File No.I-12011/41/2019-WPP Coord.

भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन नदी विकास एवं गंगा संरक्षण विभाग
केंद्रीय जल आयोग
जल आयोजन एवं परियोजनासमन्वय निदेशालय

सत्यमेव जयते

Government of India
Ministry of Jal Shakti
Deptt. of Water Resources, RD&GR
Central Water Commission
WP&P COORDINATON DIRECTORATE

विषय: Information sought by Shri Vignesh R, 110, Vinayagar Kovil Street, Madurapuri, Alagapuri, Periyakulam, Theni, Tamilnadu - 625523 under RTI Act -2005 vide application dt 14/10/2019 (email- smartvigneshwaran@gmail.com)

With reference to above RTI Application, which was received in this office on 17-10-2019 on transfer from Nodal Officer for RTI, CWC, New Delhi, it is to inform that the information as available with WP&P Wing of CWC, New Delhi is furnished below:-

1. DPR of Mekedatu Balancing Reservoir Cum Drinking Water Project was submitted by Karnataka State Government to Central Water Commission in Jan-2019. The DPR is under examination/appraisal in CWC. As the DPR is of State Govt , as per RTI clause No 34, the information related to third party is not to be disclosed, Hence for copy of DPR, it is requested that concern State/ project authorities may please be contacted.

2. The copies of DPR of Mekedatu Balancing Reservoir Cum Drinking Water Project have been circulated to all concerned including Cauvery Water Management Authority (CWMA), CWC & Central Electricity Authority (CEA). Comments of specialized Directorates/ Divisions of CWC and CEA have been communicated to CWMA.

3.6 No information is available in respect of point No 3,4,5 &6. However it is to inform that the matter is sub judice as court case presently being heard in the Hon'ble supreme court of India. Last hearing was held on 08/11/2019.

Digitally signed by PADMA DORJE
Date:Thu Nov 14 15:09:23 IST 2019
Reason:Approved

निदेशक Director

ज.आ.एवं प. स.नि. तथा मुख्य जनसूचना अधिकारी WP&P (C) & CPIO

Shri Vignesh, 110, Vinayagar Kovil Street, Madurapuri, Alagapuri, Periyakulam, Theni, Tamilnadu - 625523

प्रति अवर सचिव एवं सूचना के अधिकार के नोडल अधिकारी, केंद्रीय जल आयोग, सेवा भवन, रामकृष्ण पुरम, नई दिल्ली-110066 को उनके पत्र सं॰ A-49012/8/2019/RTI/419 दिनांक 15-10-2019 के संदर्भ में सूचना एवं आवश्यक कार्यवाही हेतु ।

In case you are not satisfied with the information/ reply provided by this office, you may directly prefer an appeal within 30 days from the receipt of this letter to the first appellate authority whose address is given as under. Name, designation & address of Appellate Authority for WP&P wing of CWC is Chief Engineer (PAO), Central Water Commission, 7th Floor (S), SewaBhawan, R. K. Puram, New Delhi – 110066. Phone No. 26103561 Fax No.26103561. email-ceprjap@nic.in

File No.I-12011/41/2019-WPP Coord.

भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन नदी विकास एवं गंगा संरक्षण विभाग
केंद्रीय जल आयोग
जल आयोजन एवं परियोजनासमन्वय निदेशालय

सत्यमेव जयते

Government of India
Ministry of Jal Shakti
Deptt. of Water Resources, RD&GR
Central Water Commission
WP&P COORDINATON DIRECTORATE

RTI MATTER (SPEED/REG POST)

विषय: सूचना के अधिकार अधिनियम 2005 के अंतर्गत Shri Subramanya Sharma Velamuri, 11-85, Shastry Bhawan, Lok Ahitam Mama Karaneeyam, Vasudaa Lawas Chamers, Kottavalasa, Andhra Pradesh, Pin: 535183 (Email: lokahitammamakaraneeyam@gmail.com) **का** आवेदन (CWCND/R/2019/80191) दिनांक 15.10.2019 द्वारा मांगी गयी सूचना के संबंध में।

(Application dt 15/10/2019 under RTI Act of Shri Subramanya Sharma Velamuri, 11-85, Shastry Bhawan, Lok Ahitam Mama Karaneeyam, Vasudaa Lawas Chamers, Kottavalasa, Andhra Pradesh, Pin: 535183)

With reference to above RTI Application, which was received in this office on 16-10-2019 on transfer from Nodal Officer for RTI, CWC, New Delhi, it is to inform that the subject matter of the application does not pertain to the WP&P Wing of CWC. Hence the information may please be treated as NIL as far as WP&P Wing of CWC is concerned.

Digitally signed by PADMA DORJE
Date:Fri Oct 18 13:12:44 IST 2019
Reason:Approved

निदेशक Director

ज.आ.एवं प. स.नि. तथा मुख्य जनसूचना अधिकारी WP&P (C) & CPIO

Shri Subramanya Sharma Velamuri, 11-85, Shastry Bhawan, Lok Ahitam Mama Karaneeyam, Vasudaa Lawas Chamers, Kottavalasa, Andhra Pradesh, Pin: 535183

Copy for information and necessary action to the Under Secretary & Nodal Officer for RTI Matters, CWC, SewaBhawan, R. K. Puram, New Delhi with reference to the letter no.- A-49012/8/2019/RTI/422 dated 15-10-2019.

