximum length and width of 300 km and 150 km. It lies between 70°58’ to 73°51’ east longitudes and 22°15’ to 24°47’ north latitudes. The basin is bounded by Aravalli hills on the north and north-east, by Rann of Kutch on the west and by Gulf of Khambhat on the south. The basin is roughly triangular in shape with the Sabarmati River as the base and the source of the Vatrak River as the apex point.

Sabarmati originates from Aravalli hills at an elevation of 762 m near village Tepur, in Udaipur district of Rajasthan. The total length of river from origin to outfall into the Arabian Sea is 371 km and its principal tributaries joining from left are the Wakal, the Hathmati and the Vatrak whereas the Sei joins the river from right.

The major part of basin is covered with agriculture accounting to 74.68% of the total area. 4.19% of the total basin area is covered by water bodies. The basin spreads over 15 parliamentary constituencies (2009) comprising 13 of Gujarat and 2 of Rajasthan.

River Flow Line Diagram



Salient Features of Sabarmati Basin

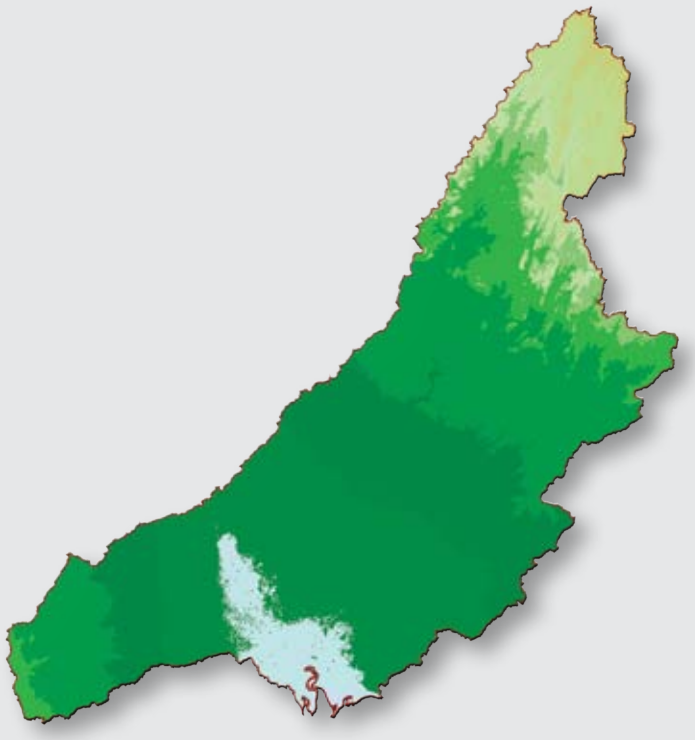
Basin Extent	Longitude	70° 58’ to 73° 51’ E
	Latitude	22° 15’ to 24° 47’ N
Length of Sabarmati River (Km)		371
Catchment Area (Sq.km.)		21674
Average Water Resource Potential (MCM)		3810
Utilizable Surface Water Resource (MCM)		1900
Live Storage Capacity of Completed Projects (MCM)		1306.77
Live Storage Capacity of Projects Under Construction (MCM)		60.77
Total Live Storage Capacity of Projects (MCM)		1367.54
No. of Hydrological Observation Stations		13
No. of Flood Forecasting Stations		2

Major Water Resources Projects of Sabarmati Basin

Name of Project	Associated Structures	Type	Status	Culturable Command Area (Th ha)	Ultimate Irrigation Potential (Th ha)
Sabarmati Irr. Project (GJ)	Dharoi Dam	Major	Completed	57.99	64.75
Guhai Irr. Project (GJ)	Guhai Dam	Medium	Completed	9.84	8.32
Hatmati Irr. Project (GJ)	Hatmati Dam, Hatmati Weir	Major	Completed	17.49	17.49
Watrak Irr. Project (GJ)	Watrak Dam	Major	Completed	18.34	16.87
Mazam Irr. Project (GJ)	Mazam Dam	Medium	Completed	4.72	5.22
Moti Fatewadi (GJ)	Wasna Barrage	Major	Completed	95.88	34.67
Kharicut Canal Project (GJ)	Raipur Weir	Major	Completed	14.61	12.80
Meshwo Irr. Project (GJ)	Meshwo Dam	Major	Completed	7.98	9.97

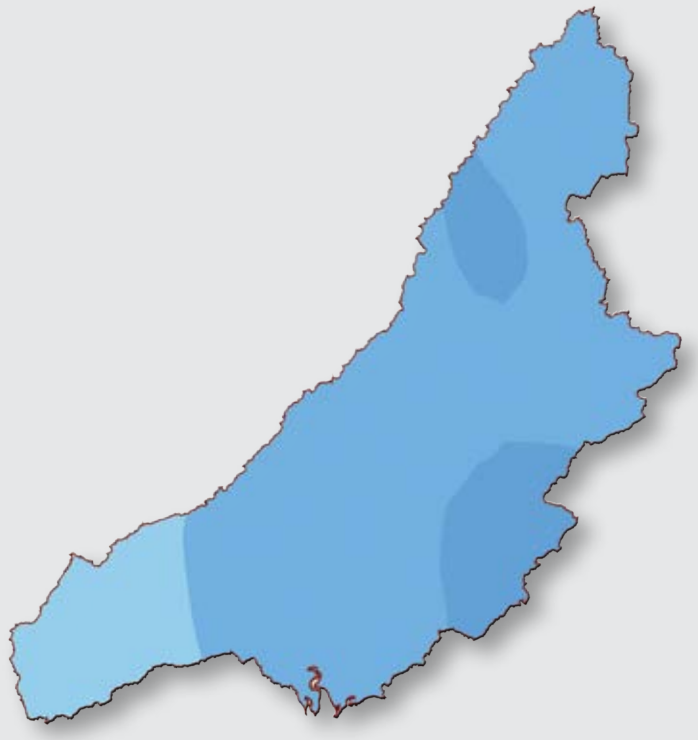
*Th. ha = Thousand Hectare, MW = Mega Watt, MCM = Million Cubic Meter

Elevation Zone Map



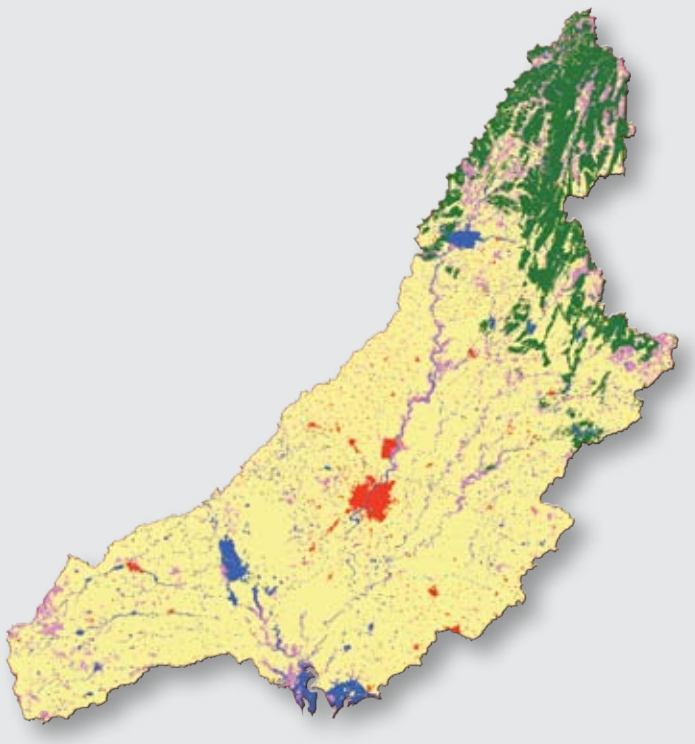
Symbol	Elevation (m)	Area (Sq. km)	% of Total Area
	< 5	184.20	0.85
	5-10	1113.85	5.14
	10-50	5554.80	25.62
	50-100	4303.09	19.85
	100-200	5345.61	24.66
	200-300	2063.20	9.52
	300-400	883.49	4.08
	400-500	612.57	2.83
	500-750	1206.61	5.57
	750-1000	396.40	1.83
	1000-1500	10.18	0.05

Average Annual Rainfall (1971-2005)



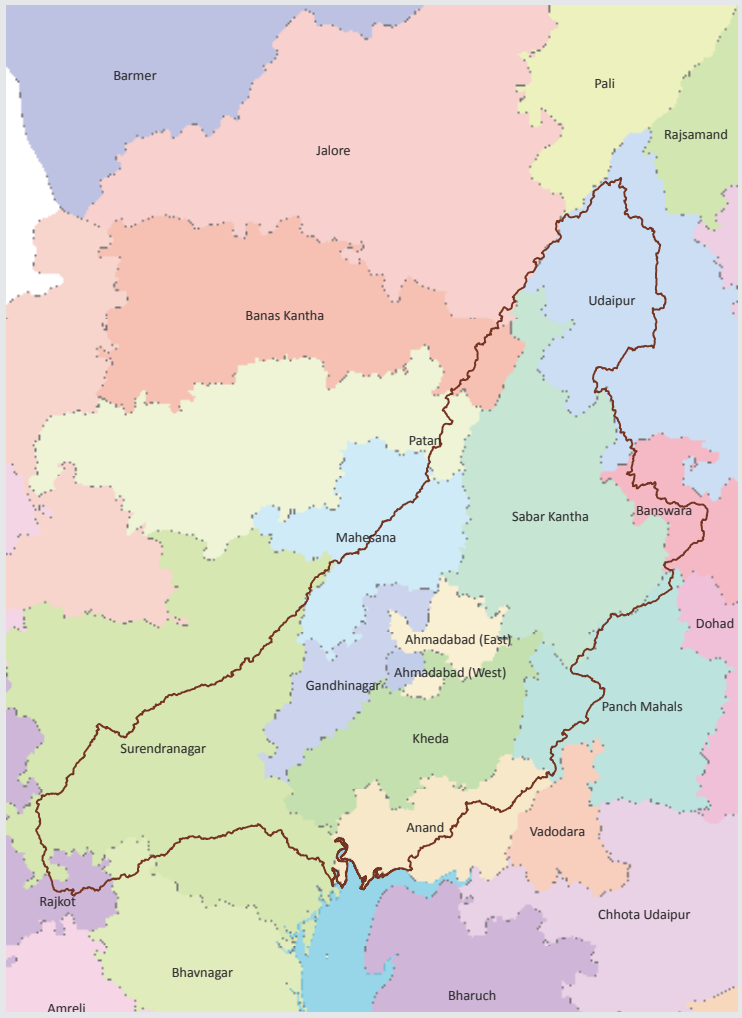
Symbol	Rainfall (mm)	Area (Sq. km)	% of Total Area
	400-600	2856.65	13.18
	600-800	15732.67	72.59
	800-1000	3084.68	14.23

Land Use / Land Cover (2005-06)

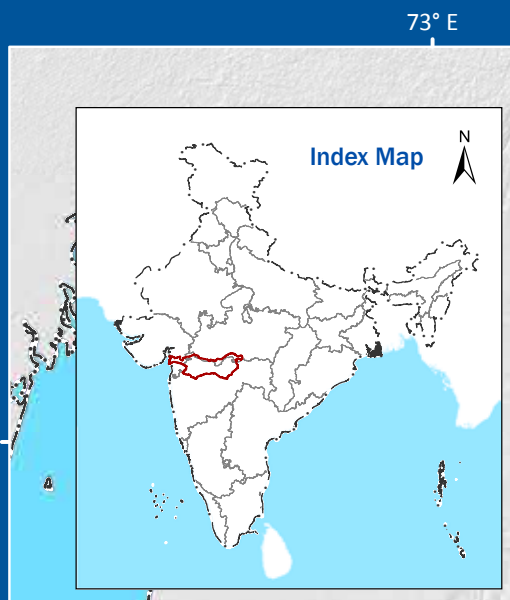


Symbol	Category	Area (Sq. km)	% of Total Area
	Built Up Land	423.14	1.95
	Agricultural	16186.38	74.68
	Forest	2595.69	11.98
	Grassland	10.72	0.05
	Wasteland	1549.13	7.15
	Waterbodies	908.94	4.19

Parliamentary Constituencies (2009)



TAPI BASIN



73° E
74° E
75° E
22° N
21° N
20° N

Vadodara
Wand Khadi
Kim
Kim
Ghanta
Motinaroli
Ver
Ghala
Anjana
Nehru Bridge
Topi
Surat
Kakrapar Barrage
Ukai
Gomai
Ambad
Arunavati
Pori
Chul
Sarangkheda
Shivan
Amravati
Gidhade
Aner
Topi
Buray
Rangavali
Pan
Savkheda
Kan
Panjhra
Panjhra
Dhule
Morane
Anjani
Karanjadi
Mosam
Bori
Suple
Punad
Dhardar
Sule Pick Up Weir
Girna
Girna
Chankapur
Kolthi
Parsul
Girna
Tittur
Panjhan
Sukhi
Manyad
Dungari
GUJARAT
Gulf of Khambhat
Daman
Silvassa

Legend

- Major City
- State Capital
- Dam / Barrage / Weir
- River
- Reservoir
- Basin Boundary
- State Boundary
- International Boundary

Major CWC Sites

- Flood Forecasting Station
- Gauge Station
- Gauge, Discharge Station
- Gauge, Discharge, Sediment Station
- Gauge, Discharge, Water Quality Station
- Gauge, Discharge, Sediment, Water Quality Station

CWC Office

- Divisional Office

Elevation

High
Low

76° E

77° E

78° E

22° N

21° N

20° N

Indore

MADHYA PRADESH

Dathrang

Balki

Teska

Tapi

Dedtalai

Kaner

Aner

Gul

Bhaunak

Suki

Mor

Bokad

Tapi

Burhanpur

Sapan

Purna

Wan

Bhusawal

Hatnur

Jalgaon

Purna

Wan

Bhuleshwar

Chandrabhaga

Pedhi

Girna

Waghur

Waghur

Jigaon

Yerli

Gopalkheda

Purna

Amravati

Jigaon Weir

Kag

Wagar

Nalganga

Biswa

Man

Kat e Purna

Uma

Lakhpuri

Ronad

Kalki

Nalganga

Gyanganga

Katepurna

Man

Utavali

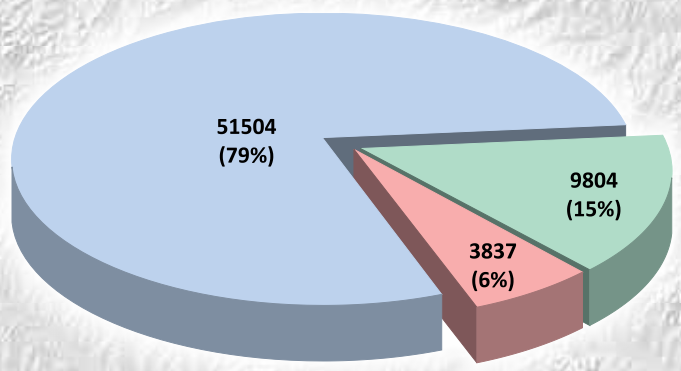
Nirguna

Murna

MAHARASHTRA

Aurangabad

State Wise Basin Area (Sq.km.)



Maharashtra Madhya Pradesh Gujarat

0 25 50 Km

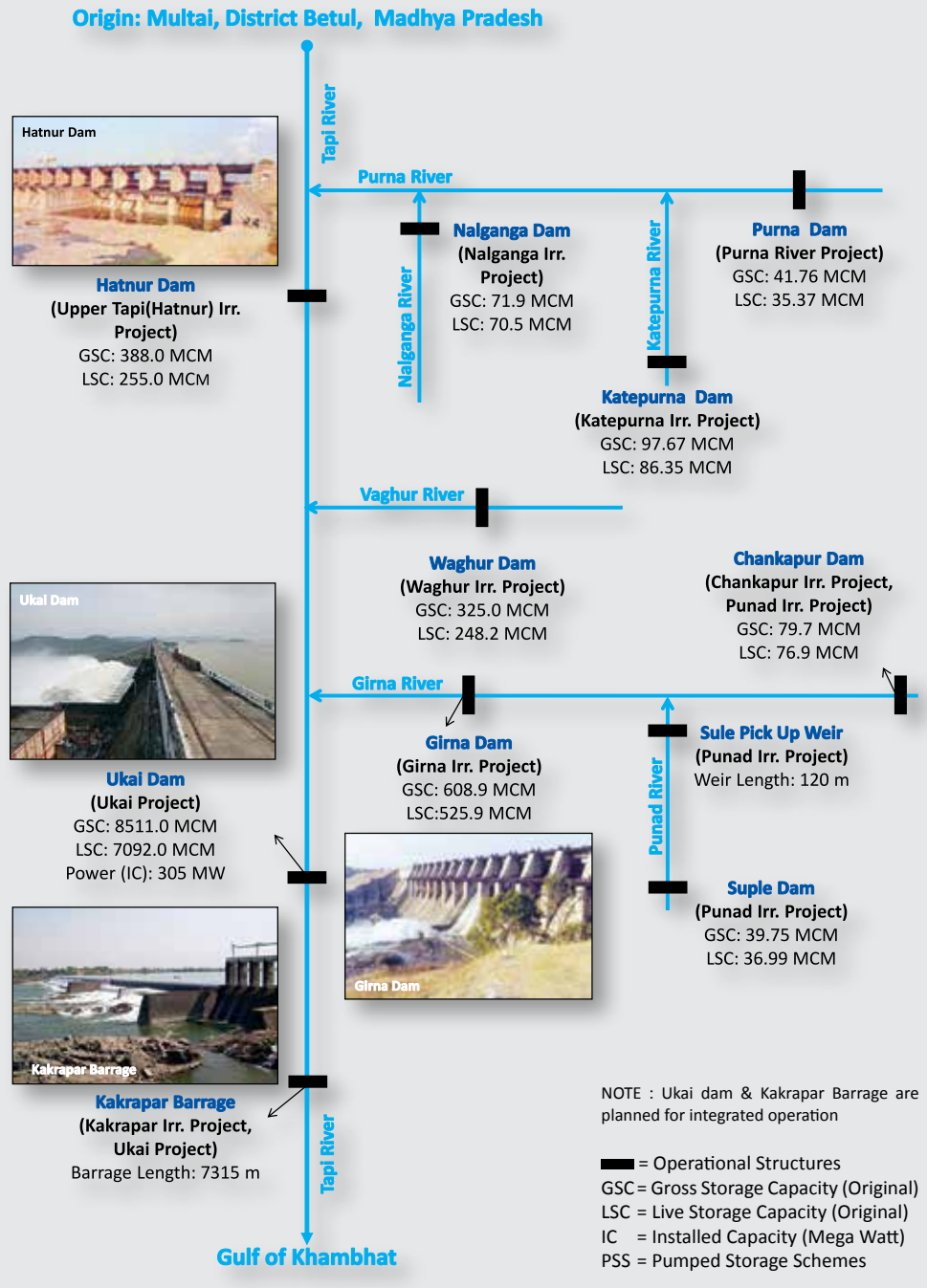
International / State boundaries & Coastal Line are as per Survey of India

The basin extends over states of Madhya Pradesh, Maharashtra and Gujarat having an area of 65,145 Sq.km with a maximum length and width of 534 & 196 km. It lies between 72°33' to 78°17' east longitudes and 20°9' to 21°50' north latitudes. Situated in the Deccan plateau, the basin is bounded by the Satpura range on the north, by the Mahadev hills on the east, by the Ajanta Range and the Satmala hills on the south and by the Arabian Sea on the west. The hilly region of the basin is well forested while the plains are broad and fertile areas suitable for cultivation.

The Tapi is the second largest westward draining river of the Peninsula. It originates near Multai reserve forest in Betul district of Madhya Pradesh at an elevation of 752 m. The total length of the river from origin to outfall into the Arabian Sea is 724 km and its important tributaries are the Suki, the Gomai, the Arunavati and the Aner which joins it from right, and those joining from left are the Vaghur, the Amravati, the Buray, the Panjhra, the Bori, the Girna, the Purna, the Mona and the Sipna.

The major part of basin is covered with agriculture accounting to 66.19% of the total area. 2.99% of the basin is covered by water bodies. The basin spreads over 18 parliamentary constituencies (2009) comprising 12 of Maharashtra, 3 of Gujarat and 3 of Madhya Pradesh.

River Flow Line Diagram



NOTE : Ukai dam & Kakrapar Barrage are planned for integrated operation

■ = Operational Structures
GSC = Gross Storage Capacity (Original)
LSC = Live Storage Capacity (Original)
IC = Installed Capacity (Mega Watt)
PSS = Pumped Storage Schemes

Salient Features of Tapi Basin

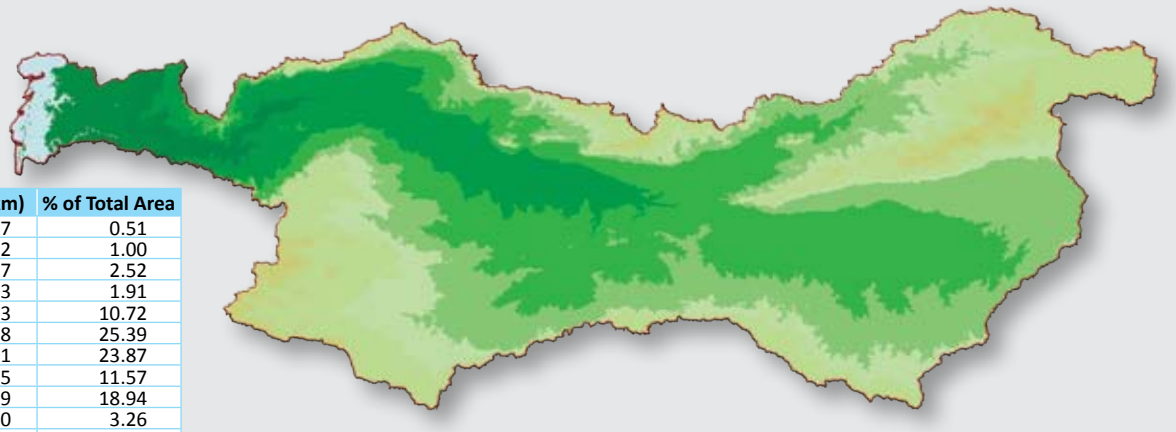
Basin Extent	Longitude	72° 33' to 78° 17' E
	Latitude	20° 9' to 21° 50' N
Length of Tapi River (Km)		724
Catchment Area (Sq.km.)		65145
Average Water Resource Potential (MCM)		14880
Utilizable Surface Water Resource (MCM)		14500
Live Storage Capacity of Completed Projects (MCM)		9408.37
Live Storage Capacity of Projects Under Construction (MCM)		847.42
Total Live Storage Capacity of Projects (MCM)		10255.79
No. of Hydrological Observation Stations		18
No. of Flood Forecasting Stations		3

Major Water Resources Projects of Tapi Basin

Name of Project	Associated Structures	Type	Status	Culturable Command Area (Th ha)	Ultimate Irrigation Potential (Th ha)	Power (MW)
Purna River Project (MS)	Purna Dam	Medium	Completed	7.84	7.53	
Katepurna Irr. Project (MS)	Katepurna Dam	Medium	Completed	11.19	8.32	
Nalganga Irr. Project (MS)	Nalganga Dam	Medium	Completed	15.64	8.74	
Upper Tapi Irr. Project (MS)	Hatnur Dam	Major	Completed	50.45	37.84	
Waghur Irr. Project (MS)	Waghur Dam	Major	Ongoing	29.74	23.58	
Punand Irr. Project (MS)	Chankapur Dam, Suple Dam, Sule Pick Up Weir	Major	Ongoing	17.84	10.84	
Chankapur Irr. Project (MS)	Chankapur Dam	Major	Completed	16.04	6.42	
Girna Irr. Project (MS)	Girna Dam	Major	Completed	79.28	57.21	
Ukai Irr. Project (GJ)	Ukai Dam, Kakrapar Barrage	Major	Completed	127.47	353.77	305
Kakrapar Irr. Project (GJ)	Kakrapar Barrage	Major	Completed	204.08		