In case you are not satisfied with the information/ reply provided by this office, you may directly prefer an appeal within 30 days from the receipt of this letter to the first appellate authority whose address is given as under. **Name, designation & address of Appellate Authority for WP&P wing of CWC is Chief Engineer (PAO), Central Water Commission, 7th Floor (S), SewaBhawan, R. K. Puram, New Delhi – 110066. Phone No. 26103561 Fax No.26103561. email- ceprjap@nic.in**

तृतीय तल (द0), सेवा भवन, रामकृष्ण पुरम
नई दिल्ली-110066
दूरभाष : 011 29583225 , फैक्स : 011 29583209
ई मेल: wppcdte@nic.in
♦जल संरक्षण - सुरक्षित भविष्य♦

3rd FLOOR (S), SEWA BHAWAN, R.K.PURAM
NEW DELHI-110066
Tel.: 01129583225
Fax: 011 29583209
Email :- wppcdte@nic.in

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भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन नदी विकास एवं गंगा संरक्षण विभाग
केंद्रीय जल आयोग
जल आयोजन एवं परियोजनासमन्वय निदेशालय

सत्यमेव जयते

Government of India
Ministry of Jal Shakti
Deptt. of Water Resources, RD&GR
Central Water Commission
WP&P COORDINATON DIRECTORATE

विषय: सूचना का अधिकार, 2005 के अंतर्गत Shri Pankti Jog, B-3, Sahajanand Towers, Jivraj Park Cross Roiad, Ahemadabad, Gujarat, Pin 380051 (Email : jogpankti@gmail.com) का दिनांक 15/10/2019 का आवेदन (सीडबल्यूसीएनडी/आर/2019/80190) द्वारा मांगी गई सूचना के संबंध मे।

With reference to above RTI Application, which was received in this office on 16-10-2019 on transfer from Under Secretary & Nodal Officer for RTI, CWC, New Delhi, (No A-49012/8/2019/RTI/423dt 15/10/2019), , the point wise information available with WP&P Wing of CWC, New Delhi is as under:

S No	Information sought	Information/Reply
1	Certified copies of minutes of meeting held by Jalshakti department regarding Rann Sarovar project along with list of participants in each of the meeting.	A meeting of the Team of CWC Officers constituted to examine the Concept Note of "Ran Sarovar Development of little rann of Kutch was held on 30/05/2019 under the chairmanship of Chief Engineer Design (N&W), CWC". Copy of minutes of meeting enclosed as **Annexure-I**
2	Separate meeting was conducted for this project inviting 18 different departments. Please provide certified copies of document giving details of officers, their designation, who participated in this meeting and certified copies of notes submitted by your department regarding this, if any	The copy of information available with CWC enclosed as **Annexure- II.**
3	Certified copied of project proposal of Rann Sarovar Project and certified copies of instruction given to State Government regarding actions to be taken on this project (if any)	Copy of project proposal of Rann Sarovar is enclosed as **Annexure-III and Annexure-V**
4	Certified copy of notification for central committee constituted for Rann Sarovar Project (if any) and certified copy of its TOR.	copy of notification for central committee/Team constituted for Rann Sarovar Project by CWC is enclosed as **Annexure- IV**
5	As per section 4(1) c of RTI Act, all above information should be put in public domain. Kindly provide certified copies of document showing information disclosure and dissemination of this project.	The project is only at conceptual stage. CWC is coordinating between project proponent and DoWR, RD&GR for checking the feasibility of the proposal. Proposal is to be owned by Govt. of Gujarat only.
6	How are peripheral Gram Panchayats being informed about this project, kindly give certified copies of document showing the same?	Nil. Applicant is advised to contact concern department of Sate Govt/ Project Authorities in this regard

Annex 1 to V are being sent by email.

As far as the Xerox copy of documents consist of 71 pages can be made available after payment of relevant fee as prescribed under RTI Act, 2005 i.e Rs 142 for Xeroxing charges+ Rs 35 for postal charges i.e. in total Rs 177/- only. Amount shall be payable in the name of DDO-II, CWC, New Delhi by postal order..

Digitally signed by PADMA DORJE
Date:Thu Nov 14 12:18:32 IST 2019
Reason:Approved

निदेशक Director

ज.आ.एवं प. स.नि. तथा मुख्य जनसूचना अधिकारी WP&P (C) & CPIO

Shri. Shri Pankti Jog, B-3, Sahajanand Towers, Jivraj Park Cross Roiad, Ahemadabad, Gujarat, Pin 380051

प्रतिलिपि अवर सचिव एवं सूचना के अधिकार के नोडल अधिकारी, केंद्रीय जल आयोग, सेवा भवन, रामकृष्ण पुरम, नई दिल्ली-110066 को उनके पत्र सं॰ A-49012/8/2019/RTI/423 दिनांक 15-10-2019 के संदर्भ में सूचना एवं आवश्यक कार्यवाही हेतु ।

In case you are not satisfied with the information/ reply provided by this office, you may directly prefer an appeal within 30 days from the receipt of this letter to the first appellate authority whose address is given as under. Name, designation & address of Appellate Authority for WP&P wing of CWC is Chief Engineer (PAO), Central Water Commission, 7th Floor (S), Sewa Bhawan, R. K. Puram, New Delhi – 110066. Phone No. 26103561 Fax No.26103561. email-ceprjap@nic.in

तृतीय तल (द 0), सेवा भवन, रामकृष्ण पुरम
नई दिल्ली-110066
दूरभाष : 011 29583225 , फैक्स : 011 29583209
ई मेल: wppcdte@nic.in
♦जल संरक्षण - सुरक्षित भविष्यΣ

3rd FLOOR (S), SEWA BHAWAN, R.K.PURAM
NEW DELHI-110066
Tel.: 01129583225
Fax: 011 29583209
Email :- wppcdte@nic.in

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I/9871/2019

भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन नदी विकास एवं गंगा संरक्षण विभाग
केंद्रीय जल आयोग
जल आयोजन एवं परियोजना समन्वय निदेशालय

सत्यमेव जयते

Government of India
Ministry of Jal Shakti
Deptt. of Water Resources, RD&GR
Central Water Commission
WP&P COORDINATON DIRECTORATE

RTI MATTER
SPEED/REG POST

दिनांक: 31-10-2019

विषय: सूचना का अधिकार, 2005 के अंतर्गत श्री निखिल केशरवानी, कमरा नं0-208, 2 रूम फील्ड हॉस्टल, ATP कालोनी, अनपरा, जिला- सोनभद्र (उ0प्र0)-231225 के दिनांक 24-10-2019 के आवेदन (MOWRC/R/2019/90039) द्वारा मांगी गई सूचना के संबंध मे ।

सूचना के अधिकार अधिनियम, 2005 के अंतर्गत मुख्य जन सूचना अधिकारी, जल संसाधन, नदी विकास एवं गंगा संरक्षण विभाग, नई दिल्ली तथा अवर सचिव एवं नोडल अधिकारी, सूचना का अधिकार, केन्द्रीय जल आयोग, नई दिल्ली से स्थानांतरित होकर इस कार्यालय में दिनांक 25-10-2019 को प्राप्त उपरोक्त आवेदन के संदर्भ में सूचित किया जाता है कि सूचना का विषय केन्द्रीय जल आयोग के जल आयोजन एवं परियोजना स्कन्ध से संबन्धित नहीं होने के कारण सूचना उपलब्ध नहीं है ।

Digitally signed by PADMA DORJE
Date:Thu Oct 31 16:31:05 IST 2019
Reason:Approved

निदेशक
ज0आ0एवंप0स0नि0
तथा मुख्य जनसूचना अधिकारी

श्री निखिल केशरवानी, कमरा नं0-208, 2 रूम फील्ड हॉस्टल, ATP कालोनी, अनपरा, जिला- सोनभद्र (उ0प्र0)-231225.

प्रति अवर सचिव एवं सूचना के अधिकार के नोडल अधिकारी, केंद्रीय जल आयोग, सेवा भवन, रामकृष्ण पुरम, नई दिल्ली-110066 को उनके पत्र सं0 A-49012/8/2019/RTI/440 दिनांक 25-10-2019 के संदर्भ में सूचना एवं आवश्यक कार्यवाही हेतु ।

In case you are not satisfied with the information/ reply provided by this office, you may directly prefer an appeal within 30 days from the receipt of this letter to the first appellate authority whose address is given as under. **Name, designation & address of Appellate Authority for WP&P wing of CWC is Chief Engineer (PAO), Central Water Commission, 7th Floor (S), Sewa Bhawan, R. K. Puram, New Delhi – 110066. Phone No. 26103561 Fax No.26103561. email- ceprjap@nic.in**

AM-4259

Most Immediate
RTI Matter

No. A-49012/8/2019/RTI/440
Government of India
Central Water Commission
RTI Cell
***

4th Floor (S), CWC
Sewa Bhawan, R.K. Puram
New Delhi-110066
Date: 25.10.2019

Sub :- RTI Application Under RTI Act 2005 of Shri Nikhil Kesharwani, Room No.208, Two Room Field Hostel ATP Colony Anpar, Anpara – 231225, Uttar Pradesh .

A copy of above RTI application Regd. No.CWCND/R/2019/80196 dated 24.10.2019 is transferred to you for taking necessary action under the provisions of RTI Act, 2005.

You are requested to kindly furnish the desired information directly to the applicant within the stipulated period under the RTI Act, 2005. In case the information asked for by the applicant also pertains to some other CPIO(s) or to some other Ministry (ies)/ Department(s), the same may also be transferred to him/them under the provisions of the RTI Act, 2005.

(Rajesh Sharma)
Under Secretary & Nodal Officer
Tel: 011-2958 3317

To

1. Director (RMCD) & CPIO, CWC, 2nd Floor, Sewa Bhawan, New Delhi.
2. Director (WP&PC) & CPIO, 3th Floor, CWC, Sewa Bhawan, New Delhi.

Copy to,

Shri Nikhil Kesharwani, Room No.208, Two Room Field Hostel ATP Colony Anpar, Anpara – 231225, Uttar Pradesh .

RTI REQUEST DETAILS

Registration No. :	CWCND/R/2019/80196	**Date of Receipt :**	24/10/2019
Transferred From :	Ministry of Water Resources, River Development & Ganga Rejuvenation on 24/10/2019 With Reference Number : MOWRC/R/2019/90039		
Remarks :	**Transferred u/s 6(3) of the RTI Act, 2005. In case, it does not fall under your jurisdiction, it may please be further transferred to the public authority to which the subject matter is more closely connected.**		
Type of Receipt :	Electronically Transferred from Other Public Authority	**Language of Request :**	English
Name :	NIKHIL KESHARWANI	**Gender :**	Male
Address :	Room no 208 Two Room Field Hostel ATP Colony Anpar, ANPARA, Pin:231225		
State :	Uttar Pradesh	**Country :**	Details not provided
Phone No. :	Details not provided	**Mobile No. :**	+91-8285481429
Email :	nikhilrkgitme@gmail.com		
Status(Rural/Urban) :	Urban	**Education Status :**	Graduate
Letter No. :	Details not provided	**Letter Date :**	Details not provided
Is Requester Below Poverty Line ? :	No	**Citizenship Status**	Indian
Amount Paid :	0 (RTI fee is received by **National Institution for Transforming India (NITI Aayog) (original recipient)**)	**Mode of Payment**	Payment Gateway
Request Pertains to :			
Information Sought :	Transferred under section 6 (3) of the RTI Act, 2005.		
Original RTI Text :	As due to late monsoon, there were the situation of flood was very serious in UP, BIHAR, and in even big cities like Mumbai. What are the steps being taken for not repetition of problem in near future. What are there progresses in those steps. How much capital required for solving these type of frequent problem. How much budget is allocated for solving thes problem.		

Print Save Close

25/10/19
90 (RTI)

File No.I-12011/41/2019-WPP Coord.

भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन नदी विकास एवं गंगा संरक्षण विभाग
केंद्रीय जल आयोग
जल आयोजन एवं परियोजनासमन्वय निदेशालय

सत्यमेव जयते

Government of India
Ministry of Jal Shakti
Deptt. of Water Resources, RD&GR
Central Water Commission
WP&P COORDINATON DIRECTORATE

विषय: सूचना का अधिकार, 2005 के अंतर्गत Shri Ashish Awasthy, Public Health Foundation of India, Gurugram, Haryana Pin 122002 (email- ashishbhuims@gmail.com) का दिनांक 24/10/2019 का आवेदन (सीडबल्यूसीएनडी/आर/2019/50168) द्वारा मांगी गई सूचना के संबंध मे।

With reference to above RTI Application, which is received in this office on 25-10-2019 on transfer from Under Secretary & Nodal Officer for RTI, CWC, New Delhi, (No A-49012/8/2019/RTI/445 dt 25-10-2019), it is to inform that the information asked is not available in WP&P Wing of CWC, the information may please treated as NIL as far as WP&P Wing of CWC, New Delhi is concerned..