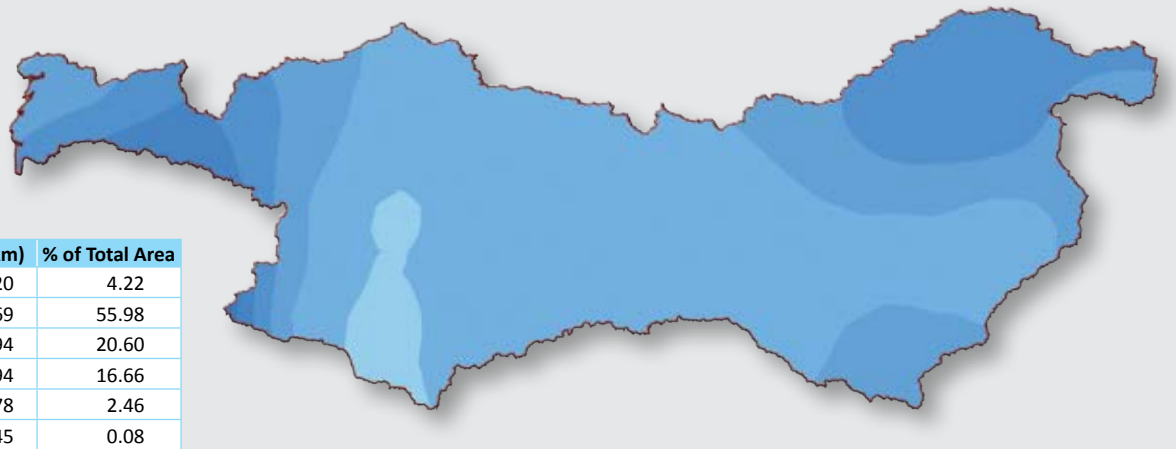
*Th. ha = Thousand Hectare, MW = Mega Watt, MCM = Million Cubic Meter

Elevation Zone Map



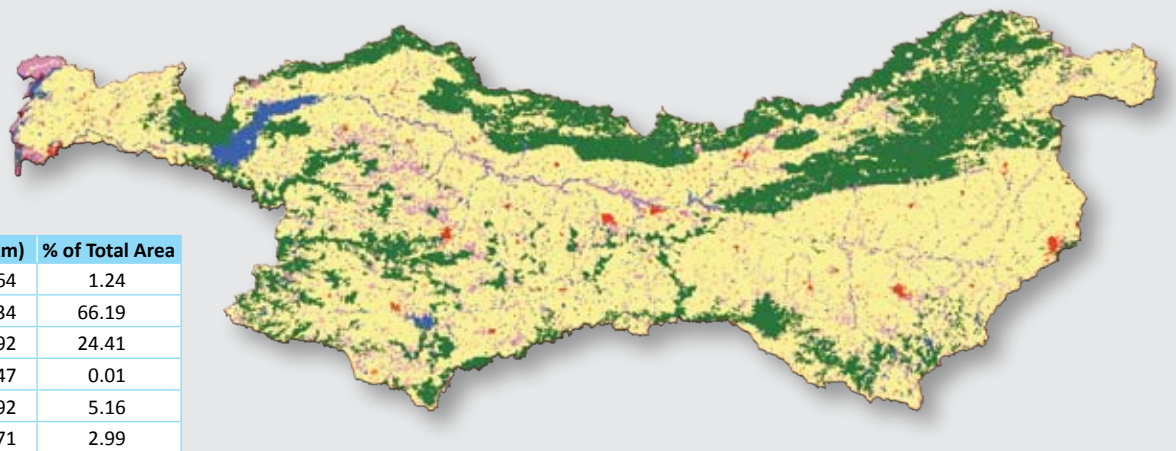
Symbol	Elevation (m)	Area (Sq. km)	% of Total Area
	< 5	333.67	0.51
	5-10	651.42	1.00
	10-50	1640.17	2.52
	50-100	1244.03	1.91
	100-200	6981.73	10.72
	200-300	16540.58	25.39
	300-400	15549.11	23.87
	400-500	7536.85	11.57
	500-750	12339.79	18.94
	750-1000	2123.10	3.26
	1000-1500	204.55	0.31

Average Annual Rainfall (1971-2005)



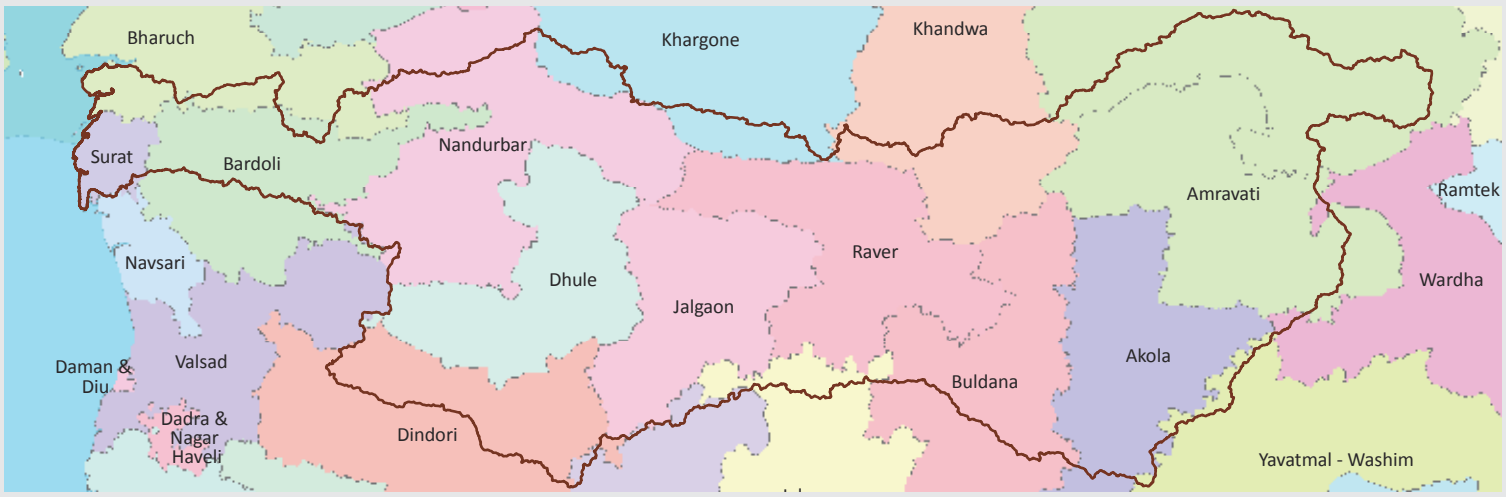
Symbol	Rainfall (mm)	Area (Sq. km)	% of Total Area
	400-600	2752.20	4.22
	600-800	36466.69	55.98
	800-1000	13420.94	20.60
	1000-1200	10850.94	16.66
	1200-1400	1604.78	2.46
	1400-1600	49.45	0.08

Land Use / Land Cover (2005-06)

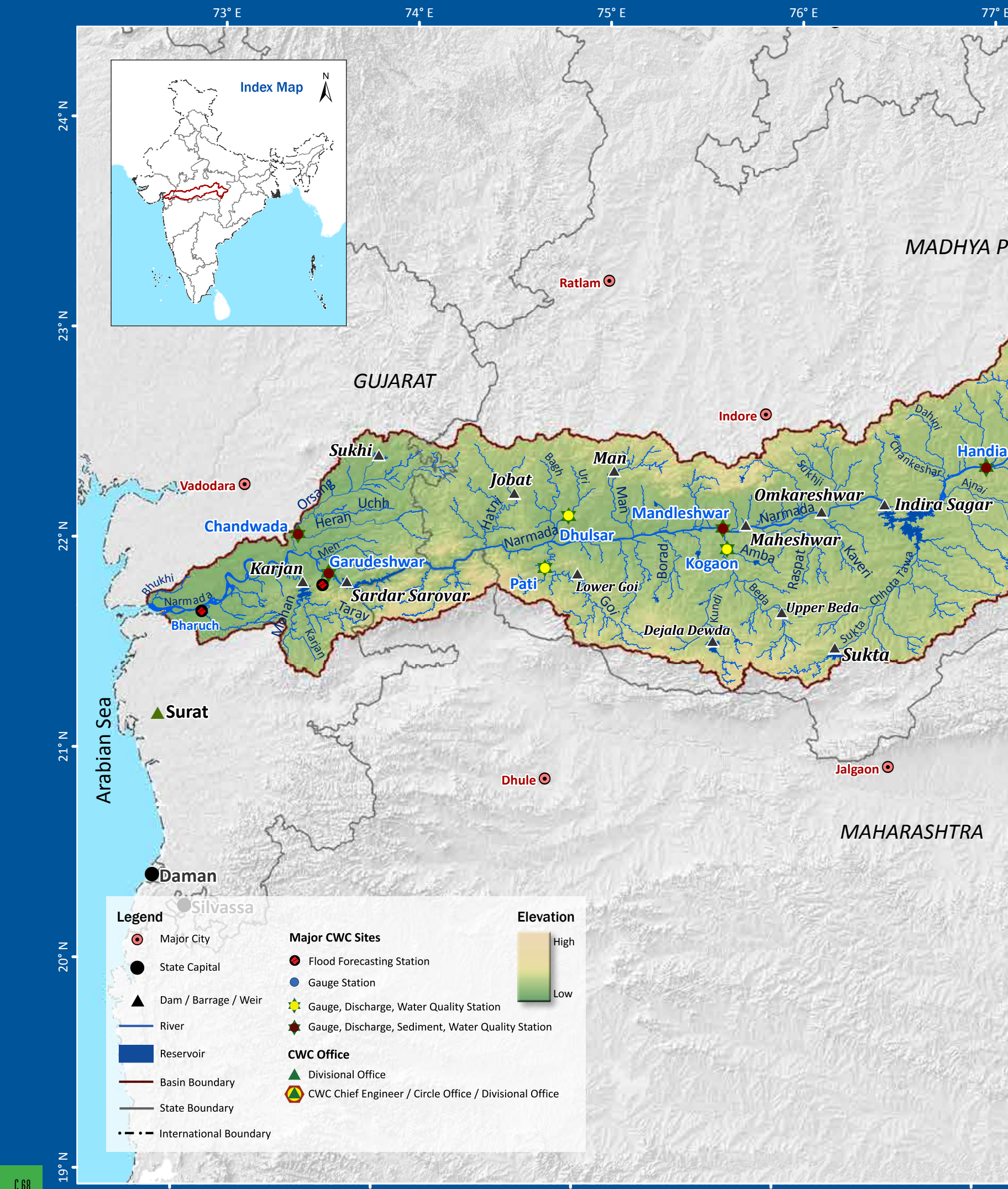


Symbol	Category	Area (Sq. km)	% of Total Area
	Built Up Land	818.64	1.24
	Agricultural	43117.34	66.19
	Forest	15899.92	24.41
	Grassland	1.47	0.01
	Wasteland	3362.92	5.16
	Waterbodies	1944.71	2.99

Parliamentary Constituencies (2009)



NARMADA BASIN



78° E
79° E
80° E
81° E
24° N
23° N
22° N
21° N
20° N
N
W
E
S
Sagar
RADESH
Bhopal
Kolar
Kolar Barrage
Barna
Sandia
Barmanghat
Tendoni
Shahdol
Hiran
Patan
Belkund
Labhera
Narmada
Belkhedi
Bargi
Dindori
Upper Narmada U/C
Mohgaon
Manot
Mandla
Matiyari
Burhner
Halon
Halon U/C
Bamni Banjar
Banjar
Mukki
Hoshangabad
Tawa
Gadarwara
Dudhi
Shakkar
Shet
Kolar
Ganjal
Chhidgaon
Denwa
Machha
Ta wa
Satpura
Balaghat
Raipur
Nagpur
Amravati
CHHATTISGARH
State Wise Basin Area (Sq.km.)
85172
(86.2%)
11399
(11.54%)
687
(0.7%)
1538
(1.56%)
Madhya Pradesh
Maharashtra
Gujarat
Chhattisgarh
0
50
100
Km
International / State boundaries & Coastal Line are as per Survey of India
78° E
79° E
80° E
81° E
C.69

Narmada basin extends over states of Madhya Pradesh, Gujarat, Maharashtra and Chhattisgarh having an area of 98,796 Sq.km which is nearly 3% of the total geographical area of the country with maximum length and width of 923 & 161 km. It lies between 72°38' to 81°43' east longitudes and 21°27' to 23°37' north latitudes. It is bounded by the Vindhyas on the north, by the Maikala range on the east, by the Satpuras on the south and by the Arabian Sea on the west. The hilly regions are in the upper part of the basin, and lower middle reaches are broad and fertile areas well suited for cultivation.

Narmada is the largest west flowing river of the peninsular India. It rises from Maikala range near Amarkantak in Anuppur district of Madhya Pradesh, at an elevation of about 900 m. The total length of the river is 1,312 km and its important tributaries are the Burhner, the Banjar, the Sher, the Shakkar, the Dudhi, the Tawa , the Ganjal, the Kundi, the Goi and the Karjan which joins from left whereas the Hiran, the Tendoni, the Barna, the Kolar, the Man, the Uri, the Hatni and the Orsang joins from right. Narmada drains into the Arabian Sea through the Gulf of Khambhat.

The major part of basin is covered with agriculture accounting to 56.90%. Water bodies cover 2.95% of the total basin area. The basin spreads over 20 parliamentary constituencies (2009) comprising 15 of Madhya Pradesh, 3 of Gujarat, and 1 each of Chhattisgarh and Maharashtra.

The Narmada water Disputes Tribunal has allocated the Narmada water amongst the States as below:

Madhya Pradesh
18.25 Million Acre Feet
Gujarat
9.0 Million Acre Feet
Rajasthan
0.5 Million Acre Feet
Maharashtra
0.25 Million Acre Feet

Total 28.0 Million Acre Feet

Salient Features of Narmada Basin

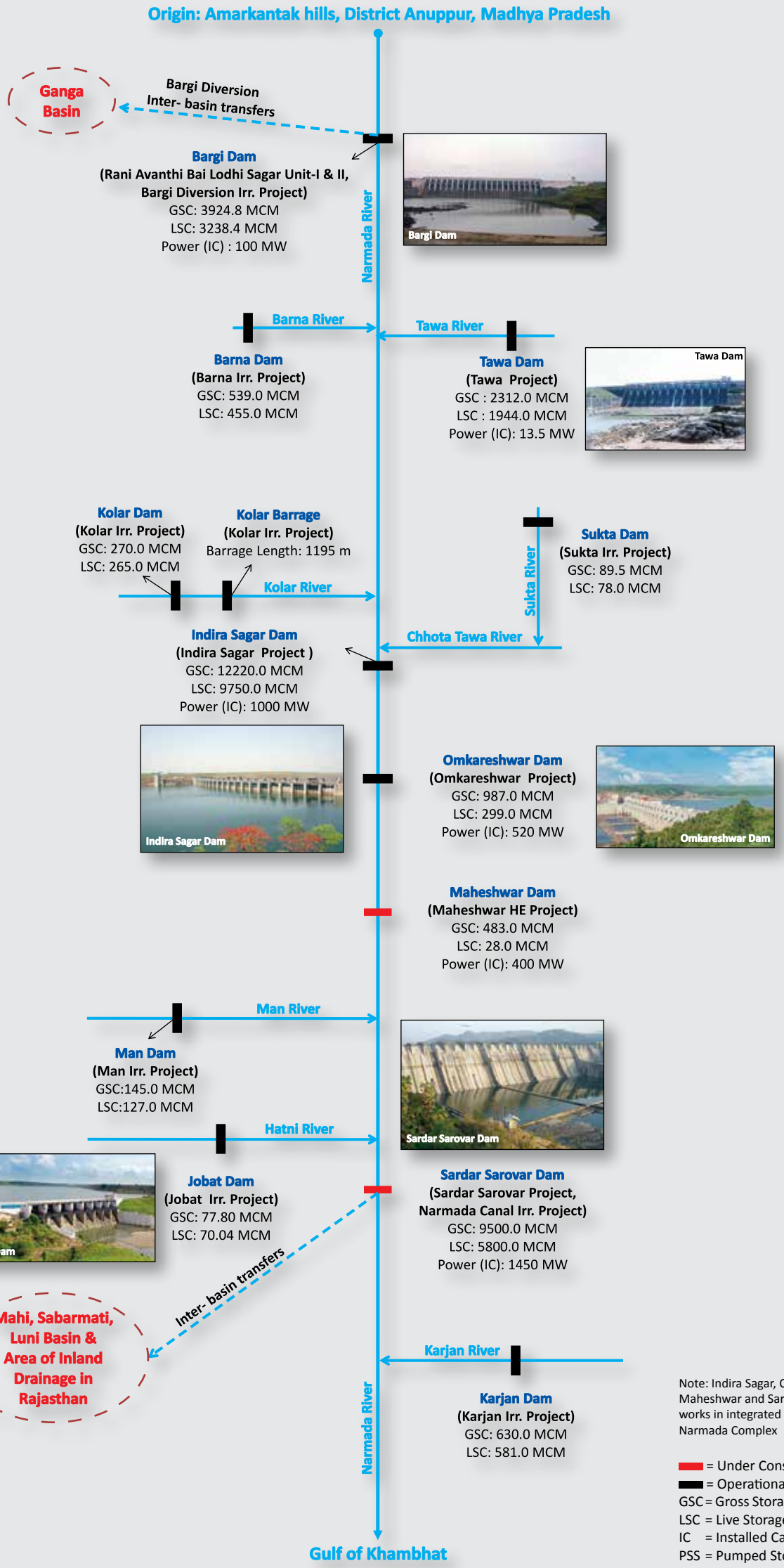
Basin Extent	Longitude	72° 38' to 81° 43' E
	Latitude	21° 27' to 23° 37' N
Length of Narmada River (Km)		1312
Catchment Area (Sq.km.)		98796
Average Water Resource Potential (MCM)		45639
Utilizable Surface Water Resource (MCM)		34500
Live Storage Capacity of Completed Projects (MCM)		16979.50
Live Storage Capacity of Projects Under Construction (MCM)		6625.10
Total Live Storage Capacity of Projects (MCM)		23604.60
No. of Hydrological Observation Stations		25
No. of Flood Forecasting Stations		4

Major Water Resources Projects of Narmada Basin

Name of Project	Associated Structures	Type	Status	Culturable Command Area (Th ha)	Ultimate Irrigation Potential (Th ha)	Power (MW)
Rani Avanthi Bai Lodhi Sagar Unit-I & II (MP)	Bargi Dam	Major	Ongoing	157.00	219.80	90+10
Bargi Diversion (MP)	Bargi Dam	Major	Ongoing	245.00	377.00	
Barna Irr. Project (MP)	Barna Dam	Major	Completed	57.90	62.00	
Tawa Irr. Project (MP)	Tawa Dam	Major	Completed	247	333	13.5
Kolar Irr. Project (MP)	Kolar Dam, Kolar Barrage	Major	Completed	45.1	60.9	
Sukta Irr. Project (MP)	Sukta Dam	Major	Completed	17.6	18.6	
Indira Sagar Project (MP)	Indira Sagar Dam	Major	Ongoing	123	169	1000 + 15
Omkareshwar Project (MP)	Omkareshwar Dam	Major	Ongoing	147	283	520
Man Irr. Project (MP)	Man Dam	Major	Ongoing	15	19.2	
Jobat Irr. Project (MP)	Jobat Dam	Major	Ongoing	9.85	12.5	
Sardar Sarovar Project	Sardar Sarovar Dam	Major	Ongoing	2120 (GJ)	1792(GJ)	1450 (MH, MP, GJ)
Narmada Canal Irr. Project (RJ)	Sardar Sarovar Dam	Major	Ongoing	246	151	
Karjan Irr. Project (GJ)	Karjan Dam	Major	Completed	51	70.3	

*Th. ha = Thousand Hectare, MW = Mega Watt, MCM = Million Cubic Meter

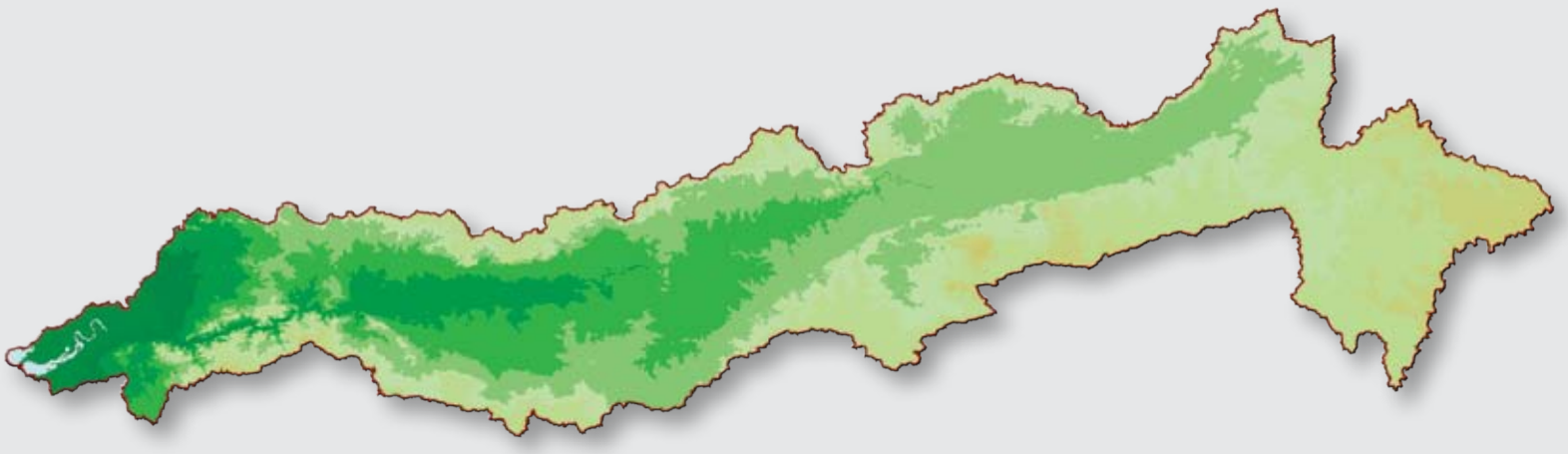
River Flow Line Diagram



Note: Indira Sagar, Omkareshwar, Maheshwar and Sardar Sarovar Projects works in integrated manner & forms Narmada Complex

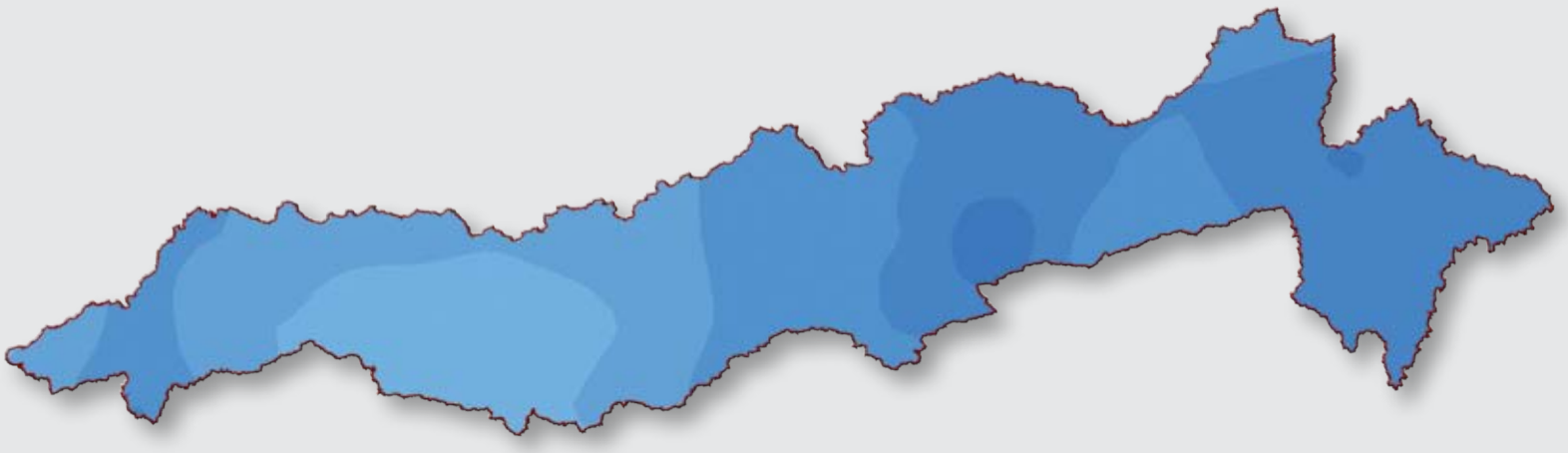
= Under Construction Structures
= Operational Structures
GSC = Gross Storage Capacity (Original)
LSC = Live Storage Capacity (Original)
IC = Installed Capacity (Mega Watt)
PSS = Pumped Storage Schemes

Elevation Zone Map



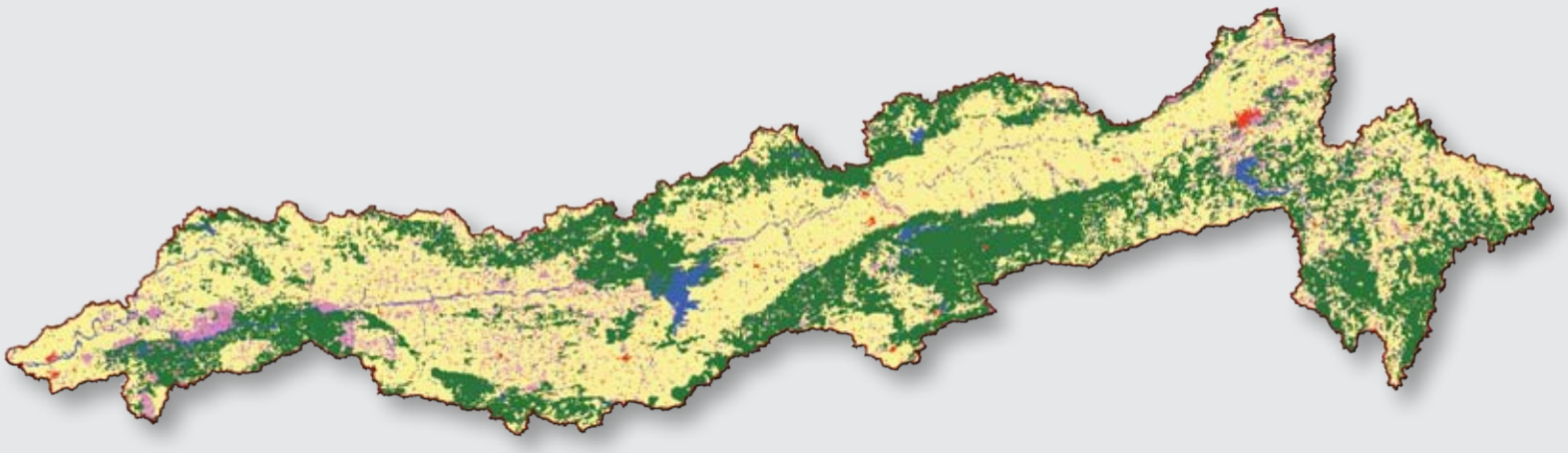
Symbol	Elevation (m)	Area (Sq. km)	% of Total Area
	< 5	102.28	0.10
	5-10	275.65	0.28
	10-50	2157.65	2.18
	50-100	1641.89	1.66
	100-200	6277.07	6.35
	200-300	16606.80	16.81
	300-400	27421.75	27.76
	400-500	15595.16	15.79
	500-750	22850.90	23.13
	750-1000	5499.81	5.57
	1000-1500	367.04	0.37

Average Annual Rainfall (1971-2005)



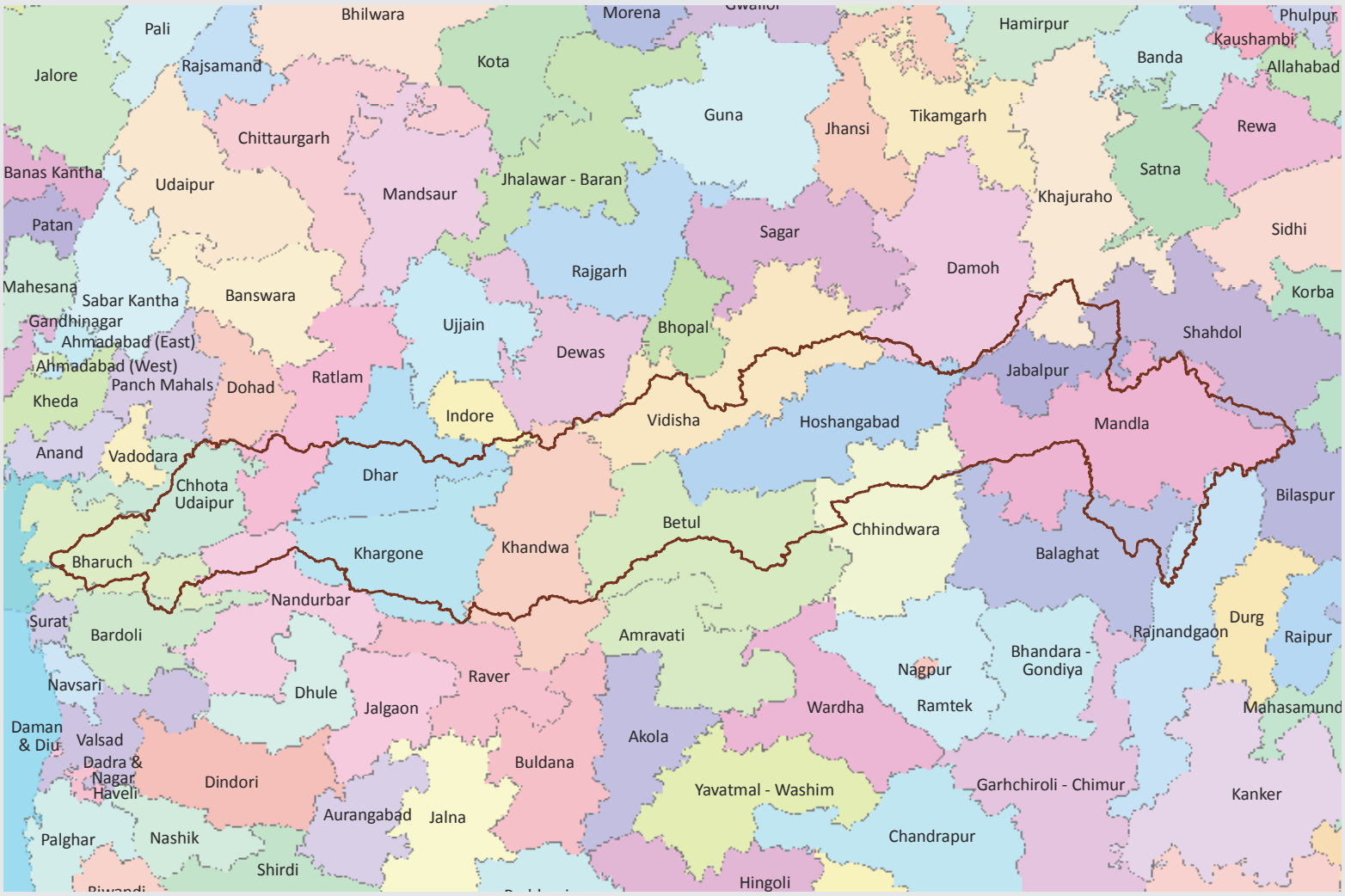
Symbol	Rainfall (mm)	Area (Sq. km)	% of Total Area
	600-800	14714.08	14.89
	800-1000	21897.29	22.16
	1000-1200	25993.40	26.31
	1200-1400	33732.03	34.15
	1400-1600	2459.20	2.49

Land Use / Land Cover (2005-06)

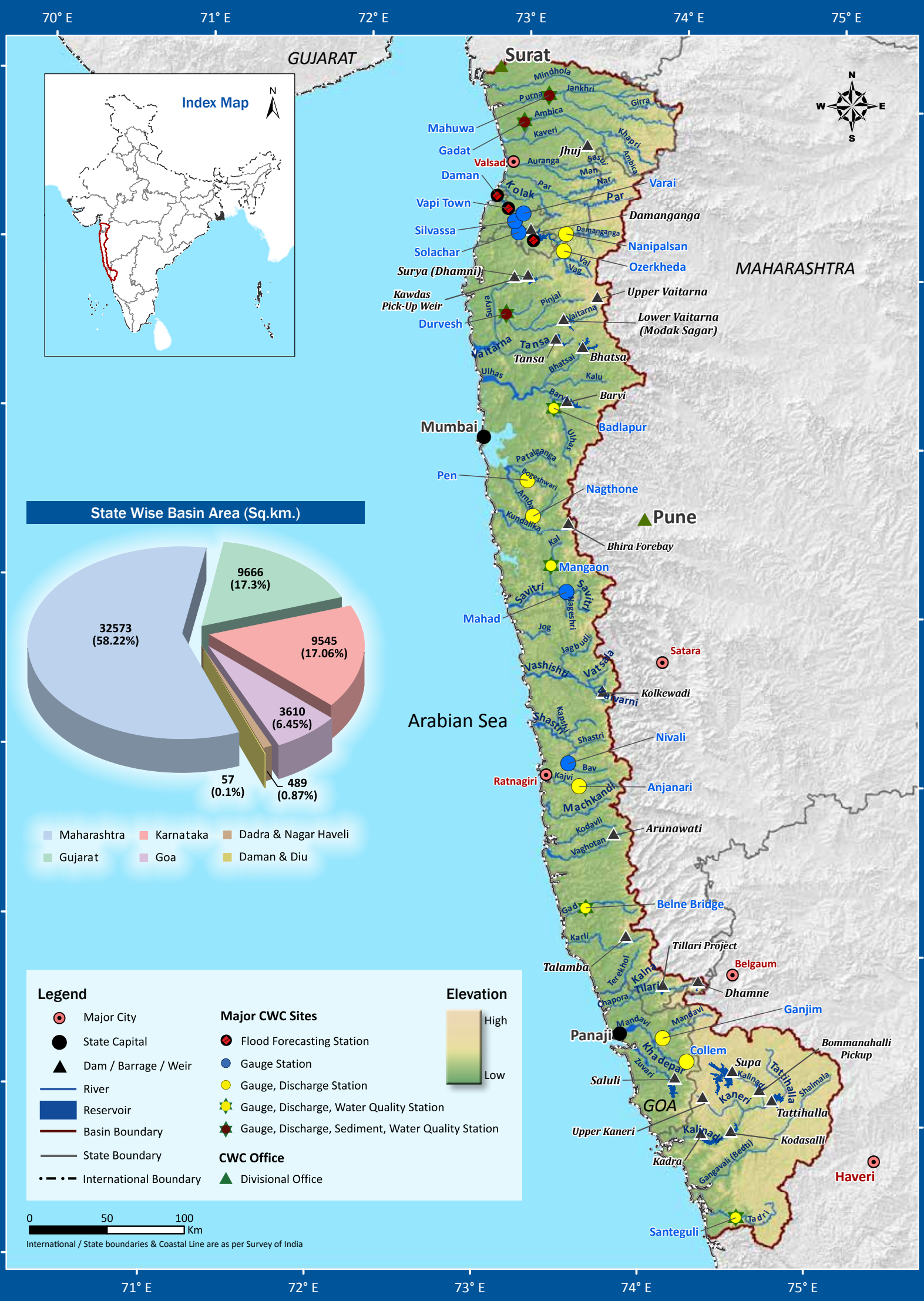


Symbol	Category	Area (Sq. km)	% of Total Area
	Built Up Land	1114.36	1.13
	Agricultural	56243.09	56.90
	Forest	32483.29	32.88
	Grassland	2.20	0.01
	Wasteland	6033.74	6.13
	Waterbodies	2919.32	2.95

Parliamentary Constituencies (2009)



WEST FLOWING RIVERS FROM TAPI TO TADRI

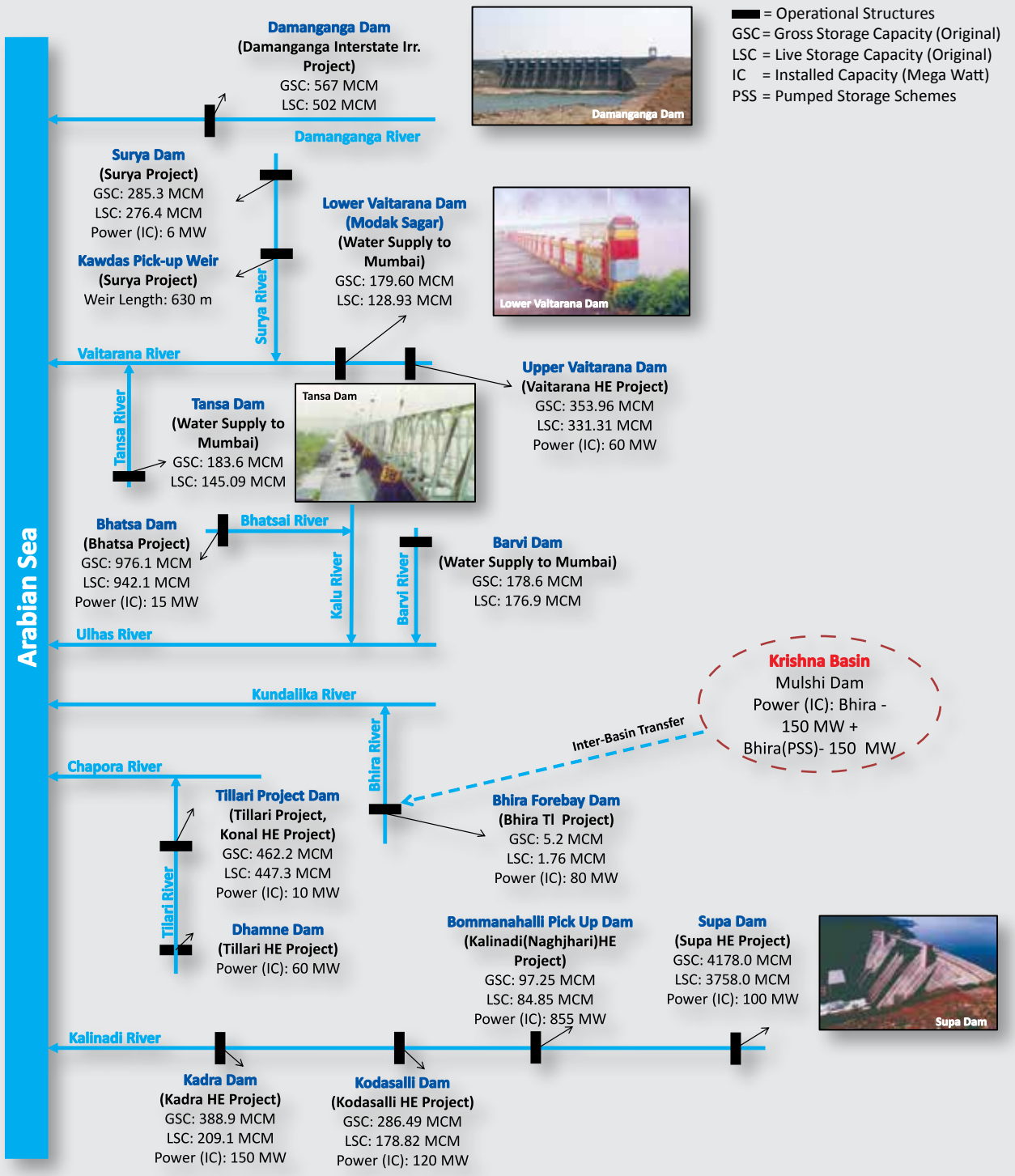


The basin covers parts of Maharashtra, Gujarat, Karnataka, Goa and Union Territory of Dadra & Nagar Haveli and Daman & Diu having an area of 55,940 Sq.km with maximum length and width of 796 km and 137 km. It spreads between 72°33' to 75°14' east longitudes and 14°17' to 21°13' north latitudes. The basin is bounded by Gujarat plains on the north, by Western Ghats on north-east and east, and by Arabian Sea in the west and south.

The various rivers in the basin does not meet into one forming a major stream, rather they flow independently and drains directly into the Arabian Sea. The independent rivers in the basin are the Purna, the Ambika, the Damanganga, the Vaitarna, the Ulhas, the Amba, the Savitri, the Vashishti, the Kajvi, the Vaghotan, the Gad, the Mandavi, the Kalinadi, the Gangavali (Bedti) and the Tadri.

The major part of basin is covered with agriculture accounting to 43.95% of the total area while 4.70% of the basin area is covered by water bodies. The basin spreads over 25 parliamentary constituencies (2009) comprising 15 of Maharashtra, 4 of Gujarat, 2 of Karnataka, 2 of Goa, 1 of Daman & Diu and 1 of Dadra & Nagar Haveli.

River Flow Line Diagram



Salient Features of West flowing rivers from Tapi to Tadri

Basin Extent	Longitude	72° 33′ to 75° 14′ E
	Latitude	14° 17′ to 21° 13′ N
Length of River (Km)		Many Independent rivers flowing
Basin Area (Sq.km.)		55940
Average Water Resource Potential (MCM)		87411
Utilizable Surface Water Resource (MCM)		11900
Live Storage Capacity of Completed Projects (MCM)		11268.03
Live Storage Capacity of Projects Under Construction (MCM)		3464.38
Total Live Storage Capacity of Projects (MCM)		14732.41
No. of Hydrological Observation Stations		22
No. of Flood Forecasting Stations		3

Elevation Zone Map

Symbol	Elevation (m)	Area (Sq. km)	% of Total Area
	< 5	3052.93	5.46
	5-10	1524.37	2.73
	10-50	10420.92	18.63
	50-100	9016.30	16.12
	100-200	10792.92	19.29
	200-300	5074.43	9.07
	300-400	3043.27	5.44
	400-500	3418.74	6.11
	500-750	8783.33	15.70
	750-1000	772.83	1.38
	1000-1500	39.96	0.07

Average Annual Rainfall (1971-2005)

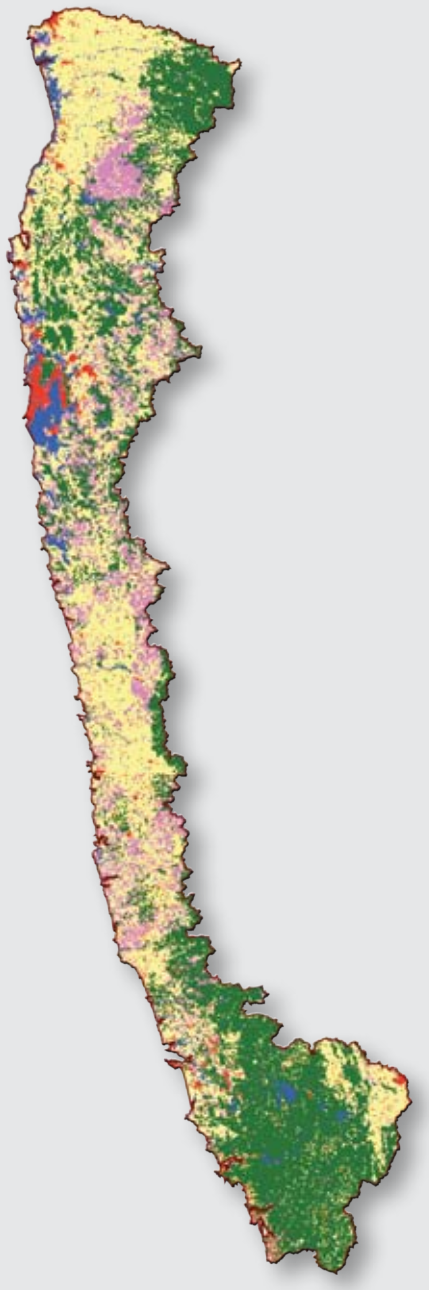
Symbol	Rainfall (mm)	Area (Sq. km)	% of Total Area
	800-1000	299.01	0.53
	1000-1200	1105.74	1.98
	1200-1400	2217.64	3.96
	1400-1600	3049.09	5.45
	1600-2000	6657.18	11.90
	2000-2500	17433.08	31.16
	2500-3000	12403.89	22.17
	3000-4000	12215.06	21.85
	4000-5000	559.31	1.00

Major Water Resources Projects of West flowing rivers from Tapi to Tadri

Name of Project	Associated Structures	Type	Status	Culturable Command Area (Th ha)	Ultimate Irrigation Potential (Th ha)	Power (MW)
Damanganga Irr. Project (GJ,DND, DD)	Damanganga Dam	Major	Completed	51.14	51.65	
Surya Project (MH)	Surya Dam, Kawdas Pick-up Weir	Major	Completed	14.60	27.19	6
Bhatsa Project (MH)	Bhatsa Dam	Major	Ongoing	53.19	42.55	15
Tillari Project (GA, MH)	Tillari Project Dam	Major	Ongoing	23.65	34.29	10
Tillari HE Project (MH)	Dhamne Dam	Major	Completed	-	-	60
Kalinadi HE Complex (KA)	Upper Kaneri, Supa, Tattihalla, Bommanahalli, Kodasilli, Kadra	Major	Completed	-	-	1225

*Th. ha = Thousand Hectare, MW = Mega Watt, MCM = Million Cubic Meter

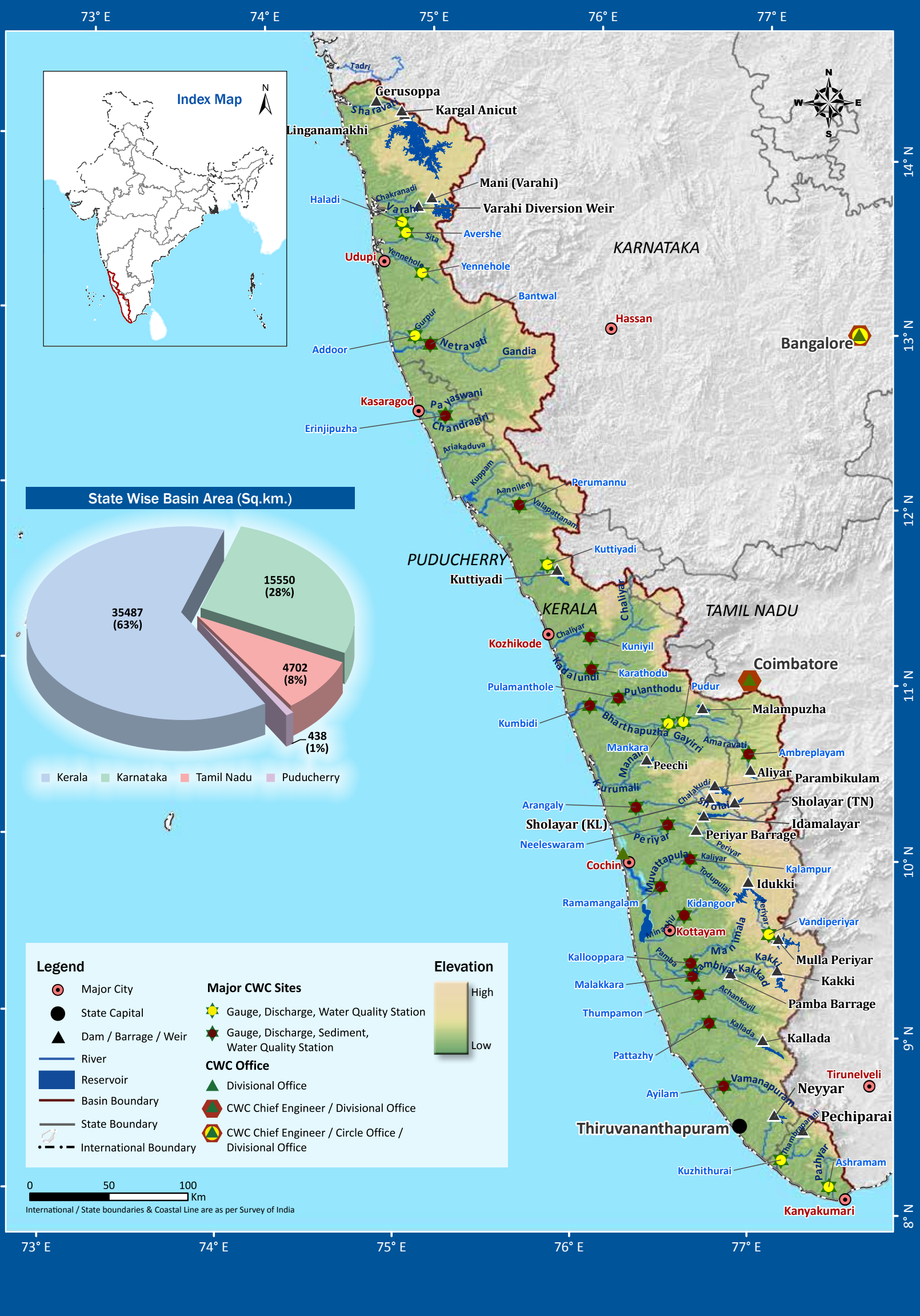
Land Use / Land Cover (2005-06)



Symbol	Category	Area (Sq. km)	% of Total Area
	Built Up Land	1810.16	3.24
	Agricultural	24586.54	43.95
	Forest	19663.25	35.15
	Grassland	42.72	0.08
	Wasteland	7206.56	12.88
	Waterbodies	2630.77	4.70

Parliamentary Constituencies (2009)

WEST FLOWING RIVERS FROM TADRI TO KANYAKUMARI



State Wise Basin Area (Sq.km.)