Digitally signed by PADMA DORJE
Date:Fri Nov 15 09:19:12 IST 2019
Reason: Approved

निदेशक Director
ज.आ.एवं प. स.नि. तथा मुख्य जनसूचना अधिकारी WP&P (C) & CPIO

Shri Ashish Awasthy, Public Health Foundation of India, Gurugram, Haryana Pin 122002

प्रति अवर सचिव एवं सूचना के अधिकार के नोडल अधिकारी, केंद्रीय जल आयोग, सेवा भवन, रामकृष्ण पुरम, नई दिल्ली-110066 को उनके पत्र सं. A-49012/8/2019/RTI/445 दिनांक 25-10-2019 के संदर्भ में सूचना एवं आवश्यक कार्यवाही हेतु ।

In case you are not satisfied with the information/ reply provided by this office, you may directly prefer an appeal within 30 days from the receipt of this letter to the first appellate authority whose address is given as under. **Name, designation & address of Appellate Authority for WP&P wing of CWC is Chief Engineer (PAO), Central Water Commission, 7th Floor (S), Sewa Bhawan, R. K. Puram, New Delhi – 110066. Phone No. 26103561 Fax No.26103561. email-ceprjap@nic.in**

तृतीय तल (द0), सेवा भवन, रामकृष्ण पुरम
नई दिल्ली-110066
दूरभाष : 011 29583225 , फैक्स : 011 29583209
ई मेल: wppcdte@nic.in
♦जल संरक्षण - सुरक्षित भविष्यΣ

3rd FLOOR (S), SEWA BHAWAN, R.K.PURAM
NEW DELHI-110066
Tel.: 01129583225
Fax: 011 29583209
Email :- wppcdte@nic.in

♦Conserve Water- Save Life♦

File No.I-12011/41/2019-WPP Coord.

भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन नदी विकास एवं गंगा संरक्षण विभाग
केंद्रीय जल आयोग
जल आयोजन एवं परियोजनासमन्वय निदेशालय

सत्यमेव जयते

Government of India
Ministry of Jal Shakti
Deptt. of Water Resources, RD&GR
Central Water Commission
WP&P COORDINATON DIRECTORATE

विषय: सूचना का अधिकार, 2005 के अंतर्गत श्री धीरज मिश्रा, F-44-45, शहीद भगत सिंह मार्ग, लेन जैन भवन के सामने, गोल मार्केट, नई दिल्ली–110001 (email dheerajmishra019@gmail.com) के दिनांक 24-10-2019 का आवेदन (MOWRC/R/2019/90040) द्वारा मांगी गई सूचना के संबंध मे।

With reference to above RTI Application, which is received in this office on 25-10-2019 on transfer from Under Secretary & Nodal Officer for RTI, CWC, New Delhi, (No A-49012/8/2019/RTI/441 dt 25-10-2019), it is to inform that the information asked is not available in WP&P Wing of CWC, the information may please treated as NIL as far as WP&P Wing of CWC, New Delhi is concerned..

Digitally signed by PADMA DORJE
Date:Fri Nov 15 09:18:40 IST 2019
Reason:Approved

निदेशक Director
ज.आ.एवं प. स.नि. तथा मुख्य जनसूचना अधिकारी WP&P (C) & CPIO

अंतर्गत श्री धीरज मिश्रा, F-44-45, शहीद भगत सिंह मार्ग, लेन जैन भवन के सामने, गोल मार्केट, नई दिल्ली--110001

प्रति अवर सचिव एवं सूचना के अधिकार के नोडल अधिकारी, केंद्रीय जल आयोग, सेवा भवन, रामकृष्ण पुरम, नई दिल्ली-110066 को उनके पत्र सं. A-49012/8/2019/RTI/441 दिनांक 25-10-2019 के संदर्भ में सूचना एवं आवश्यक कार्यवाही हेतु ।

In case you are not satisfied with the information/ reply provided by this office, you may directly prefer an appeal within 30 days from the receipt of this letter to the first appellate authority whose address is given as under. **Name, designation & address of Appellate Authority for WP&P wing of CWC is Chief Engineer (PAO), Central Water Commission, 7th Floor (S), Sewa Bhawan, R. K. Puram, New Delhi – 110066. Phone No. 26103561 Fax No.26103561. email-ceprjap@nic.in**

तृतीय तल (द 0), सेवा भवन, रामकृष्ण पुरम
नई दिल्ली-110066
दूरभाष : 011 29583225 , फैक्स : 011 29583209
ई मेल: wppcdte@nic.in
♦जल संरक्षण - सुरक्षित भविष्यΣ

3rd FLOOR (S), SEWA BHAWAN, R.K.PURAM
NEW DELHI-110066
Tel.: 01129583225
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Email :- wppcdte@nic.in

♦Conserve Water- Save Life♦

File No.I-12011/41/2019-WPP Coord.

भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन नदी विकास एवं गंगा संरक्षण विभाग
केंद्रीय जल आयोग
जल आयोजन एवं परियोजनासमन्वय निदेशालय

सत्यमेव जयते

Government of India
Ministry of Jal Shakti
Deptt. of Water Resources, RD&GR
Central Water Commission
WP&P COORDINATON DIRECTORATE

RTI MATTER
SPEED/REG POST

विषय: सूचना का अधिकार, 2005 के अंतर्गत Shri Fazil Khan, B-Wing, First Floor, 15-16 Express Trade Tower, Sector 16 A, Noida, Uttar Pradesh Pin 201301 email.: khanfazil444@gmail.com के दिनांक 24-10-2019 का आवेदन (MOWRC/R/2019/50446) द्वारा मांगी गई सूचना के संबंध मे।

सूचना के अधिकार अधिनियम, **2005** के अंतर्गत अवर सचिव एवं नोडल अधिकारी, सूचना का अधिकार, केन्द्रीय जल आयोग, नई दिल्ली से स्थानांतरित होकर इस कार्यालय में दिनांक **25-10**-2019 को प्राप्त उपरोक्त आवेदन के संदर्भ में सूचित किया जाता है कि चाही गई सूचना केन्द्रीय जल आयोग के जल आयोजन एवं परियोजना स्कन्ध से संबन्धित नहीं होने के कारण सूचना उपलब्ध नहीं / शून्य है ।

Digitally signed by PADMA DORJE
Date:Wed Nov 20 09:46:13 IST 2019
Reason:Approved

निदेशक
ज 0 आ 0 एवंप 0 स 0 नि0
तथा मुख्य जनसूचना अधिकारी

Shri Fazil Khan, B-Wing, First Floor, 15-16 Express Trade Tower, Sector 16 A, Noida, Uttar Pradesh Pin 201301

प्रति अवर सचिव एवं सूचना के अधिकार के नोडल अधिकारी, केंद्रीय जल आयोग, सेवा भवन, रामकृष्ण पुरम, नई दिल्ली-110066 को उनके पत्र सं0 A-49012/8/2019/RTI/443 दिनांक 25-10-2019 के संदर्भ में सूचना एवं आवश्यक कार्यवाही हेतु ।

In case you are not satisfied with the information/ reply provided by this office, you may directly prefer an appeal within 30 days from the receipt of this letter to the first appellate authority whose address is given as under. **Name, designation & address of Appellate Authority for WP&P wing of CWC is Chief Engineer (PAO), Central Water Commission, 7th Floor (S), SewaBhawan, R. K. Puram, New Delhi – 110066. Phone No. 26103561 Fax No.26103561. email-ceprjap@nic.in**

तृतीय तल (द 0), सेवा भवन, रामकृष्ण पुरम
नई दिल्ली-110066
दूरभाष : 011 29583225 , फैक्स : 011 29583209
ई मेल: wppcdte@nic.in
♦जल संरक्षण - सुरक्षित भविष्य♦

3rd FLOOR (S), SEWA BHAWAN, R.K.PURAM
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I/9870/2019

भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन नदी विकास एवं गंगा संरक्षण विभाग
केंद्रीय जल आयोग
जल आयोजन एवं परियोजना समन्वय निदेशालय

सत्यमेव जयते

Government of India
Ministry of Jal Shakti
Deptt. of Water Resources, RD&GR
Central Water Commission
WP&P COORDINATON DIRECTORATE

RTI MATTER
SPEED/REG POST

दिनांक: 31-10-2019

विषय: सूचना का अधिकार, 2005 के अंतर्गत श्री राज कुमार महतो, पुटकी, बलिहारी एरिया, मोड़ नं0 7, प्रेम नगर, पुटकी, पोस्ट आफिस- कुसुंदा (झारखंड)-828116 के दिनांक 24-10-2019 के आवेदन (IMETD/R/2019/50270) द्वारा मांगी गई सूचना के संबंध मे ।

सूचना के अधिकार अधिनियम, 2005 के अंतर्गत मुख्य जन सूचना अधिकारी, भारत मौसम विज्ञान विभाग, नई दिल्ली तथा अवर सचिव एवं नोडल अधिकारी, सूचना का अधिकार, केन्द्रीय जल आयोग, नई दिल्ली से स्थानांतरित होकर इस कार्यालय में दिनांक 25-10-2019 को प्राप्त उपरोक्त आवेदन के संदर्भ में सूचित किया जाता है कि सूचना का विषय केन्द्रीय जल आयोग के जल आयोजन एवं परियोजना स्कन्ध से संबन्धित नहीं होने के कारण सूचना उपलब्ध नहीं है ।

Digitally signed by PADMA DORJE
Date:Thu Oct 31 16:32:41 IST 2019
Reason:Approved

निदेशक
ज0आ0एवंप0स0नि0
तथा मुख्य जनसूचना अधिकारी

श्री राज कुमार महतो, पुटकी, बलिहारी एरिया, मोड़ नं0 7, प्रेम नगर, पुटकी, पोस्ट आफिस- कुसुंदा (झारखंड)-828116.

प्रति अवर सचिव एवं सूचना के अधिकार के नोडल अधिकारी, केंद्रीय जल आयोग, सेवा भवन, रामकृष्ण पुरम, नई दिल्ली-110066 को उनके पत्र सं0 A-49012/8/2019/RTI/444 दिनांक 25-10-2019 के संदर्भ में सूचना एवं आवश्यक कार्यवाही हेतु ।

In case you are not satisfied with the information/ reply provided by this office, you may directly prefer an appeal within 30 days from the receipt of this letter to the first appellate authority whose address is given as under. **Name, designation & address of Appellate Authority for WP&P wing of CWC is Chief Engineer (PAO), Central Water Commission, 7th Floor (S), Sewa Bhawan, R. K. Puram, New Delhi – 110066. Phone No. 26103561 Fax No.26103561. email- ceprjap@nic.in**

Attd 297

Most Immediate
RTI Matter

No. A-49012/8/2019/RTI/444
Government of India
Central Water Commission
RTI Cell
***

4th Floor (S), CWC
Sewa Bhawan, R.K. Puram
New Delhi-110066
Date: 25.10.2019

Sub :- RTI Application Under RTI Act 2005 of Shri Raj Kumar Mahato, Putki Balihari Area more no. 07, Prem Nagar, Putki, P.O.- Kusunda, PS – Putki -828116, Jharkhand.

A copy of above RTI application Regd. No.CWCND/R/2019/90004 dated 24.10.2019 is transferred to you for taking necessary action under the provisions of RTI Act, 2005.

You are requested to kindly furnish the desired information directly to the applicant within the stipulated period under the RTI Act, 2005. In case the information asked for by the applicant also pertains to some other CPIO(s) or to some other Ministry (ies)/ Department(s), the same may also be transferred to him/them under the provisions of the RTI Act, 2005.

(Rajesh Sharma)
Under Secretary & Nodal Officer
Tel: 011-2958 3317

To

1. Director (RMCD) & CPIO, CWC, 2nd Floor, Sewa Bhawan, New Delhi.
2. Director (WP&PC) & CPIO, 3th Floor, CWC, Sewa Bhawan, New Delhi.
3. S.E.(Coord.) & CPIO, Lower Ganga Basin Organisation, Central Water Commission, 177-B, Sri Krishna Puri, **Patna-800001 (Bihar)**

Copy to,

Shri Raj Kumar Mahato, Putki Balihari Area more no. 07, Prem Nagar, Putki, P.O.- Kusunda, PS – Putki -828116, Jharkhand.