Legend

- Major City
- State Capital
- Dam / Barrage / Weir
- River
- Reservoir
- Basin Boundary
- State Boundary
- International Boundary

Major CWC Sites

- Gauge, Discharge, Water Quality Station
- Gauge, Discharge, Sediment, Water Quality Station

CWC Office

- Divisional Office
- CWC Chief Engineer / Divisional Office
- CWC Chief Engineer / Circle Office / Divisional Office

Elevation

High

Low

0 50 100 Km

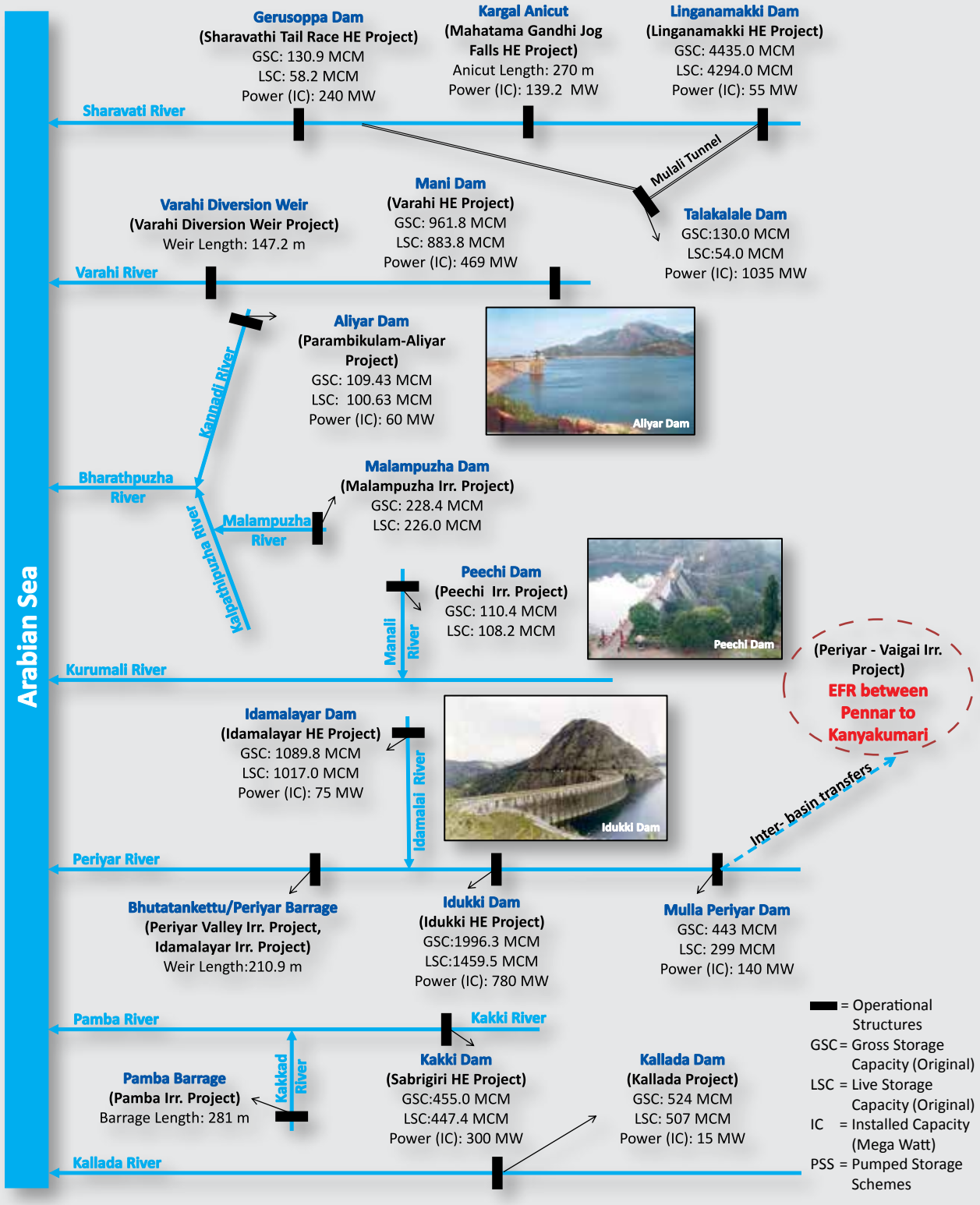
International / State boundaries & Coastal Line are as per Survey of India

The basin extends over states of Kerala, Karnataka, Tamil Nadu and Union Territory of Puducherry having an area of 56,177 Sq.km which is 1.73 % of total geographical area of the country with a maximum length and width of 777 km and 135 km. It spreads between 74°25' to 77°36' east longitudes and 8°3' to 14°24' north latitudes. The basin is bounded by Sahyadri hills on the north, by the Western Ghats on the east, by Indian Ocean on the south and by the Arabian Sea on the west.

The major independent rivers (directly draining into Arabian Sea) in the basin are the Varahi, the Netravati, the Payaswani, the Valapattanam, the Chaliyar, the Kadalundi, the Bharathapuzha, the Periyar, the Muvattupula, the Minachil, the Pamba, the Achankovil, the Kallada and the Vamanapuram.

The major part of basin is covered with agriculture accounting to 50.82% of the total area while 3.65% is covered by water bodies. The basin spreads over 30 parliamentary constituencies (2009) comprising 20 of Kerala, 6 of Karnataka and 3 of Tamil Nadu and 1 of Puducherry.

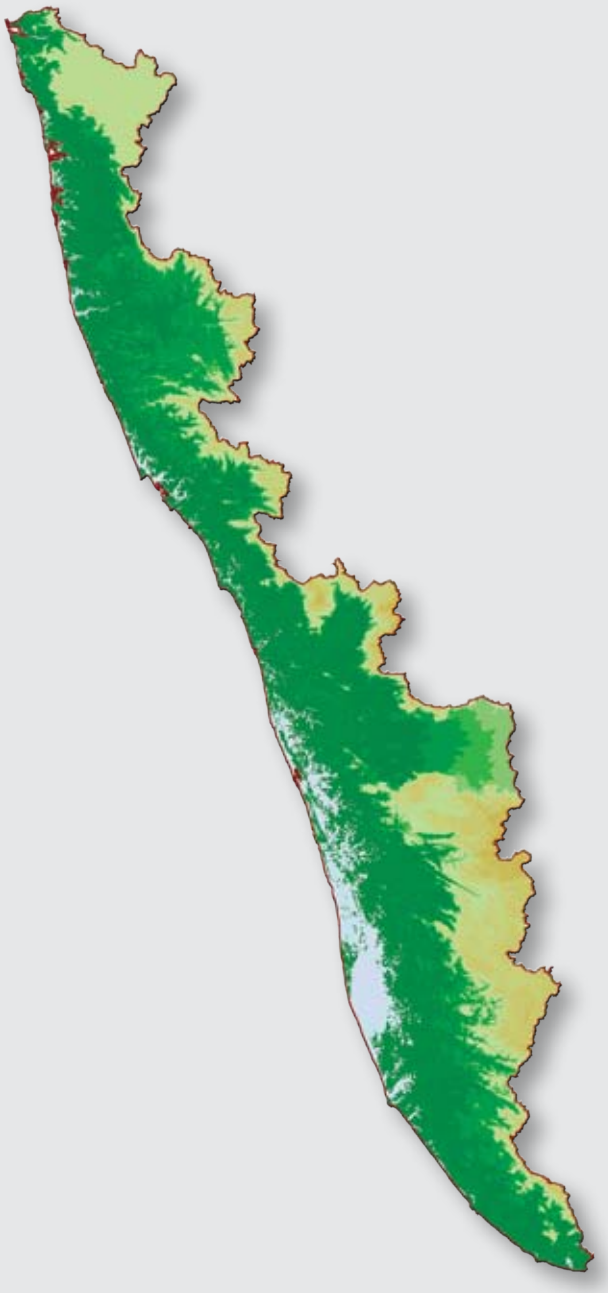
River Flow Line Diagram



Salient Features of West flowing rivers from Tadri to Kanyakumari

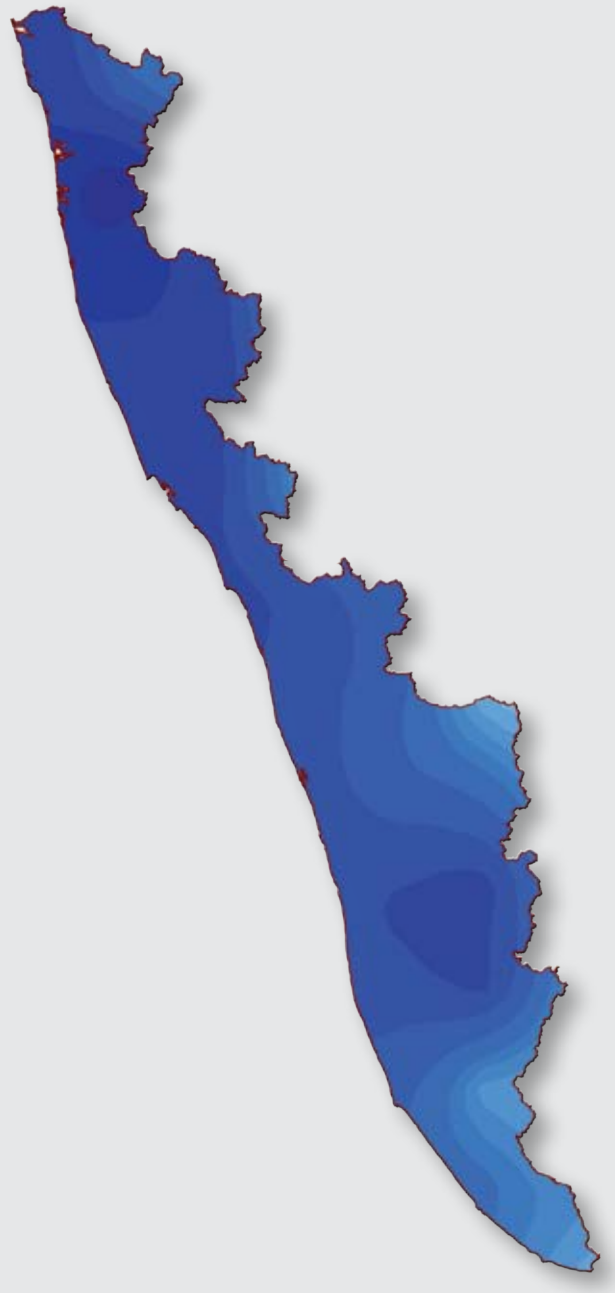
Basin Extent	Longitude	74° 25′ to 77° 36′E
	Latitude	8° 3′ to 14° 24′ N
Length of River (Km)		Many independent rivers flowing
Basin Area (Sq.km.)		56177
Average Water Resource Potential (MCM)		113530
Utilizable Surface Water Resource (MCM)		24300
Live Storage Capacity of Completed Projects (MCM)		10236.16
Live Storage Capacity of Projects Under Construction (MCM)		1317.54
Total Live Storage Capacity of Projects (MCM)		11553.70
No. of Hydrological Observation Stations		29
No. of Flood Forecasting Stations		0

Elevation Zone Map



Symbol	Elevation (m)	Area (Sq. km)	% of Total Area
	< 5	2215.61	3.95
	5-10	2063.73	3.67
	10-50	12971.81	23.09
	50-100	10980.31	19.55
	100-200	7922.72	14.10
	200-300	2912.61	5.18
	300-400	2325.31	4.14
	400-500	1427.14	2.54
	500-750	5611.82	9.99
	750-1000	3659.16	6.51
	1000-1500	3144.67	5.60
	1500-2000	724.06	1.29
	2000-3000	218.05	0.39

Average Annual Rainfall (1971-2005)



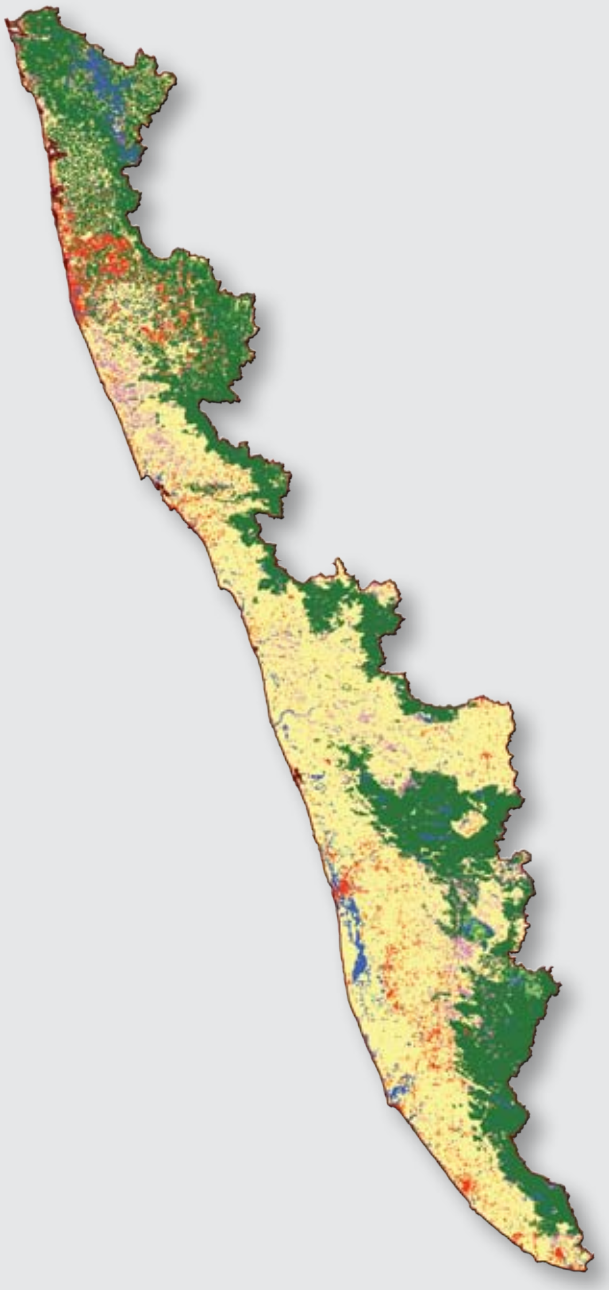
Symbol	Rainfall (mm)	Area (Sq. km)	% of Total Area
	600-800	39.20	0.07
	800-1000	350.57	0.62
	1000-1200	1319.45	2.35
	1200-1400	2473.04	4.40
	1400-1600	2689.02	4.79
	1600-2000	4938.17	8.79
	2000-2500	9525.23	16.96
	2500-3000	15577.86	27.73
	3000-4000	14248.07	25.36
	4000-5000	4090.06	7.28
	5000-6000	926.33	1.65

Major Water Resources Projects of West flowing rivers from Tadri to Kanyakumari

Name of Project	Associated Structures	Type	Status	Culturable Command Area (Th ha)	Ultimate Irrigation Potential (Th ha)	Power (MW)
Varahi Diversion Weir Project (KA)	Varahi Diversion Weir	Major	Ongoing	15.70	15.70	
Malampuzha Irr. Project (KL)	Malampuzha Dam	Major	Completed	22.55	45.10	
Parambikulam-Aliyar Project (TN)	Aliyar Dam	Major	Completed	174.52	101.25	60
Peechi Irr. Project (KL)	Peechi Dam	Major	Completed	17.55	7.18	
Periyar Valley Irr. Project (KL)	Bhutatankettu/Periyar Barrage	Major	Completed	32.80	30.49	
Pamba Irr. Project (KL)	Pamba Barrage	Major	Completed	21.13	20.72	
Idamalayar Irr. Project (KL)	Bhutatankettu/Periyar Barrage	Major	Ongoing	13.21	27.51	
Kallada Project(KL)	Kallada Dam	Major	Ongoing	61.63	92.80	15
Sharavathi HE Complex (KA)	Talakalale, Linganmakki, Kargal Anicut, Gerosuppa Dam	Major	Completed	-	-	1469.2

*Th. ha = Thousand Hectare, MW = Mega Watt, MCM = Million Cubic Meter

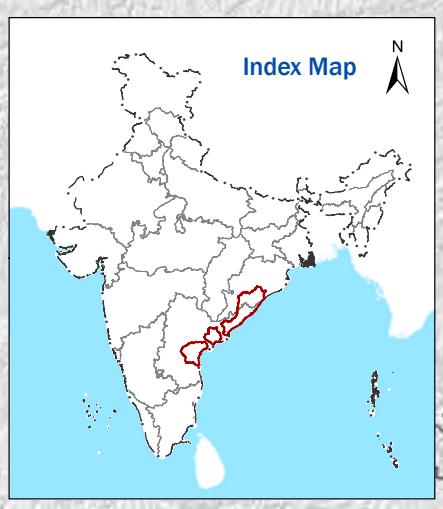
Land Use / Land Cover (2005-06)



Symbol	Category	Area (Sq. km)	% of Total Area
	Built Up Land	3251.64	5.78
	Agricultural	28546.94	50.82
	Forest	19506.93	34.72
	Grassland	505.71	0.90
	Wasteland	2317.51	4.13
	Waterbodies	2048.27	3.65

Parliamentary Constituencies (2009)

EAST FLOWING RIVERS BETWEEN MAHANADI AND PENNAR



77° E 78° E 79° E 80° E 81° E

20° N 19° N 18° N 17° N 16° N 15° N

MAHARASHTRA

CHHATTISG

ANDHRA PRADESH

KARNATAKA

Hyderabad

Khammam

Yerakal

Bajneru

Tammileru

Gunderu

Tammileru

Erra

Kolleru Lake

Bhud imeru

Upputeru

Gundlakamma

Vogaruvagu

Nallamara

Marella

Prakasam

Veligonda

Musi

Sri Ramathirtham

Palleru

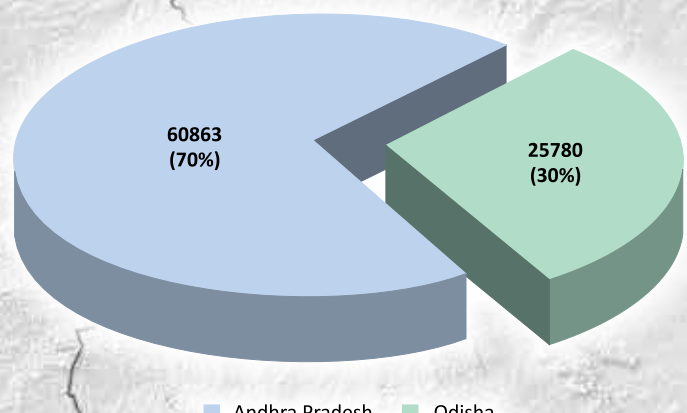
Manneru

Rallapadu

Pillaperu

Nellore

State Wise Basin Area (Sq.km.)



77° E 78° E 79° E 80° E 81° E


82° E
83° E
84° E
85° E
86° E
20° N
19° N
18° N
17° N
16° N
15° N
ODISHA
PUDUCHERRY
Bay of Bengal
Bhubaneswar
Daha
Bhanjanagar
Barha
Madhabarida
Soroda
Kutraguda
Purushottampur
Ganjam
Mohana
Gudari
Ghodahada
Mahendragarh
Gunupur
Bada Jhara
Thotapally Barrage
Neradi Barrage
Koraput
Kashinagar
Gotta Barrage
(Vamsdhara Stage-I)
Srikakulam
Vizianagaram
Raiwada
Tandava
Anakapally
Yeleru
Yanam
Chaulahua
Banshadhara
Rushikulya
Baghua
Harabanga
Ghodahada
Bahuda
Suvrnamukhi
Vegavati
Nagavalli
Vamshadhara
Silimarla
Gosta ni
Pedoi
Yeluru
Madieru
Tandava
Varaha
Surpa
Sarada
Peddaeru
Eluru
Kalava
Legend
Major City
State Capital
Dam / Barrage / Weir
River
Reservoir
Basin Boundary
State Boundary
International Boundary
Major CWC Sites
Flood Forecasting Station
Gauge Station
Gauge, Discharge Station
Gauge, Discharge, Sediment, Water Quality Station
CWC Office
CWC Chief Engineer / Circle Office / Divisional Office
Elevation
High
Low
0
50
100
Km
International / State boundaries & Coastal Line are as per Survey of India

C.83

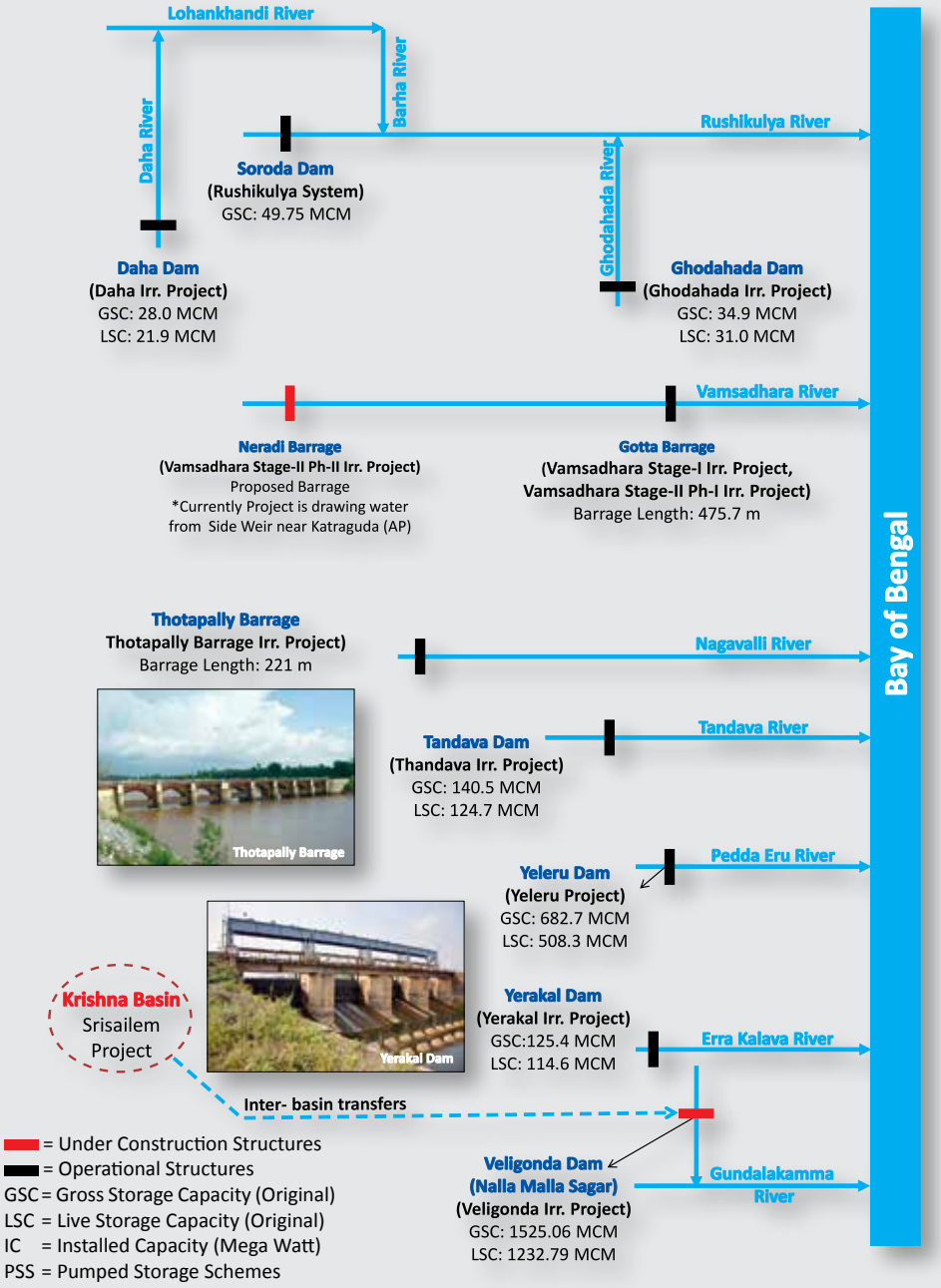
The basin spreads over states of Andhra Pradesh and Odisha having an area of 86,643 Sq.km and stretches between 78°40' to 85°1' east longitudes and 14°34' to 20°22' north latitudes. It is bounded by the Eastern Ghats on the north and west, by Nallamala Range and Andra plains on the south and by the Bay of Bengal on the east.

This composite basin comprises of three river systems. The river systems between Mahanadi and Godavari covers an area of 49,685 Sq.km and the river systems between Krishna and Pennar extends over an area of 24,669 Sq.km. In addition, there is also a small area between Godavari and Krishna drained mainly by the small stream of Palleru. This minor portion of the basin has an area of about 12,289 Sq.km.

The independent rivers (directly draining into Bay of Bengal) in the basin from north to south are the Rushikulya, the Bahuda, the Vamsadhara, the Nagavali, the Sarada, the Varaha, the Tandava, the Eluru, the Gundlakamma, the Musi, the Paleru and the Manneru.

The major part of basin is covered with agricultural land accounting to 59.85% of the total area and 3.66% of the basin is covered by water bodies. The basin spreads over 23 parliamentary constituencies (2009) comprising 17 of Andhra Pradesh and 6 of Odisha.

River Flow Line Diagram



Salient Features of East flowing rivers between Mahanadi & Pennar

Basin Extent	Longitude	78° 40' to 85° 1' E
	Latitude	14° 34' to 20° 22' N
Length of River (Km)		Many Independent rivers flowing
Basin Area (Sq.km.)		86643
Average Water Resource Potential (MCM)		22520
Utilizable Surface Water Resource (MCM)		13100
Live Storage Capacity of Completed Projects (MCM)		1601.44
Live Storage Capacity of Projects Under Construction (MCM)		1424.97
Total Live Storage Capacity of Projects (MCM)		3026.41
No. of Hydrological Observation Stations		13
No. of Flood Forecasting Stations		4

Major Water Resources Projects of East flowing rivers between Mahanadi & Pennar

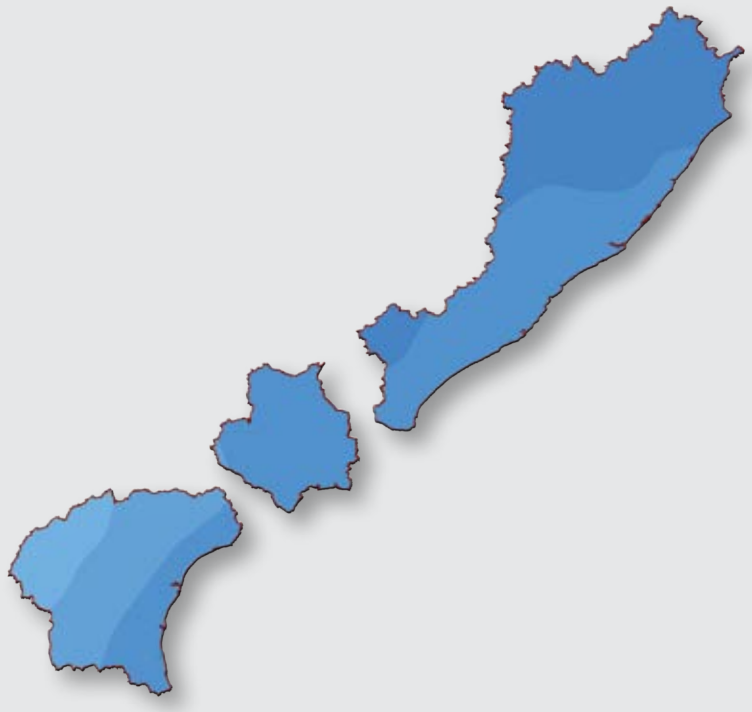
Name of Project	Associated Structures	Type	Status	Culturable Command Area (Th ha)	Ultimate Irrigation Potential (Th ha)
Rushikulya System (OD)	Soroda Dam	Major	Completed	59.06	60.30
Daha Irr. Project (OD)	Daha Dam	Medium	Completed	4.76	7.05
Ghodahada Irr. Project (OD)	Ghodahada Dam	Medium	Completed	8.99	8.20
Vamsadhara Stage-I Irr. Project (AP)	Gotta Barrage	Major	Completed	60.00	59.99
Vamsadhara Stage-II Ph-I Irr. Project (AP)	Gotta Barrage	Major	Completed	33.29	25.203
Vamsadhara Stage-II Ph-II Irr. Project (AP)	Neradi Barrage	Major	Ongoing	18.21	18.21
Thotapally Barrage Irr. Project including stabalization of Nagavali Head Regulator Project (AP)	Thotapally Barrage	Major	Completed	25.90(Old) + 48.56	16.48(Old) + 74.46
Thandava Irr. Project (AP)	Tandava Dam	Medium	Completed	19.42	19.75
Yeleru Project (including old system) (AP)	Yeleru Dam	Major	Completed		85.63
Yerakal Irr. Project (AP)	Yerakal Dam	Medium	Ongoing	13.90	13.90
Veligonda Irr. Project (AP)	Veligonda Dam	Major	Ongoing	177.26	181.10

*Th. ha = Thousand Hectare, MW = Mega Watt, MCM = Million Cubic Meter

Elevation Zone Map

Symbol	Elevation (m)	Area (Sq. km)	% of Total Area
	< 5	3646.39	4.21
	5-10	5496.43	6.34
	10-50	16138.96	18.63
	50-100	15573.72	17.97
	100-200	17566.27	20.27
	200-300	7396.99	8.54
	300-400	4934.39	5.70
	400-500	3666.17	4.23
	500-750	7481.63	8.63
	750-1000	3701.27	4.27
	1000-1500	1037.42	1.20
	1500-2000	3.38	0.01

Average Annual Rainfall (1971-2005)



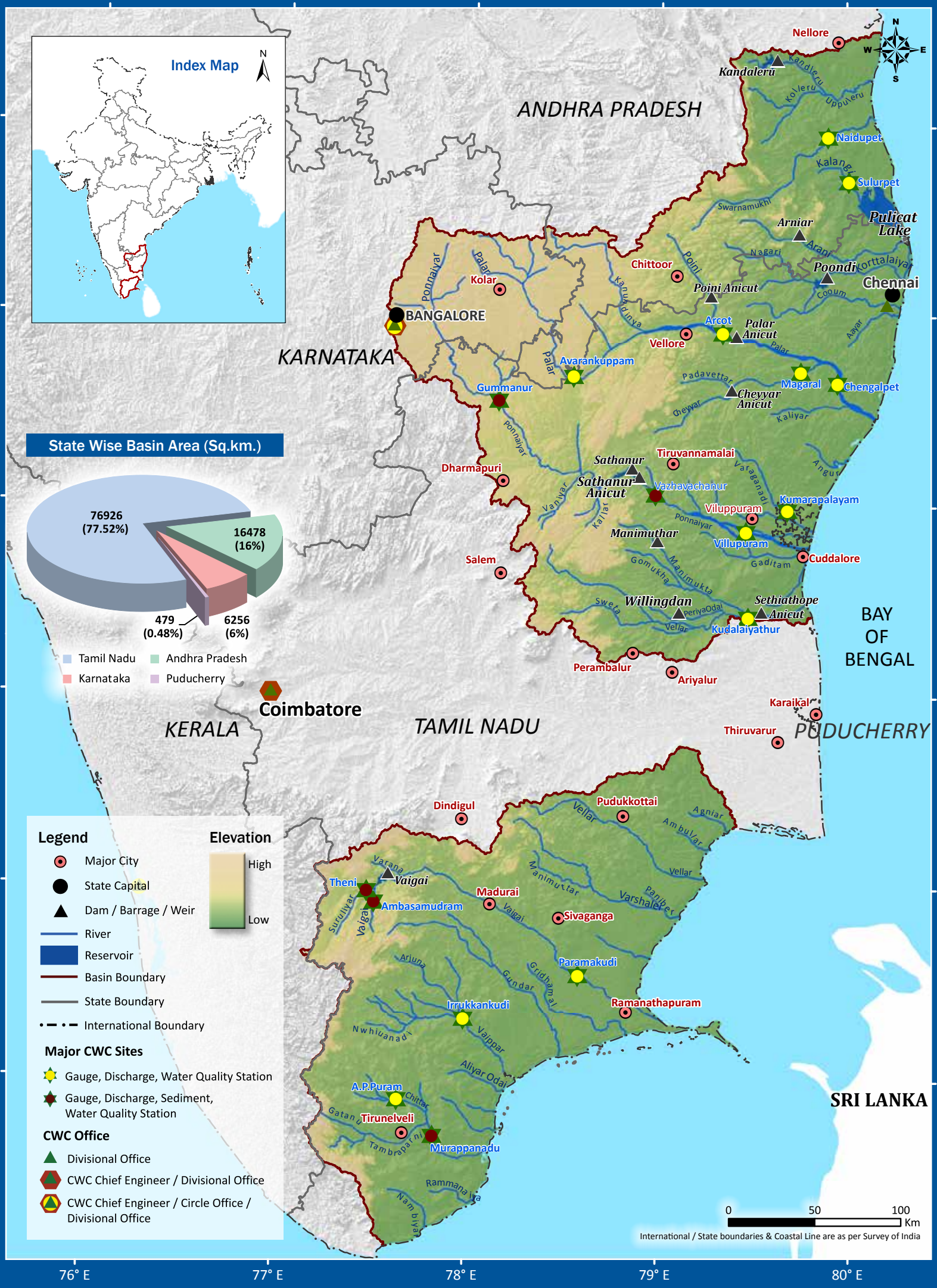
Symbol	Rainfall (mm)	Area (Sq. km)	% of Total Area
	600-800	5558.61	6.42
	800-1000	12589.84	14.53
	1000-1200	41915.79	48.37
	1200-1400	26578.76	30.68

Land Use / Land Cover (2005-06)

Symbol	Category	Area (Sq. km)	% of Total Area
	Built Up Land	2254.66	2.60
	Agricultural	51853.01	59.85
	Forest	22470.25	25.93
	Grassland	18.42	0.02
	Wasteland	6879.16	7.94
	Waterbodies	3167.50	3.66

Parliamentary Constituencies (2009)

EAST FLOWING RIVERS BETWEEN PENNAR AND KANYAKUMARI



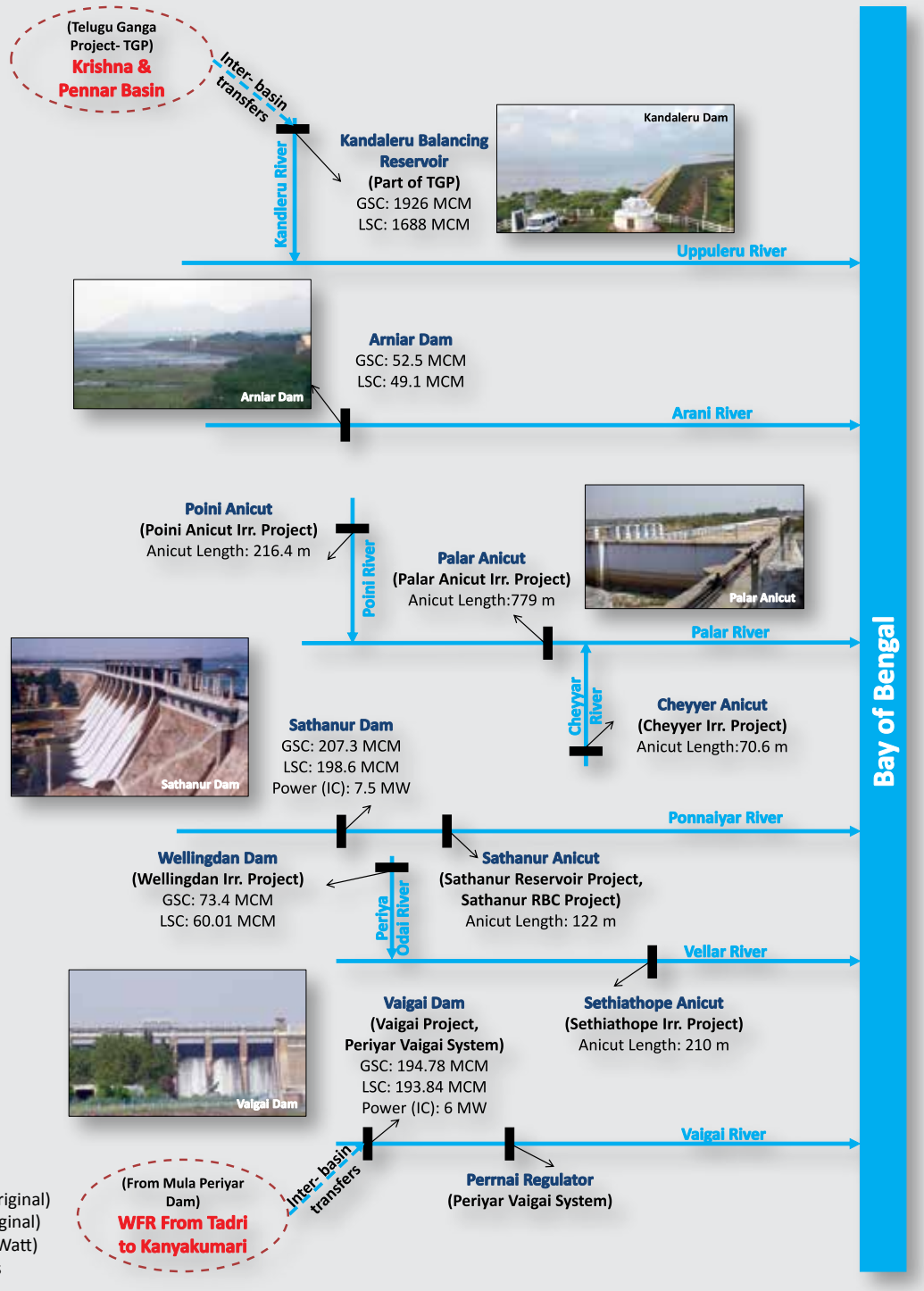
The basin extends over states of Tamil Nadu, Andhra Pradesh, Karnataka and Union Territory of Puducherry having a total area of 1,00,139 Sq.km and accounts for 3.08% of the total geographical area of the country. The basin extends between 77°1' to 80°17' east longitudes and 8°11' to 14°27' north latitudes. It is bounded by the Eastern Ghats on the north, by Tamil Nadu uplands on the west, by the Indian Ocean on the south and by the Bay of Bengal on the east.

The composite basin comprises of the river systems between Pennar and Cauvery having an area of 65,049 Sq.km and the river systems between Cauvery and Kanyakumari with an area of 35,090 Sq.km

The independent rivers (directly draining into Bay of Bengal) are the Kandleru, the Swarnamukhi, the Arani, the Korttalaiyar, the Cooum, the Adyar, the Palar, the Gingee, the Ponnaiyar, the Vellar, the Varshalei, the Vaigai, the Gundar, the Vaippar and the Tambraparni.

The major part of basin is covered with agricultural land accounting to 66.65% of the total area and 9.02% of the basin is covered by water bodies. The basin spreads over 41 parliamentary constituencies (2009) comprising of 30 Tamil Nadu, 6 of Karnataka, 4 of Andhra Pradesh and 1 of Puducherry.

River Flow Line Diagram

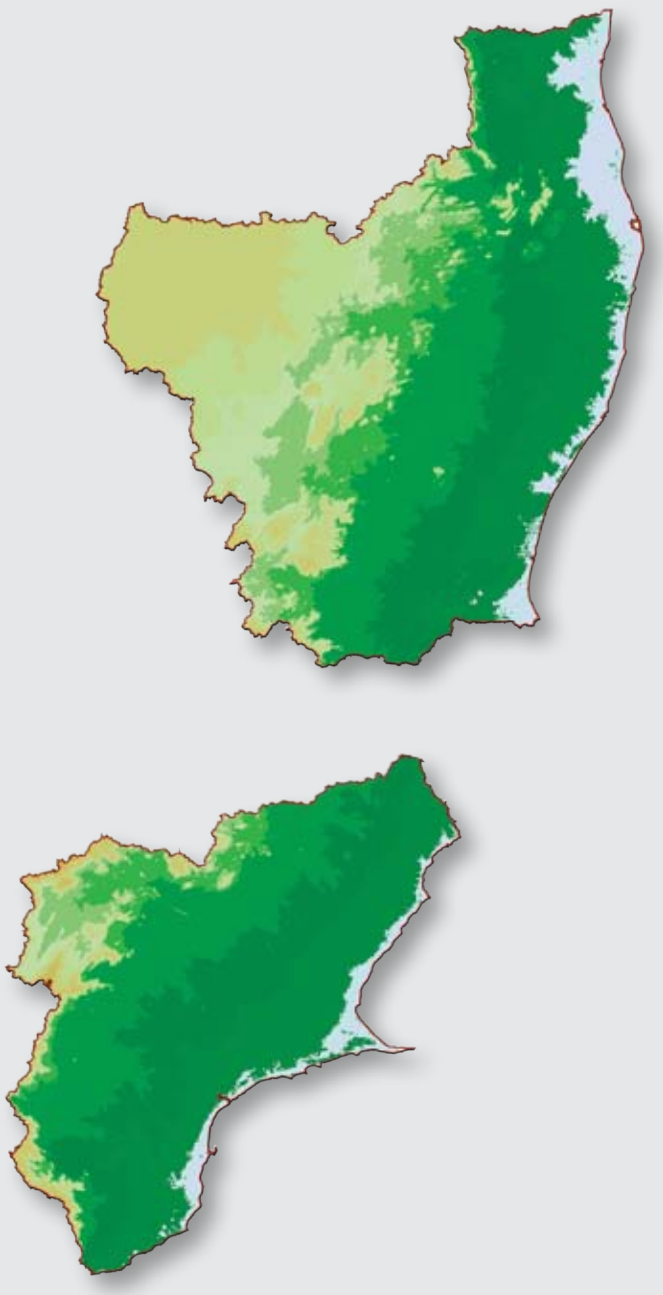


= Operational Structures
GSC = Gross Storage Capacity (Original)
LSC = Live Storage Capacity (Original)
IC = Installed Capacity (Mega Watt)
PSS = Pumped Storage Schemes

Salient Features of East flowing rivers between Pennar and Kanyakumari

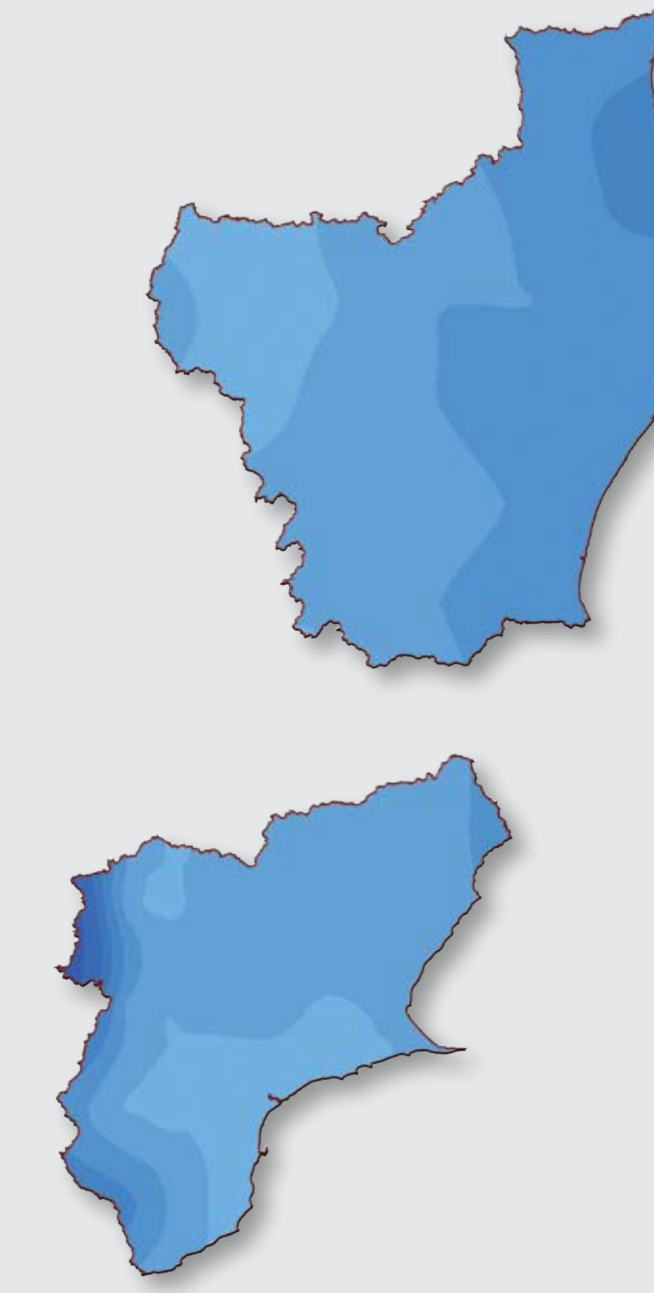
Basin Extent	Longitude	77° 1′ to 80° 17′ E
	Latitude	8° 11′ to 14° 27′ N
Length of River (Km)		Many independent rivers flowing
Basin Area (Sq.km.)		100139
Average Water Resource Potential (MCM)		16460
Utilizable Surface Water Resource (MCM)		16500
Live Storage Capacity of Completed Projects (MCM)		1838.41
Live Storage Capacity of Projects Under Construction (MCM)		68.49
Total Live Storage Capacity of Projects (MCM)		1906.9
No. of Hydrological Observation Stations		17
No. of Flood Forecasting Stations		0

Elevation Zone Map



Symbol	Elevation (m)	Area (Sq. km)	% of Total Area
	< 5	3268.84	3.26
	5-10	3264.37	3.26
	10-50	19042.99	19.02
	50-100	18133.75	18.11
	100-200	19760.12	19.74
	200-300	6682.25	6.67
	300-400	6119.23	6.11
	400-500	5254.87	5.25
	500-750	7804.88	7.79
	750-1000	9416.03	9.40
	1000-1500	1139.39	1.14
	1500-2000	202.49	0.20
	2000-3000	49.79	0.05

Average Annual Rainfall (1971-2005)