RTI REQUEST DETAILS

Registration No. :	CWCND/R/2019/90004	**Date of Receipt :**	24/10/2019
Transferred From :	India Meteorological Department on 24/10/2019 With Reference Number : IMETD/R/2019/50270		
Type of Receipt :	Electronically Transferred from Other Public Authority	**Language of Request :**	English
Name :	RAJ KUMAR MAHATO	**Gender :**	Male
Address :	PUTKI BALIHARI AREA MORE NO.07,PREM NAGAR PUTKI, P.O.-KUSUNDA , P.S.-PUTKI, Pin:828116		
State :	Jharkhand	**Country :**	Details not provided
Phone No. :	Details not provided	**Mobile No. :**	+91-9204527325
Email :	prithviraj1234mahato@gmail.com		
Status(Rural/Urban) :	Rural	**Education Status :**	Above Graduate
Letter No. :	Details not provided	**Letter Date :**	Details not provided
Is Requester Below Poverty Line ? :	No	**Citizenship Status**	Indian
Amount Paid :	10)	**Mode of Payment**	Payment Gateway

Request Pertains to :

Information Sought :

Dear Sir,
Kindly refer online RTI application dated 21.10.2019 received through RTI Online portal from Shri Raj Kumar Mahato, Putki, Jharkhand, seeking information related to Rainfall data and Run Off data of Dhanbad district for the period 2008 to 2018. However as the information pertaining to Run Off data of Dhanbad district is closely related to your office, hence the application is transferred u/s 6(3) of the Act for na. Regards,IMD,RMC Kolkata,ACPIO For CPIO.

Original RTI Text :

With due respect I Raj Kumar Mahato currently Pursuing M.TECH with water Engg & management from Central University of Jharkhand. I am working on PROMET Modeling for improvement of GROUND WATER RECHARGE OF DHANBAD DISTRICT(JHARKHAND). For this I need Rainfall and Runoff data of Dhanbad District.
So Please send me the Rainfall and Runoff Data of DHANBAD DISTRICT (JHARKHAND) FROM 2008 TO 2018.
Thanks & Regards
Raj Kumar Mahato

Print Save Close

25/10/19 SO (RTI)

File No.I-12011/41/2019-WPP Coord.

भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन नदी विकास एवं गंगा संरक्षण विभाग
केंद्रीय जल आयोग
जल आयोजन एवं परियोजनासमन्वय निदेशालय

सत्यमेव जयते

Government of India
Ministry of Jal Shakti
Deptt. of Water Resources, RD&GR
Central Water Commission
WP&P COORDINATON DIRECTORATE

विषय: सूचना का अधिकार, 2005 के अंतर्गत Shri Kunal P Singh, Shriji Nirwana, Building No. 1, Room No 303, Opposite to Katrap Vidhyalaya, Badlapur, Thane District, Maharastra,Pin 421503 (email- kunalpsingh108@gmail.com) का दिनांक 30/10/2019 का आवेदन (सीडबल्यूसीएनडी/आर/2019/50169) द्वारा मांगी गई सूचना के संबंध मे।

With reference to above RTI Application, which is received in this office on 31-10-2019 on transfer from Under Secretary & Nodal Officer for RTI, CWC, New Delhi, (No A-49012/8/2019/RTI/447 dt 31-10-2019, the desired information (Report of the Standing Sub-committee for Assessment of Availability and Requirement of water for diverse uses in the country, 2000) is enclosed herewith.

Encl: As Above

Digitally signed by PADMA DORJE
Date:Fri Nov 15 09:17:44 IST 2019
Reason:Approved

निदेशक Director
ज.आ.एवं प. स.नि. तथा मुख्य जनसूचना अधिकारी WP&P (C) & CPIO

Shri Kunal P Singh, Shriji Nirwana, Building No. 1, Room No 303, Opposite to Katrap Vidhyalaya, Badlapur, Thane District, Maharastra,Pin 421503

प्रति अवर सचिव एवं सूचना के अधिकार के नोडल अधिकारी, केंद्रीय जल आयोग, सेवा भवन, रामकृष्ण पुरम, नई दिल्ली-110066 को उनके पत्र सं. A-49012/8/2019/RTI/447 दिनांक 31-10-2019 के संदर्भ में सूचना एवं आवश्यक कार्यवाही हेतु ।

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तृतीय तल (द 0), सेवा भवन, रामकृष्ण पुरम
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ई मेल: wppcdte@nic.in
♦जल संरक्षण - सुरक्षित भविष्यΣ

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NEW DELHI-110066
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Email :- wppcdte@nic.in

♦**Conserve Water- Save Life**♦

BP Dte
O/C

REPORT OF

THE STANDING SUB-COMMITTEE

FOR

ASSESSMENT OF AVAILABILITY AND REQUIREMENT OF WATER FOR DIVERSE USES IN THE COUNTRY

MINISTRY OF WATER RESOURCES
CENTRAL WATER COMMISSION
NEW DELHI
AUGUST, 2000

FOREWORD

Water is nature's most invaluable gift and is also the basic necessity for sustaining life on this planet. For centuries, water has been considered as the resource taken for granted. Abundant rain, rivers and streams whose flow was perennially renewed assured the growing civilisation on the assumption that this wealth would never run out. Yet over the last two decades, we have squandered this once - plentiful resource, so that for many countries water scarcity is the single most critical limiting factor for development. The way in which we use or misuse water affects the quality and the availability of this most pecious resource not only for oneself, one's community, one's country, one's generation, but also for coming generations in the global eco-system. The paradigms of development have been based on evermore intensive and wasteful use of water.

The human activities on the land are the major causes of both water shortages and water pollution. Agricultural demands more land to farm and so the forests are cut down to clear land for farming with a little knowledge or concern for the fact that somewhere downstream rivers are drying up and fields are becoming deserts. Industrial growth demands more water for its processes so clean water is pumped out of rivers and the waste is pumped in. The growing demand of cities also puts enormous pressure on water sources. The water for drinking, irrigation, industry and other requirements all comes from the same source which are not being replenished as fast as before. Similarly the ground water reserves are approaching the threshold of sustainability that points out that the rate at which these are depleted is higher than the rate at which these can be replenished. These concerns affirm commitments to seek common solutions for sustainability of fresh water resources both in terms of their supply and quality.

The National Water Policy, 1987 also gives emphasis that water being the most crucial elements in the developmental planning and as such efforts to develop, conserve, utilise and manage this important resources have to be guided by National Perspective. Keeping this in view and also that a large quantities of water in addition to existing uses are required for meeting specially the food and drinking water requirement for a large and growing population in the country, the Ministry of Water Resources constituted in 1996, a Standing Sub-Committee for assessment of availability and requirement of water for diverse uses in the country under the Chairmanship of Member (WP&P), CWC. The Committee was assigned to assess the present and long term availability of utilisable water in the country, present use and future demand in next 25-50 years for diverse uses and suggest yardsticks and prepare guidelines on various related aspects.

The Standing Sub-Committee benefitting from views/suggestions and contribution of the representative members of the Ministries of Agriculture, Urban Development, Rural Development, Industry, Environment & Forest, Surface Transport, Power, Water Resources, Central Ground Water Board, has prepared its report. The Report of the Standing Sub-Committee on "assessment of availability and requirement of water for diverse uses in the country and guidelines" contains availability of water, the assessment of water requirement for domestic, irrigation, industrial sectors, etc., for the years 2000, 2010, 2025 and 2050. The report gives the river basinwise requirement of water for domestic and irrigation sectors, however, for other sectors the overall requirement of water have been given due to constraints in their basinwise assessments. The report also contains the basinwise demand management and the suggested yardsticks and guidelines for assessment of availability and demand of water for diverse uses.

Shri Ravinder Singh, Chief Engineer (BPMO) & Member-Secretary of the Sub-Committee had the responsibility for organising meetings and overall co-ordination with the Committee members. The work of finalisation of the Report has been accomplished by the Basin Planning Directorate. The team headed by Shri R.P. Saxena, Director along with his Deputy Directors, Assistant Directors and staff of the Directorate has done an excellent work.

The valuable contribution and support of all the members of the Sub-Committee received all along the deliberations of the meetings of the Committee are highly appreciated but for which, the task could have not been performed.

This report of the Standing Sub-Committee should be useful as benchmark study for deliberations of the Standing Committee for setting up coordination mechanism in all the States/UTs to work out future strategies and ways and means to harmonise and optimal use of water resources in the country for diverse purposes.

NEW DELHI
AUGUST, 2000

(R.S.PRASAD)
MEMBER (WP&P), CWC &
CHAIRMAN OF THE
STANDING SUB-COMMITTEE

List of Officers of Basin Planning Directorate associated with preparation of the Report.

1. Shri R. P. Saxena, Director
2. Shri A. K. Mohinta, Deputy Director
3. Shri B. P .Pandey, Deputy Director
4. Shri M. A. Kirmani, Deputy Director
5. Shri Shakti Sarraf, Assistant Director
6. Shri Ashis Banerjee, Assistant Director
7. Shri M. Appa Rao, E.A.D.
8. Shri P. K. Sen, E.A.D
9. Shri A. K. Sharma, PS
10. Shri O. P. Haridasan, Steno
11. Shri S. R. Dixit, Sr. Computer
12. Shri D. C. Sharma, UDC
13. Shri Swaran Singh, D'man Grade I
14. Shri Chetan Dev, D'man Grade II

CONTENTS

1.0 BACKGROUND

Water is a key element in the socio-economic development of a country. In India, water resources development has been traditionally for irrigated agriculture. Irrigation accounts for around 80% of the total water use at present. However, with the rapid growth in population coupled with overall economic development due to industrialisation and urbanisation, the demand of water for domestic and industrial uses is increasing at an enormous rate. Although irrigated agriculture will continue to be the major consumer of water, it has to face competition from other uses in the future in several areas of the country. With increasing demand of water for various basic and developmental purposes, water is becoming scarce in many river basins. It has become necessary to develop and manage the limited water resources of the country in an optimal manner so that the demands of water for various purposes continue to be met in the future.

India's National Water Policy recommends development and management of water resources at the basin or sub-basin level which is the basic hydrological unit, taking into consideration the various demands for water.

Efficient planning and management of water resources call for an accurate assessment of the present and future demands of water for various purposes.

In the case of irrigated agriculture, the present and future water requirements for irrigation have been assessed based on the present irrigation development and ultimate irrigation potential. Efforts are also underway to reassess the ultimate irrigation potential basin-wise so that the water requirements for irrigation basin-wise could be updated accurately.

In the case of domestic and industrial water demands, the estimates that have been made so far, were either for the country as a whole or for individual States. The estimates were also very approximate. No serious attempt has so far been made to assess the domestic and industrial water requirements basin-wise, which is very essential for basin level planning and management of water resources as recommended by the National Water Policy.

With a view to estimate the requirements of water for diverse uses in the river basins for the next 25-50 years, the Ministry of Water Resources (MOWR) has constituted a Standing Sub-Committee in September 1996 with Member (WP&P), Central Water Commission as Chairman, representatives of the Ministries of Urban Affairs & Employment, Rural Areas & Employment, Industry, Surface Transport, Environment & Forests, Agriculture & Co-operation and Power, Commissioner (PP), MOWR as Members and Chief Engineer (Basin Planning & Management organisation), Central Water Commission as Member-Secretary vide Ministry of Water Resources, Government of India No. 2/3/86-PP (Vol. V) dated New Delhi, the 4th September, 1996 which is shown at Annex-1.

The Standing Sub-Committee held five meetings. During the meetings of the Sub-Committee, it was decided that the respective Ministries would prepare perspective plans for the sector after assessing the water requirements for the sector dealt by them for the years 1996, 2000, 2010, 2025 and 2050. However, no perspective plan was received from any of the Members. In view of this, it was desired by MOWR that the Member-Secretary would attempt rough perspective requirements for various water uses based on the available information with them which can be refined, improved and updated in terms of details and the methodology/ basis indicated by respective Ministries. It was initially accepted that the respective ministries may have much more information and details with them and they may have suggestions for detailed working out of water requirements. The intention of this document is to give an account of whatever material/ basis is available/ adopted by MOWR and other Members. The respective ministries were sought to give a critical look and give suggestions for modifications/ improvements in this regard. To prepare the perspective plan for different sectors i.e. irrigation, industries, urban and rural water supplies, Sub-Groups/Working-Groups were constituted by concerned Ministries. Some feedback was received from Ministry of Urban Affairs and Employment, Ministry of Rural Areas and Employment. The report has been prepared with their feedback. The portion pertaining to Industrial Sector, Energy Sector and Navigation has been revised on the basis of latest information / data supplied by Ministry of Industry, Ministry of Power (Central Electricity Authority) and Ministry of Surface Transport (Inland Waterways Authority of India) during the meetings of the Standing Sub-Committee.