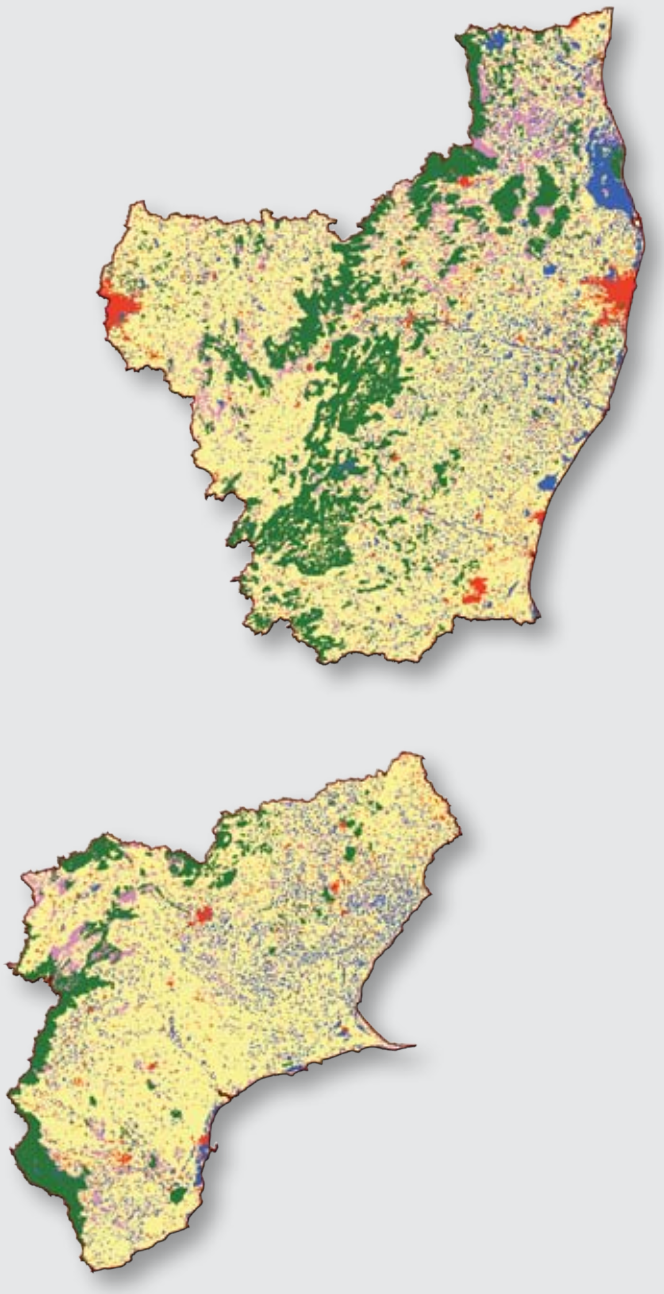
Symbol	Rainfall (mm)	Area (Sq. km)	% of Total Area
	600-800	16085.60	16.05
	800-1000	47711.83	47.65
	1000-1200	30605.13	30.56
	1200-1400	4582.04	4.58
	1400-1600	363.96	0.36
	1600-2000	548.45	0.55
	2000-2500	237.57	0.24
	2500-3000	4.42	0.01

Major Water Resources Projects of East flowing rivers between Pennar and Kanyakumari

Name of Project	Associated Structures	Type	Status	Culturable Command Area (Th ha)	Ultimate Irrigation Potential (Th ha)	Power (MW)
Poini Anicut Irr. Project (TN)	Poini Anicut	Major	Completed	12.76	12.76	
Palar Anicut Irr. Project (TN)	Palar Anicut	Major	Completed	49.89	49.89	
Cheyyer Irr. Project (TN)	Cheyyer Anicut	Major	Completed	14.57	14.57	
Sathanur Reservoir Project (TN)	Sathanur Anicut	Medium	Completed	9.70	9.70	7.5
Sathanur RBC Irr. Project (TN)	Sathanur Anicut	Medium	Completed	8.450	11.72	
Wellingdan Irr. Project (TN)	Wellingdan Dam	Major	Completed	11.19	11.15	
Sethiathope Irr. Project (TN)	Sethiathope Anicut	Major	Completed	24.52	24.52	
Periyar Vaigai Irr. System including Modernisation (TN)	Vaigai Dam, Perrnai Regulator	Major	Completed	78.35	102.74	6

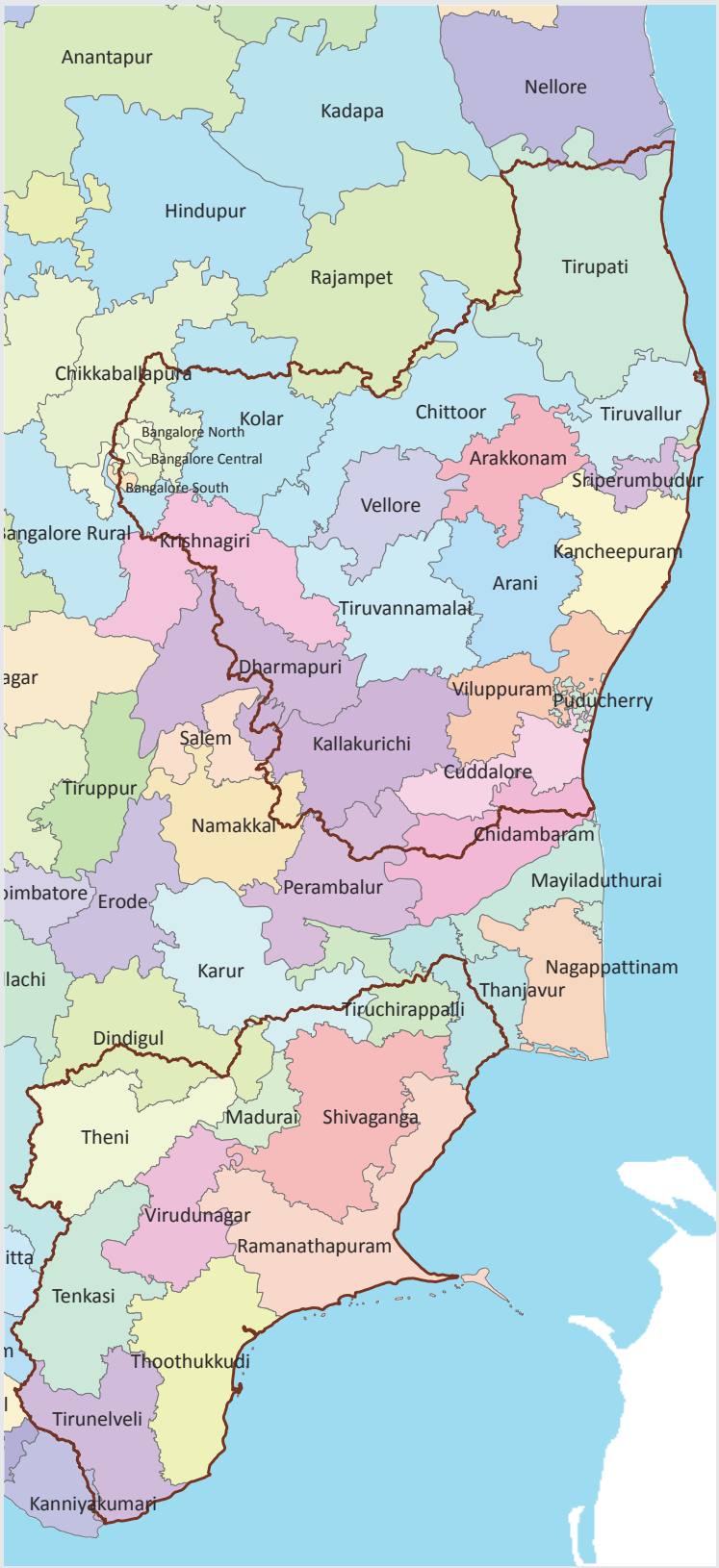
*Th. ha = Thousand Hectare, MW = Mega Watt, MCM = Million Cubic Meter

Land Use / Land Cover (2005-06)

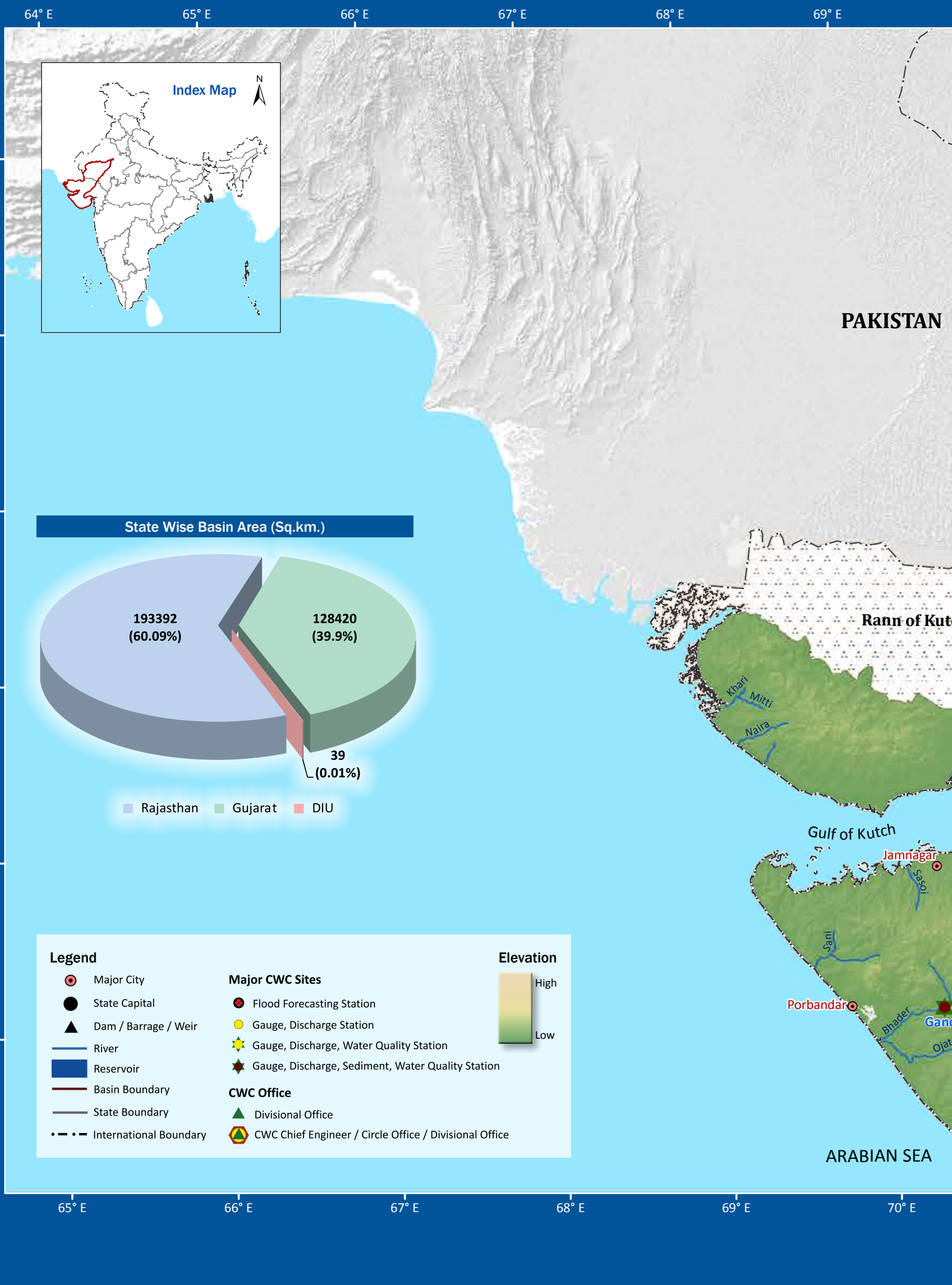


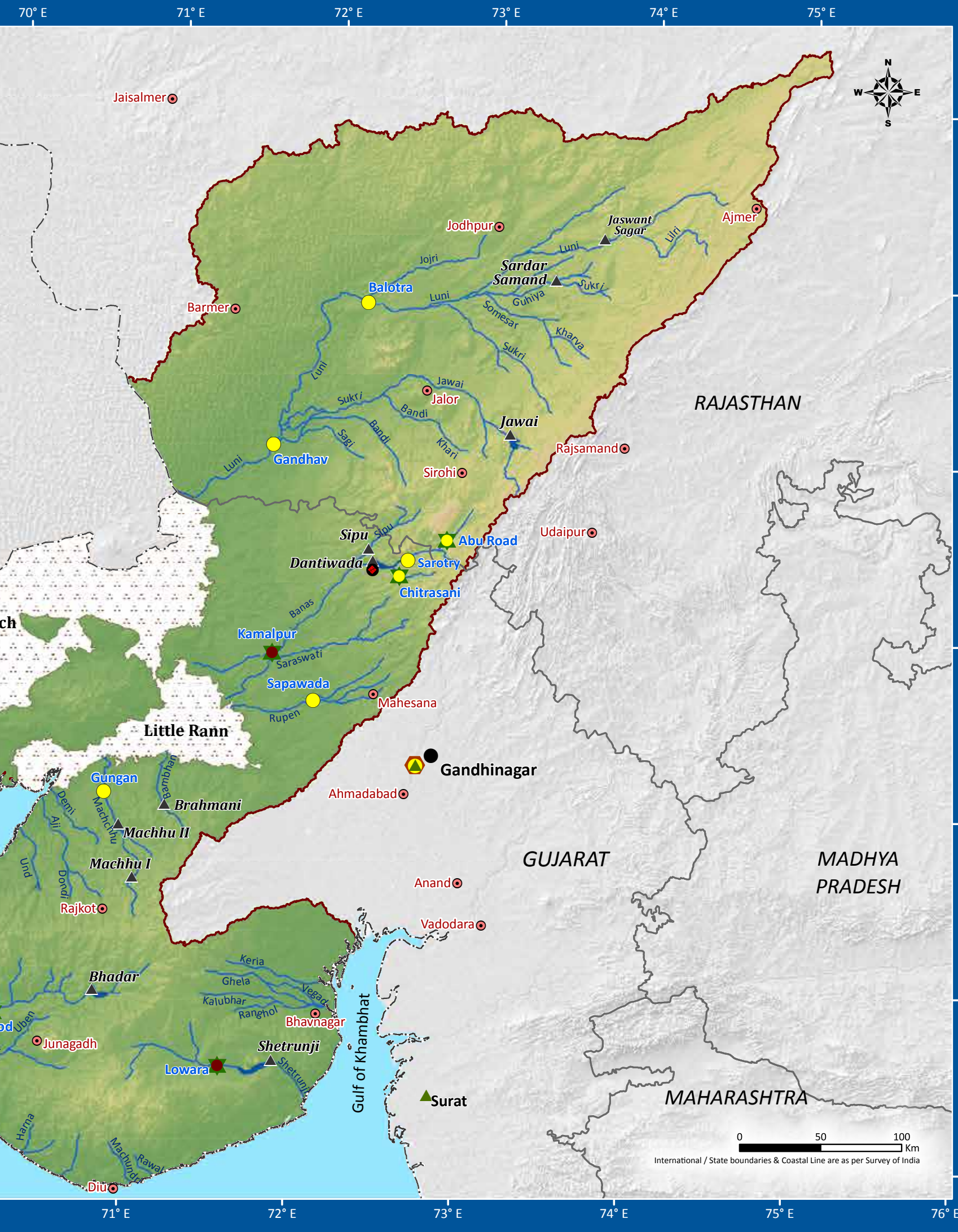
Symbol	Category	Area (Sq. km)	% of Total Area
	Built Up Land	3544.30	3.54
	Agricultural	66741.82	66.65
	Forest	15017.88	15.00
	Grassland	7.45	0.01
	Wasteland	5799.65	5.79
	Waterbodies	9027.90	9.02

Parliamentary Constituencies (2009)



WEST FLOWING RIVERS OF KUTCH AND SAURASHTRA INCL. LUNI




70° E
71° E
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Jaswant Sagar
Sardar Samand
Balotra
Jojri
Luni
Liliri
Sukri
Guhiya
Somesar
Kharva
Jawai
Jalor
Bandi
Sagi
Khari
Gandhav
Sirohi
Rajsamand
RAJASTHAN
Udaipur
Sipu
Abu Road
Dantiwada
Sarotry
Chitrasani
Banas
Kamalpur
Saraswati
Sapawada
Rupen
Mahesana
Little Rann
Gandhinagar
Ahmadabad
Gungan
Bambhan
Brahmani
Machchhu
Machhu II
Machhu I
Aji
Demi
Und
Dondi
Rajkot
GUJARAT
MADHYA PRADESH
Anand
Vadodara
Keria
Ghela
Vegad
Kalubhar
Ranghol
Bhavnagar
Bhadar
Uben
Junagadh
Shetrunji
Lowara
Gulf of Khambhat
Surat
MAHARASHTRA
Harna
Machhundri
Rawal
Diu
0
50
100
Km
International / State boundaries & Coastal Line are as per Survey of India

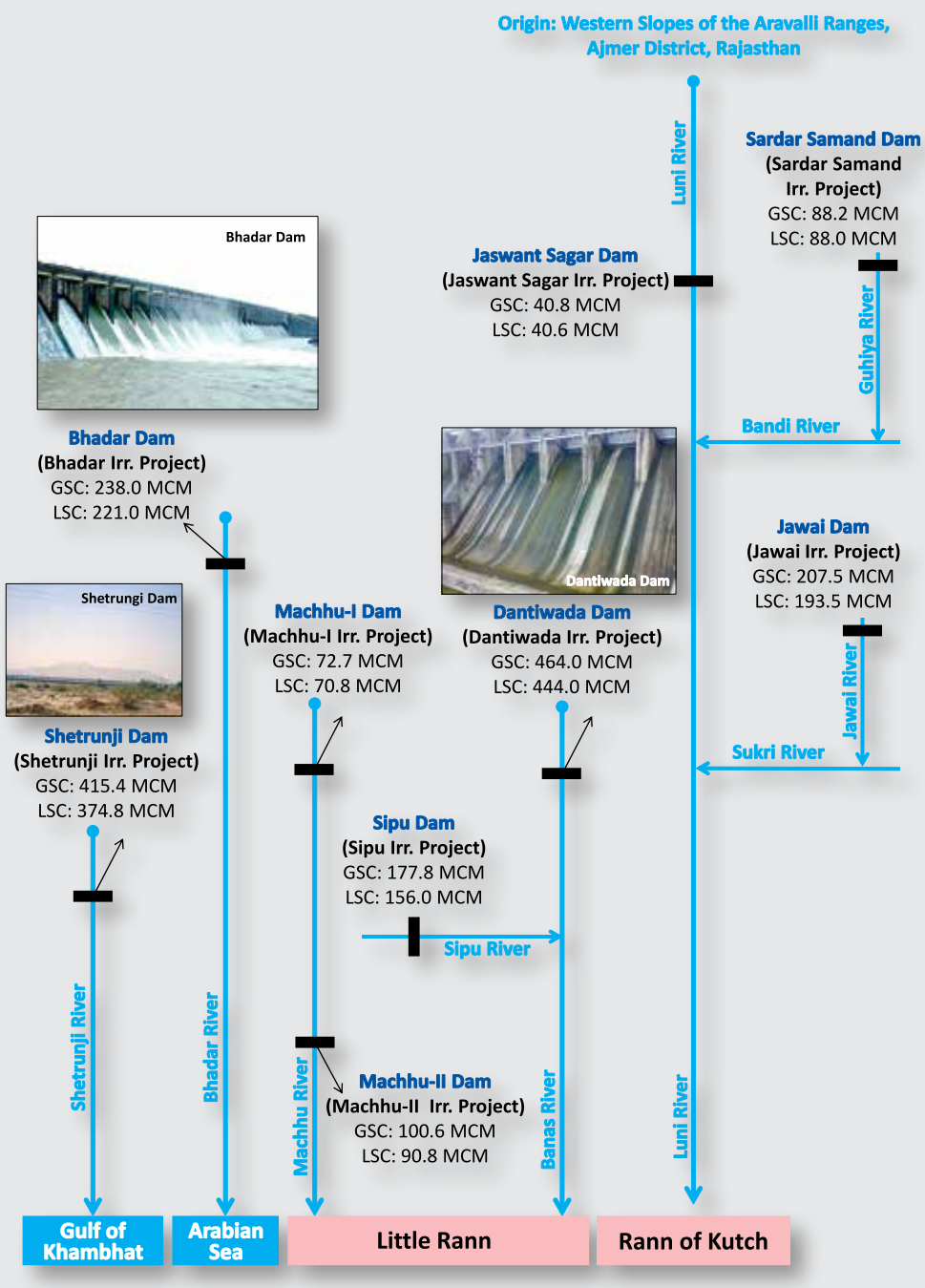
The basin extends over large areas in Rajasthan and Gujarat and covers whole of Diu having an area of 321,851 Sq.km with maximum length and width of 865 km and 445 km. It lies between 67°52' to 75°19' east longitudes and 20°53' to 26°57' north latitudes. The basin is bounded by Aravalli range and Gujarat plains on the east, by Rajasthan desert on north, and by the Arabian Sea on the south and the west.

Luni is the major river system of the basin and it originates from western slopes of the Aravalli ranges at an elevation of 772 m in Ajmer district of Rajasthan. The total length of the river is 511 km and it drains a total area of 32,879 Sq.km. The river flows up to Rann of Kutch forming a delta where the water spreads out and does not contribute any runoff. The main tributaries of Luni joining from left are the Lilri, the Guhiya, the Bandi (Hemawas), the Sukri, the Jawai, the Khari Bandi, the Sukri Bandi and the Sagi whereas the Jojri joins it from right.

Other independent rivers of the basin are the Shetrunji, the Bhadar, the Machhu, the Rupen, the Saraswati and the Banas. The Shetrunji drains into the Gulf of Khambhat, the Bhadar outfalls into Arabian Sea, and the Machhu, the Rupen, the Saraswati and the Banas drains into Little Rann of Kutch.

The major part of basin is covered with agriculture accounting to 65.06% of the total area and only 5.25% of the basin is covered by water bodies. The basin spreads over 20 parliamentary constituencies (2009) comprising 11 of Gujarat, 8 of Rajasthan, and 1 of Daman & Diu.

River Flow Line Diagram



= Operational Structures
GSC = Gross Storage Capacity (Original)
LSC = Live Storage Capacity (Original)
IC = Installed Capacity (Mega Watt)
PSS = Pumped Storage Schemes

Salient Features of West flowing rivers of Kutch & Saurashtra including Luni

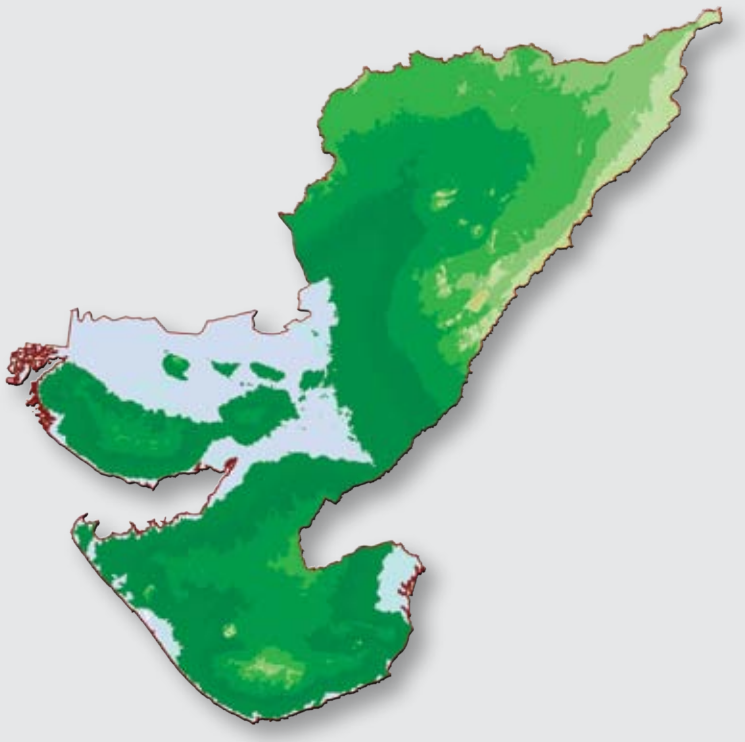
Basin Extent	Longitude	67° 52' to 75° 19' E
	Latitude	20° 53' to 26° 57' N
Length of Luni River (Km)		511
Basin Area (Sq.km.)		321851
Average Water Resource Potential (MCM)		15100
Utilizable Surface Water Resource (MCM)		15000
Live Storage Capacity of Completed Projects (MCM)		4726.92
Live Storage Capacity of Projects Under Construction (MCM)		797.23
Total Live Storage Capacity of Projects (MCM)		5524.15
No. of Hydrological Observation Stations		15
No. of Flood Forecasting Stations		1

Major Water Resources Projects of West flowing rivers of Kutch & Saurashtra including Luni

Name of Project	Associated Structures	Type	Status	Culturable Command Area (Th ha)	Ultimate Irrigation Potential (Th ha)
Jaswant Sagar Irr. Project (RJ)	Jaswant Sagar Dam	Medium	Completed	3.82	3.82
Sardar Samand Irr. Project (RJ)	Sardar Samand Dam	Medium	Completed	8.56	8.56
Jawai Irr. Project (RJ)	Jawai Dam	Medium	Completed	17.61	17.61
Dantiwada Irr. Project (GJ)	Dantiwada Dam	Major	Completed	60.04	40.48
Sipu Irr. Project (GJ)	Sipu Dam	Major	Completed	16.00	22.08
Machhu-I Irr. Project (GJ)	Machhu-I Dam	Medium	Completed	10.41	6.66
Machhu-II Irr. Project (GJ)	Machhu-II Dam	Medium	Completed	10.13	9.00
Bhadar Irr. Project (GJ)	Bhadar Dam	Major	Completed	26.57	17.16
Shetrunji Irr. Project (GJ)	Shetrunji Dam	Major	Completed	34.47	26.60

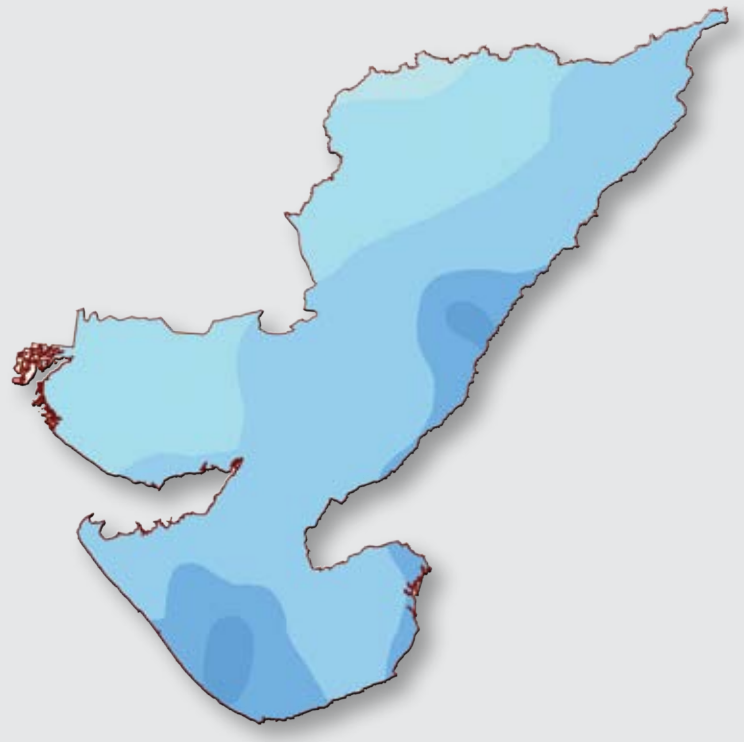
*Th. ha = Thousand Hectare, MW = Mega Watt, MCM = Million Cubic Meter

Elevation Zone Map



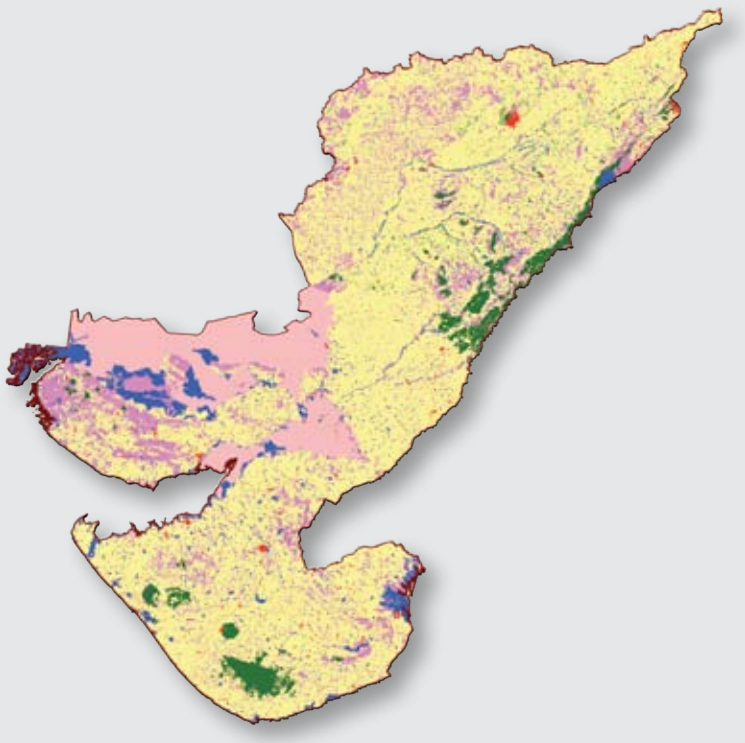
Symbol	Elevation (m)	Area (Sq. km)	% of Total Area
	< 5	41148.74	12.79
	5-10	15999.86	4.97
	10-50	55116.65	17.12
	50-100	47974.78	14.90
	100-200	74692.74	23.21
	200-300	52278.49	16.25
	300-400	22864.59	7.10
	400-500	8182.26	2.54
	500-750	2846.14	0.88
	750-1000	549.36	0.17
	1000-1500	186.36	0.06
	1500-2000	11.03	0.01

Average Annual Rainfall (1971-2005)



Symbol	Rainfall (mm)	Area (Sq. km)	% of Total Area
	<200	6229.14	1.94
	200-400	97372.89	30.25
	400-600	168715.00	52.42
	600-800	40841.77	12.69
	800-1000	8692.20	2.70

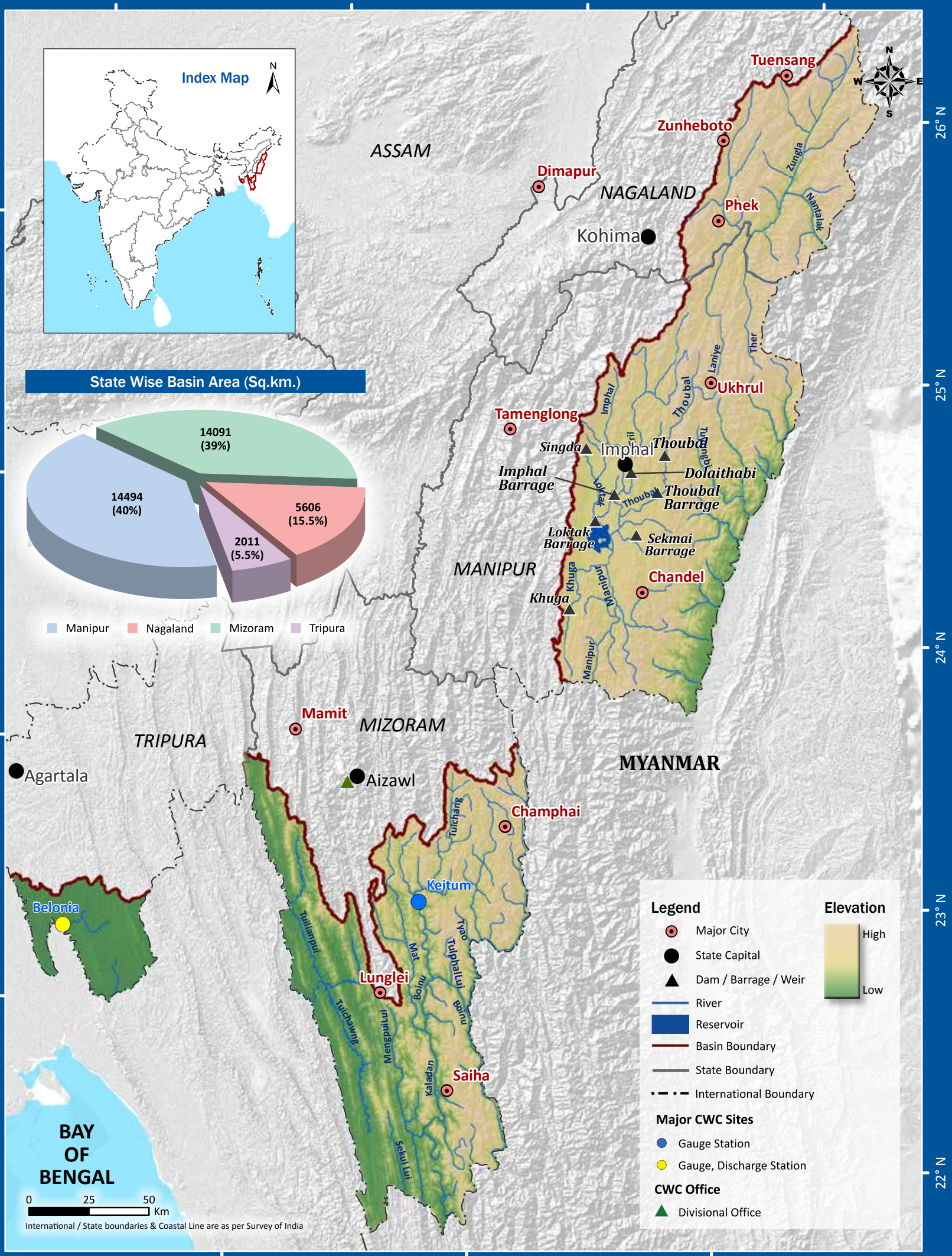
Land Use / Land Cover (2005-06)



Symbol	Category	Area (Sq. km)	% of Total Area
	Built Up Land	3720.44	1.16
	Agricultural	209392.77	65.06
	Forest	11456.12	3.56
	Grassland	4009.37	1.25
	Wasteland	46115.23	14.32
	Waterbodies	16908.29	5.25
	Rann	30248.78	9.40

Parliamentary Constituencies (2009)

MINOR RIVERS DRAINING INTO MYANMAR & BANGLADESH

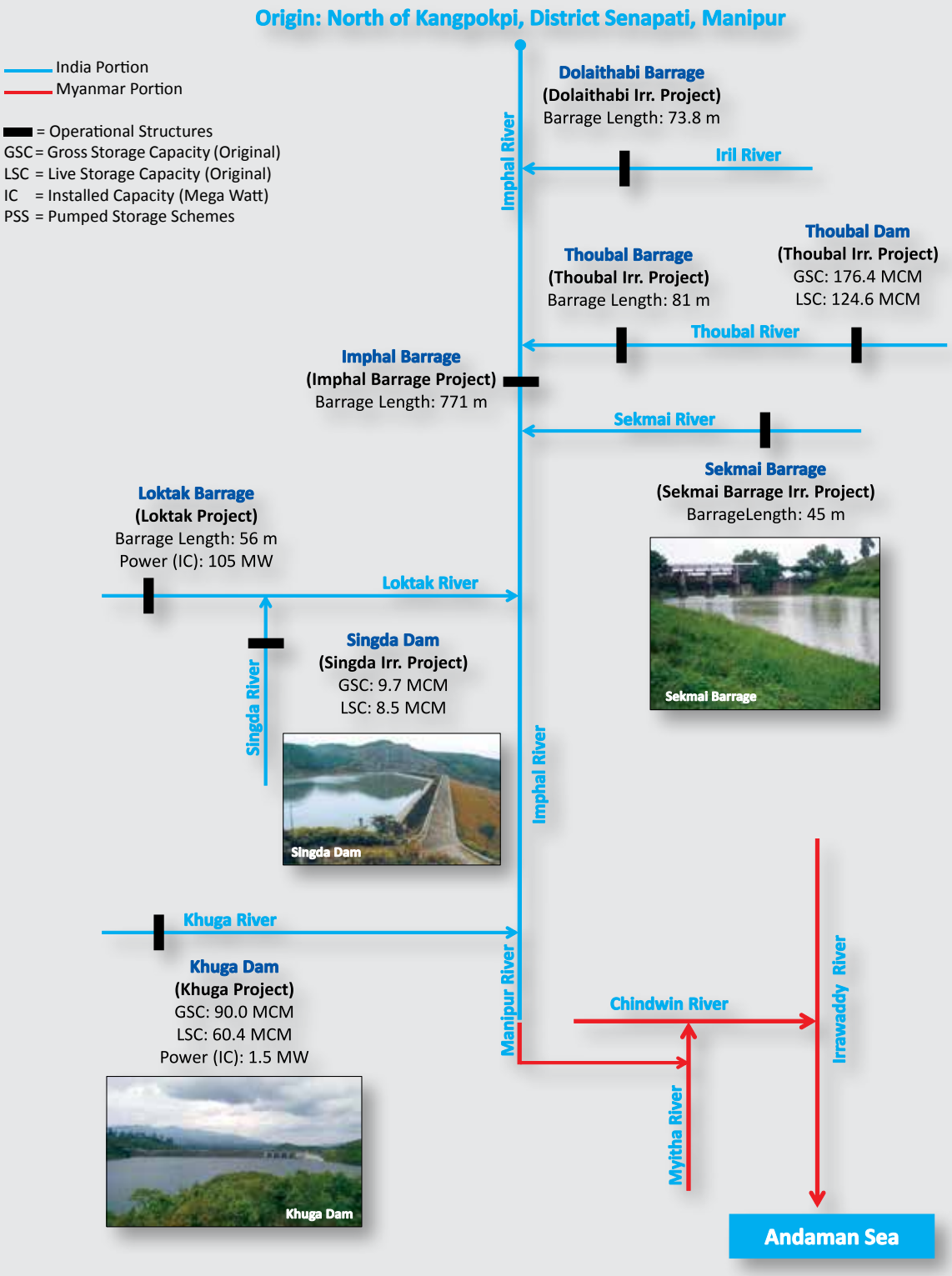


The basin extends over states of Mizoram, Nagaland, Manipur and Tripura having a total area of approx. 36,202 Sq.km and its geographical extent is between 91°33' to 94°52' east longitudes and 21°45' to 26°40' north latitudes. The basin is bounded by Purvanchal range in the north and the west and by Bay of Bengal in the east and the south.

The Imphal is the main river of the basin and it rises near Kangpokpi in Senapati district of Manipur and receives the Iril from the south and the Thoubal from the east. It also receives the Khuga from the south-west and is known as Manipur River below its confluence. The Chakpi River joins Imphal from the opposite direction 3 km below Shuganu and the combined water flows southward through a narrow gorge to fall into the Chindwin river of Burma.

The major part of basin is covered with forest accounting to 71.64% of the total area and only 1.66% of the basin is covered by water bodies. The basin spreads over 6 parliamentary constituencies (2009) comprising 2 each of Manipur and Tripura, 1 each of Mizoram and Nagaland.

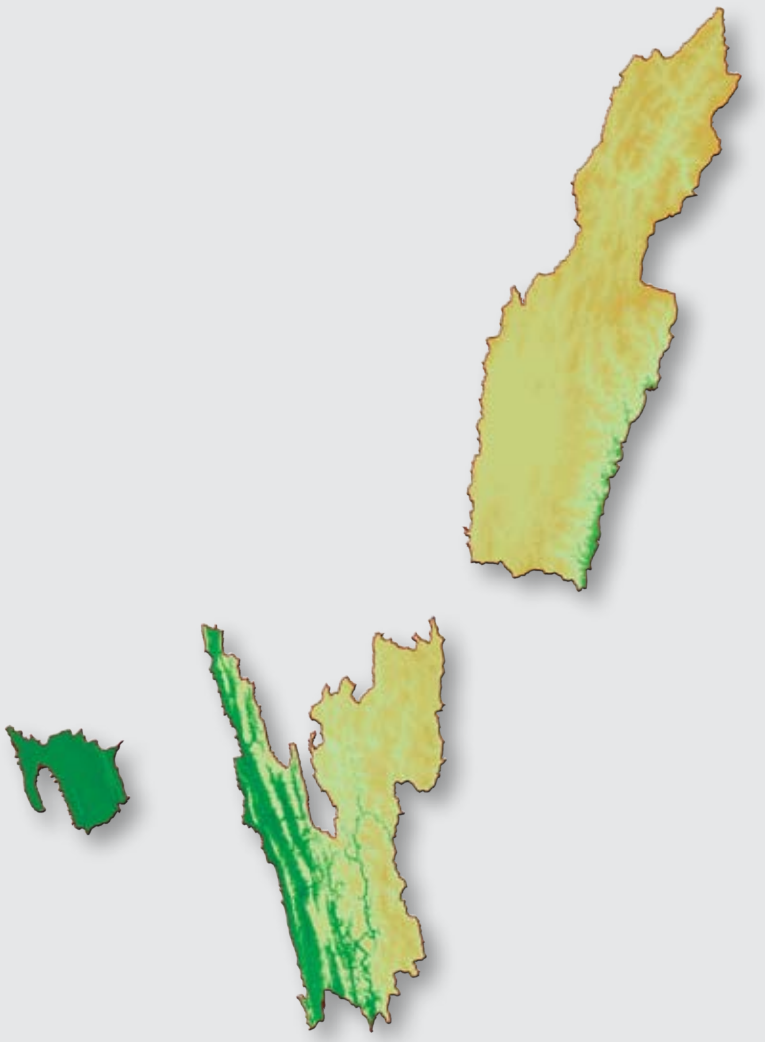
River Flow Line Diagram



Salient Features of Minor rivers draining into Myanmar & Bangladesh

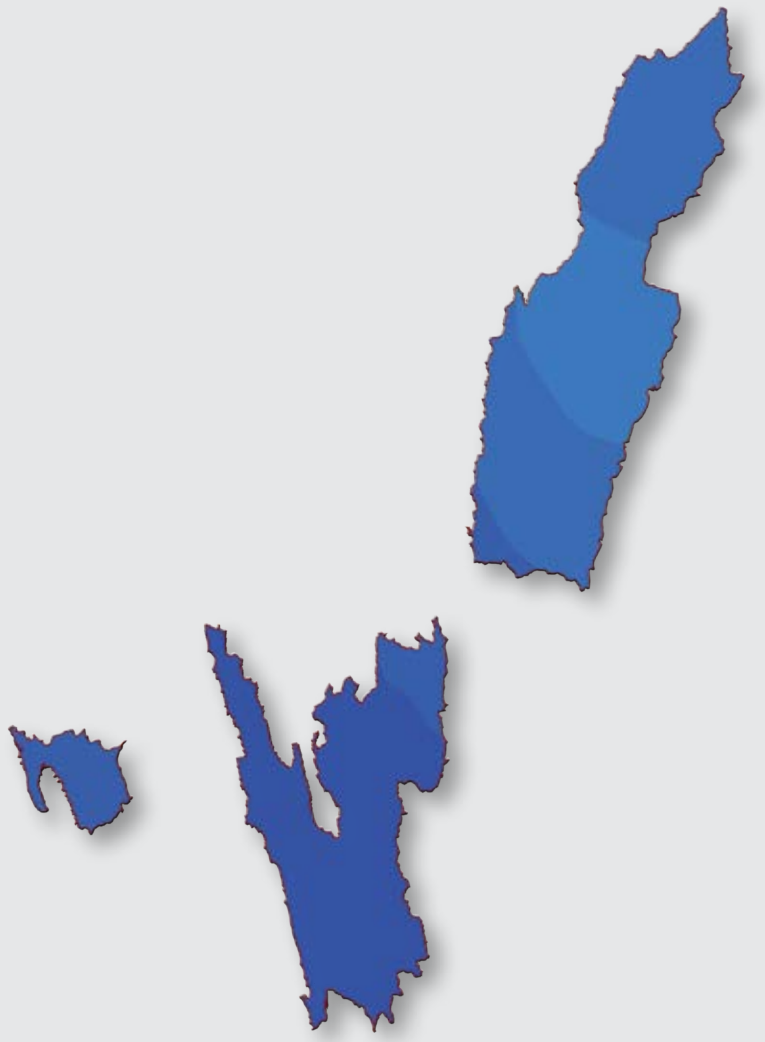
Basin Extent	Longitude	91° 33′ to 94° 52′ E
	Latitude	21° 45′ to 26° 40′ N
Length of River (Km)		Many independent rivers flowing
Basin Area (Sq.km.)		36202
Average Water Resource Potential (MCM)		31000
Utilizable Surface Water Resource (MCM)		–
Live Storage Capacity of Completed Projects (MCM)		312
Live Storage Capacity of Projects Under Construction (MCM)		0
Total Live Storage Capacity of Projects (MCM)		312
No. of Hydrological Observation Stations		5
No. of Flood Forecasting Stations		0

Elevation Zone Map



Symbol	Elevation (m)	Area (Sq. km)	% of Total Area
	5-10	4.71	0.01
	10-50	1133.17	3.13
	50-100	1288.15	3.56
	100-200	1772.35	4.90
	200-300	1539.01	4.25
	300-400	1448.84	4.00
	400-500	1494.75	4.13
	500-750	4025.62	11.12
	750-1000	8394.32	23.19
	1000-1500	9958.32	27.51
	1500-2000	3818.58	10.55
	2000-3000	1299.03	3.59
	3000-4000	25.15	0.07

Average Annual Rainfall (1971-2005)



Symbol	Rainfall (mm)	Area (Sq. km)	% of Total Area
	1400-1600	7225.17	19.96
	1600-2000	13302.95	36.75
	2000-2500	748.81	2.07
	2500-3000	1343.77	3.71
	3000-4000	13581.30	37.52

Major Water Resources Projects of Minor rivers draining into Myanmar & Bangladesh

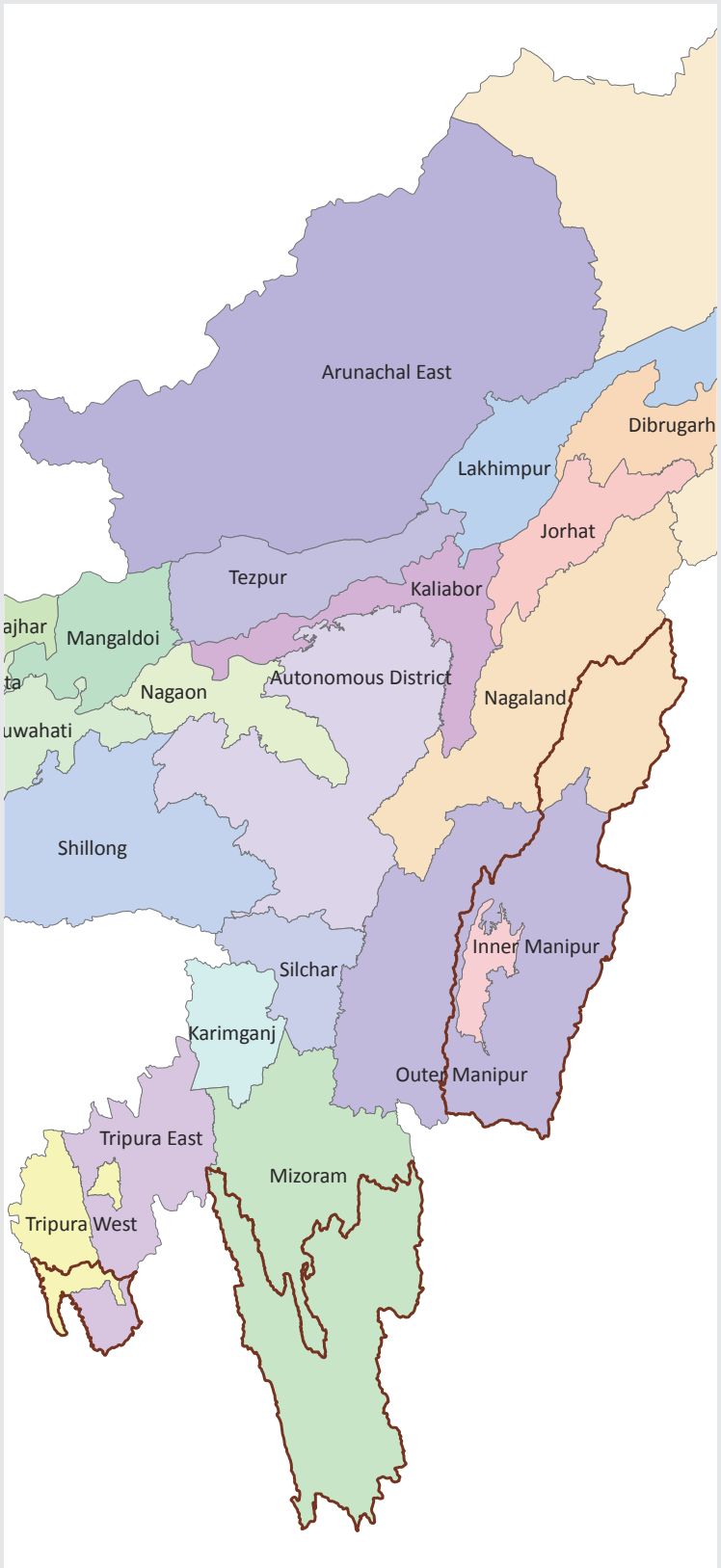
Name of Project	Associated Structures	Type	Status	Culturable Command Area (Th ha)	Ultimate Irrigation Potential (Th ha)	Power (MW)
Dolaithabi Irr. Project (MN)	Dolaithabi Barrage	Medium	Ongoing	5.5	7.54	
Thoubal Irr. Project (MN)	Thoubal Dam, Thoubal Barrage	Major	Ongoing	21.86	33.40	
Imphal Barrage Irr. Project (MN)	Imphal Barrage	Medium	Completed	3.6	6.4	
Khuga Project (MN)	Khuga Dam	Major	Ongoing	9.58	15.00	1.5
Sekmai Barrage Irr. Project (MN)	Sekmai Barrage	Medium	Completed	5.00	8.50	
Loktak Project (Lift irrigation) (MN)	Loktak Barrage	Major	Completed	16.00	38.30	105
Singda Lift Irr. Project (MN)	Singda Dam	Medium	Completed	2.40	4.00	

*Th. ha = Thousand Hectare, MW = Mega Watt, MCM = Million Cubic Meter

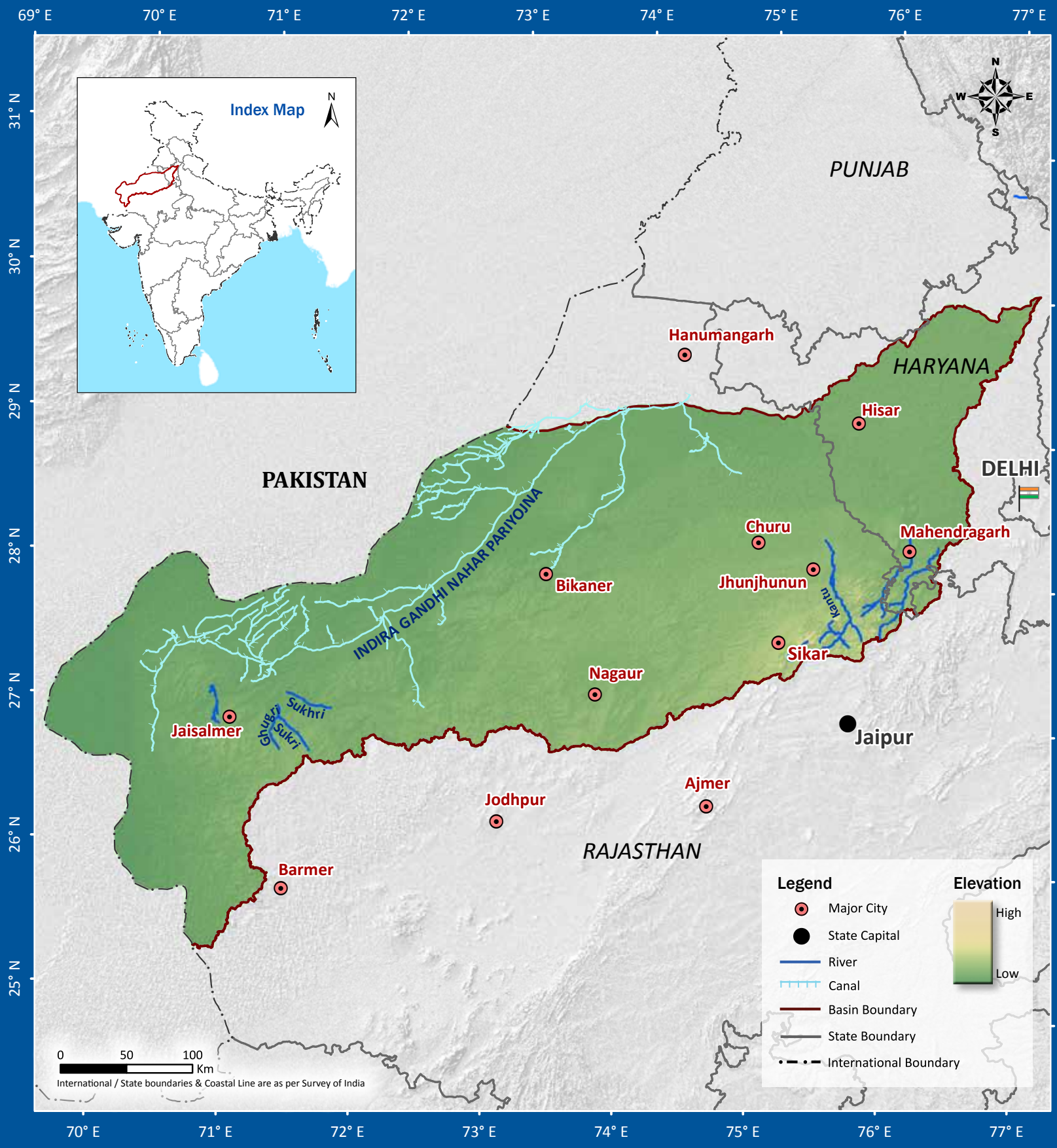
Land Use / Land Cover (2005-06)

Symbol	Category	Area (Sq. km)	% of Total Area
	Built Up Land	627.70	1.73
	Agricultural	5976.68	16.51
	Forest	25935.65	71.64
	Grassland	128.86	0.36
	Wasteland	2933.43	8.10
	Waterbodies	599.68	1.66

Parliamentary Constituencies (2009)



AREA OF INLAND DRAINAGE IN RAJASTHAN



The basin extends over states of Haryana and Rajasthan and lies between 69°13' to 77°15' east longitudes and 25°31' to 29°44' north latitudes. It is bounded by the Punjab plains on the north and east, by Aravalli range on the south and by Thar Desert on the west. Small rivers draining into the basin are the Kantu, the Kakni, the Ghugri and the Sukri.

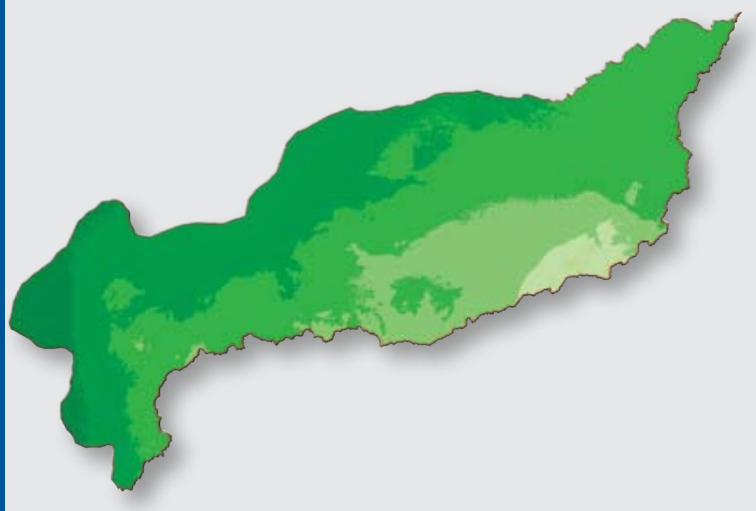
The major part of basin is covered with agricultural land accounting to 64.15% of the total area and 0.4% of the basin is covered by water bodies. The basin spreads over 16 parliamentary constituencies (2009) comprising 7 of Haryana and 9 of Rajasthan.

Major Water Resource Project of Area of Inland Drainage in Rajasthan

Name of Project	Type	Status	Culturable Command Area (Th ha)	Ultimate Irrigation Potential (Th ha)
Indira Gandhi Nahar Pariyojna (IGNP) Stage –I (RJ)	Major	Completed	557.6	553
Indira Gandhi Nahar Pariyojna (IGNP) Stage –II (RJ)	Major	Ongoing	1410	964

*Th. ha = Thousand Hectare, MW = Mega Watt, MCM = Million Cubic Meter

Elevation Zone Map

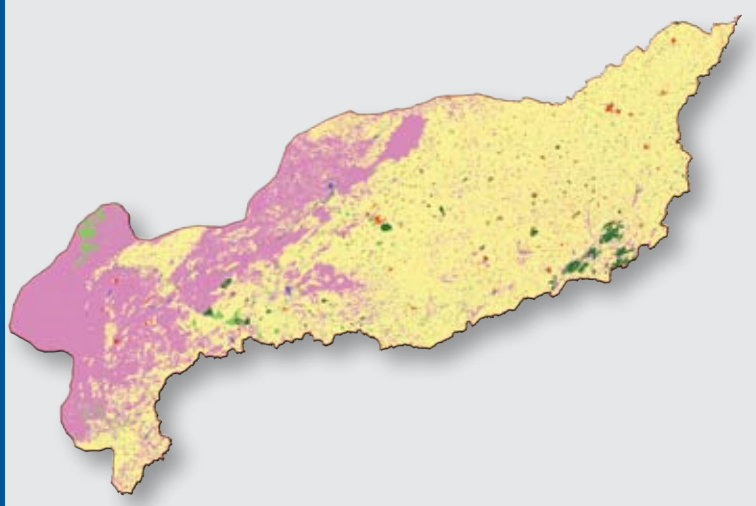


Symbol	Elevation (m)	% of Total Area
	10-50	0.06
	50-100	4.85
	100-200	30.52
	200-300	45.49
	300-400	16.16
	400-500	2.43
	500-750	0.45
	750-1000	0.03

Average Annual Rainfall (1971-2005)

Symbol	Rainfall (mm)	% of Total Area
	<200	30.17
	200-400	46.36
	400-600	22.88
	600-800	0.58
	800-1000	0.01

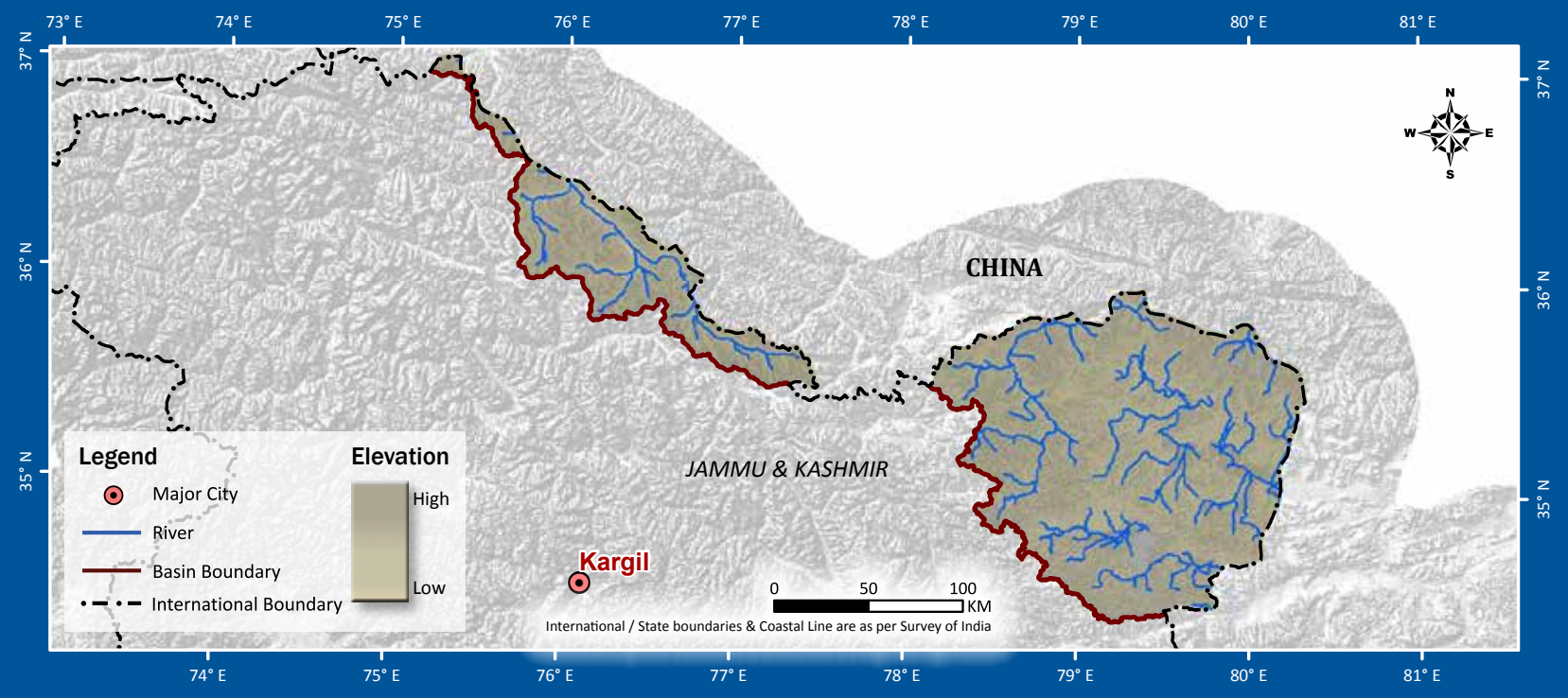
Land Use / Land Cover (2005-06)



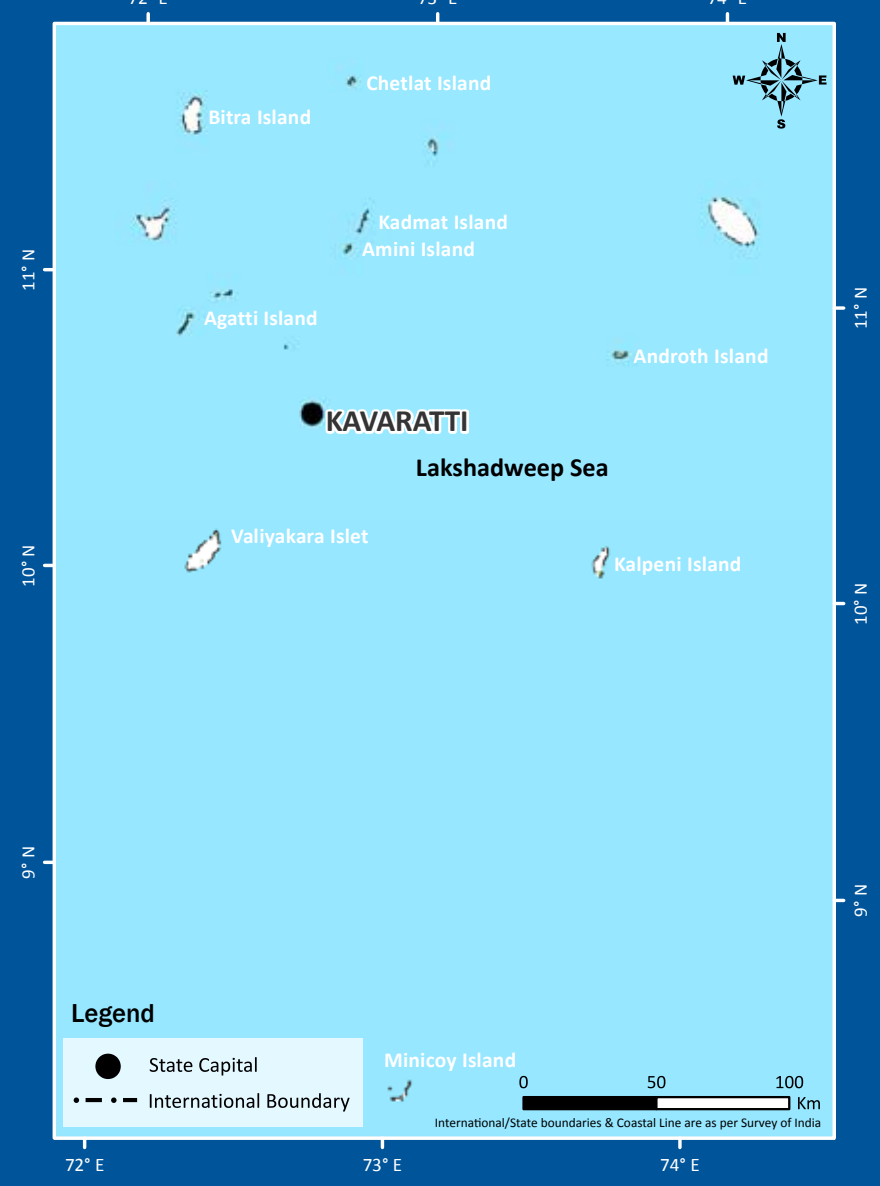
Symbol	Category	% of Total Area
	Built Up Land	1.25
	Agricultural	64.15
	Forest	1.17
	Grassland	2.40
	Wasteland	30.63
	Waterbodies	0.40

Parliamentary Constituencies (2009)

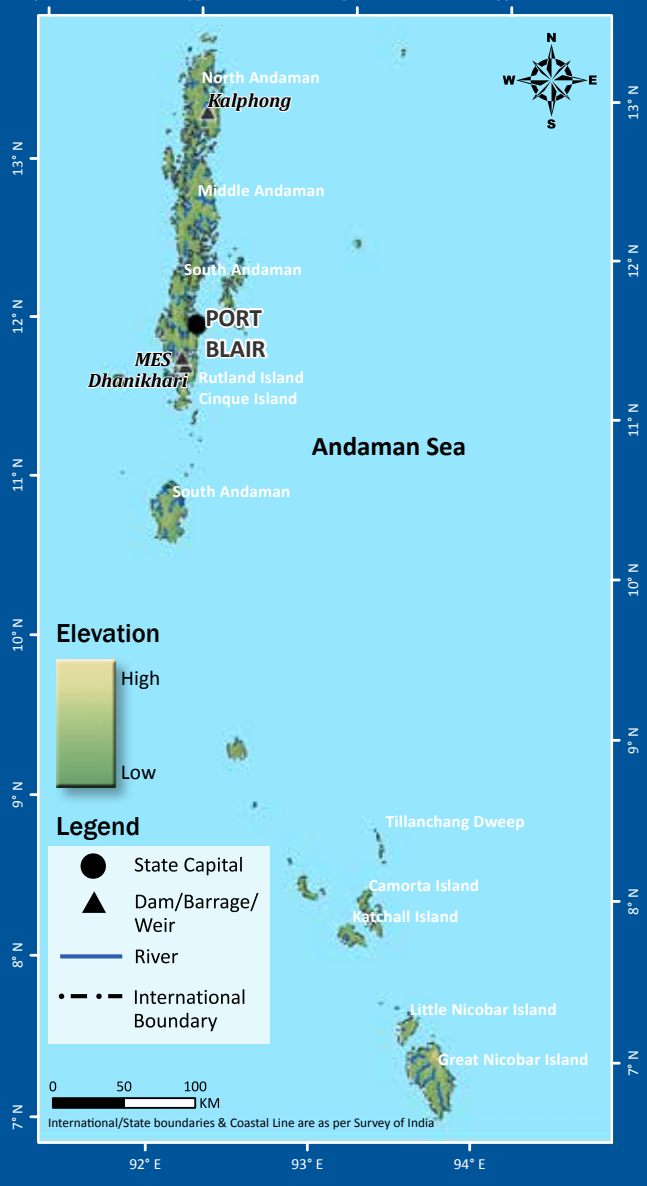
AREA OF NORTH LADAKH NOT DRAINING INTO INDUS



DRAINAGE AREA OF LAKSHADWEEP ISLANDS



DRAINAGE AREA OF ANDAMAN & NICOBAR ISLANDS



Note: These three basins are classified under India-WRIS Project.

India-WRIS Project: Digital Watershed Atlas

Hydrological unit-wise assessment of water resources of India is a prerequisite for its proper management. Basin has been recognized as a practical hydrological unit for water resources management by many water resources experts.

Delineating hydrological units has been a strenuous task due to varying geography of India and the base data availability. Different organisations have adopted different methodology, criteria and base data to perform the same for the country at convenient scale. The first watershed atlas on 1:1 million scale was prepared and published by All India Soil and Land Use Survey (AISLUS, 1990) (renamed as Soil and Landuse Survey of India, SLUSI). Later, watershed maps at relatively larger scale (1:2,50,000) were prepared by Central Ground Water Board (CGWB) in 2006 under Hydrology Project (Phase-I) for effective implementation of water resources development schemes.

National level watershed atlas is being prepared on 1:50,000 scale under India-WRIS project. It is considered appropriate at present because the standard 1:50,000 scale map series of the country are available, and now a days majority of thematic maps are also being produced on same or larger scale. A semi-automated hydrological unit boundary delineation approach is adopted to prepare a Watershed Atlas of the Country using DEM, larger scale drainage network and other ancillary data. This approach is potentially more objective, repeatable, cost-effective, and consistent than previously adopted manual delineation methods.

Hydrological Unit and its Hierarchy

A watershed is an area from which runoff, resulting from precipitation, flows past a single point into a large stream, lake or ocean. It's a general phenomenon governed by the topography of the terrain. The boundary between two adjacent watersheds is called the drainage divide line. Pour point is the location at which the water flows out of the area. This is the lowest point in elevation along the boundary or the drainage lines.

The size of the hydrological unit is governed by the size of the stream or river in question or the point of interception on the stream or river such as dam, barrage, weir, hydrological observation sites etc. Size of hydrologic unit is of practical importance in land and water resources development. A workable size of the hydrological unit is defined by the aims and objectives of a particular development programme. For example, a multipurpose irrigation cum hydel project would have its hydrological unit spread over thousands of Sq. Km, whereas for a farm pond the size may be a few hectares only. In deserts and plain river basins with incipient drainage, it may be difficult to delineate small sized hydrologic unit, whereas in undulating and hilly landscapes a smaller sized hydrologic unit can also be easily delineated. The classification schema adopted highlights six categories of hydrological units viz., water resources region, basin, sub-basin, watershed, sub-watershed and micro-watershed. Country has been divided into 6 water resource regions, 25 basins and 101 sub-basins.

Delineation Approach

Semi-automated approach for delineation of hydrological units (region, basin, sub-basin and watershed) uses SRTM DEM, topo maps on 1:50000 scale, IRS P6 LISS IV & CARTOSAT merged data, drainage network, surface water bodies, rail / road network and other ancillary data.

Drainage divides from contour/ridge lines are used to demarcate the boundary of sub- watershed and micro-watershed manually. The divide has been marked where flow is in opposite directions. Knowledge of terrain as well as DEM is essential for accurate demarcation of boundary.

Hydrological boundary has been validated with reference to contours and drainage network. Hydrological unit boundary cuts perpendicular to the contour lines but it does not cross the drainage line at any location except its outlet.

Codification Schema

The codification schema assigns unique code for each category of hydrological unit. Coding for hydrologic unit like watershed, sub-watershed and micro-watershed has been done from the upstream to downstream direction. They are coded sequentially based on the location of the outlet, starting with the uppermost stream outlet. The downstream code is always a higher number than the upstream code. The main-stem hydrologic unit carries the higher code when outlets are adjacent or break at the same place.

The watershed hierarchy and codification schema adopted is given below.

Watershed hierarchy and codification

Sl. No.	Nomenclature/ Hydrological Levels	Size Range (Sq. Km)	Average Size (Sq. Km)	Width/Digits	Values
1	Region	60,000-20,00,000	4,50,000	1	A - E
2	Basin	4,000-8,00,000	1,10,000	02	1-27
3	Sub basin	4,000-70,000	30,000	03	XYZ
4	Watersheds	200-1000	600	02	1-99
5	Sub-watershed	50-90	70	03	L 1-99 M 1-99 U 1-99
6	Micro Watershed	5-15	10	02	1-99

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Sources of Information

The information provided in the atlas has been compiled from various sources. The important sources are listed below:

Atlas

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- Land Use Land Cover Atlas of India (Based on Multi-temporal Satellite Data of 2005-06), 2011. National Remote Sensing Centre, Hyderabad.
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About India-WRIS Project and River Basin Atlas

A nationwide water resources information system, "Generation of Database and Implementation of Web Enabled Water Resources Information System (India-WRIS) in the country" containing all aspects of water resources and related data have been designed to provide data and information in public domain through India-WRIS WebGIS portal. India-WRIS provides 'Single Window' solution for all water resources data and information in a standardized national GIS framework. It allows users to search, access, visualize, understand and analyse comprehensive and contextual water resources data for assessment, monitoring, planning, development and finally Integrated Water Resources Management.

This River Basin Atlas of India is one of the publications brought out under 'India-WRIS' project. This provides snapshot of water resources of all river basins in the country, terrain and hill shade view, rainfall pattern, major drainage and water resources projects, hydrological observation sites, land use / land cover along with basin wise parliamentary constituencies in the country.

Visit and explore India-WRIS WebGIS:
www.india-wris.nrsc.gov.in

इंडिया-वारिस
India-WRIS
A Joint Project of CWC and ISRO

देश में जल संसाधन आँकड़ों का जनन व वेब सामर्थ्य
सूचना प्रणाली का क्रियान्वयन
Generation of Database and Implementation of Web Enabled Water Resources Information System (India-WRIS) in the country