2.0 RIVER BASINS OF INDIA AND THEIR WATER RESOURCES

The precipitation is the source of fresh water on the earth. The total precipitation in India is of the order of 4000 billion cubic metre (BCM). More than 80% of this occurs during the five monsoon months of June to October.

River basin is the basic hydrological unit for water resources planning and management. In India there are twelve major river basins each having a drainage area exceeding 20000 sq.km. These are: (1) Indus; (2) Ganga-Brahmaputra-Meghna; (3) Godavari; (4) Krishna; (5) Cauvery; (6) Mahanadi; (7) Pennar; (8) Brahmani-Baitarani; (9) Sabarmati; (10) Mahi; (11) Narmada and (12) Tapi. The remaining medium rivers (with drainage area from 2000 to 20000 sq.km) and minor rivers (with drainage area less than 2000 sq.km) are combined together suitably to make eight composite river basins for the purpose of planning and management. These eight composite river basins are : (1) Subernarekha - combining Subernarekha and other small rivers between Subernarekha and Baitarani; (2) East flowing rivers between Mahanadi and Pennar; (3) East flowing rivers between Pennar and Kanyakumari; (4) Area of Inland Drainage in Rajasthan Desert; (5) West Flowing rivers of Kutch and Saurashtra including Luni; (6) West Flowing rivers from Tapi to Tadri; (7) West flowing rivers from

Tadri to Kanyakumari and (8) Minor rivers draining into Bangladesh and Myanmar (Burma).

A map of India showing all the twenty river basins is given at Fig. 1.

2.1 Availability of utilisable water in the country

The water resources potential in the river basins of the country has been assessed from time to time. The assessment made by the First Irrigation Commission (1902-03) for all the river systems in India was 1443 BCM. The assessment made in 1949 based on Khosla's formula worked out to be 1673 BCM. According to the study made by the Central Water and Power Commission during 1954-66 based on statistical analysis of flow data and on rainfall - runoff relationships, the water resources potential of various river systems amounted to 1881 BCM. The CWC Publication on "Water Resources of India" (1988) contain the water resources potential for the entire country as 1880 BCM.

The latest assessment made by the Central Water Commission in the year 1993. These assessments were mostly based on discharge observations conducted by CWC and were considered as reliable. The data on upstream abstractions were collected from various sources and varying assumptions had necessarily to be resorted to wherever data were not readily available. Similarly ground water abstractions were generally estimated by Central Ground Water Board and State Ground Water Board and these estimates were invariably district or taluk wise and not basin or sub-basin wise. The basinwise figures were worked out by area proportionate basis. It was suggested that it would be more convenient if ground water studies are carried out basin or sub-basinwise. According to these estimates the average annual run-off in the rivers of the country is assessed as 1869 Billion Cubic Metre (BCM) The reassessment studies carried out by CWC in 1993 had some limitations:

(1) For working out the upstream abstractions for various uses, assumptions had to be made depending upon the type of data that could be obtained for the abstractions. Uniform procedure could not naturally be adopted for all the river basins. Particularly for estimating withdrawals for irrigation which is the major consumer of water varying assumptions had to be made. In many cases while diversions from major and medium irrigation projects were available, those from minor schemes were seldom available.

(2) In most of the cases the year-wise withdrawal from ground water has been estimated approximately assuming linear variation between the State-wise draft given by the Irrigation Commission of 1972 for the year 1967-68 and by the Central Ground Water Board for the year 1983-84, and interpolating for other years.

(3) Return flows have been assumed to be 10% in the case of irrigation (major and medium) and 80% in the case of domestic and industrial supplies which are only approximate.

The utilisable flow from a river basin can be considered as the quantum of water that can be withdrawn from its natural occurrence. The withdrawal of water will mainly depend on the possibility of having storage and diversion structures and as well as availability of land. There may be constraints in development of such structures due to physiographic conditions, environmental consideration, technology available, economic viability etc.

The utilisable surface water was estimated in the past by different authorities. The Irrigation Commission (1972) estimated the utilisable quantity as 666 BCM from surface water. The National Commission on Agriculture (1976) estimated the utilisable flow as 700 BCM. Dr. K.L. Rao, suggested that the utilisable flows should be nearly 50 percent of annual water reserve. The Central Water Commission, keeping in view the various constraints estimated that only about 690 BCM of water can be put to beneficial use by conventional measures through surface structure. Apart from this, the quantum of utilisable ground water has been estimated as 432 BCM. Basin-wise surface water resources potential is given in Table -1, Table - 2 gives information on basinwise replenishable ground water potential.

Recently a National Commission for Integrated Water Resources Development Plan (NCIWRDP) was set up by the MOWR in September, 1996. The issue of water availability was also examined by the National Commission. According to National Commission the total water resources of the country is estimated as 1952.87 or 1953 BCM. It may be mentioned that water availability as assessed by National Commission is same in all the basins (as assessed by CWC) except Brahmaputra and Krishna Basin.

In Brahmaputra Basin, CWC considered the flows as 537.24 BCM as assessed by the Brahmaputra Board in their report of 1987 which contains average flow upto Jogighopa site on Brahmaputra. There are however, certain tributaries like Gaurang, Sankosh, Tipka, Torsa, Teesta, Jinjiram etc. which join Brahmaputra downstream of Jogighopa. The National Commission estimated the additional contribution of these tributaries as 91.81 BCM and assessed the flow of Brahmaputra Basin as 629.05 BCM. Similarly in Krishna Basin, the difference is about 8.31 BCM which is mainly due to the reason that CWC estimates of 78.12 BCM were based on the run-off data at Vijayawada site whereas the National Commission considered the mean flow yield series accepted by Krishna Water Disputes Tribunal (KWDT) as 69.81 BCM. The Report submitted by the National Commission is under consideration by MOWR and till such time the report is accepted, the figure of 1869 BCM as assessed by CWC may be adopted. Thereafter the figure accepted by MOWR may be adopted.

The National Commission in their Report have adopted the utilisable flows in various basins a assessed by CWC, that is 690 BCM. An extract from National Commission's Report is given at Table 1A.

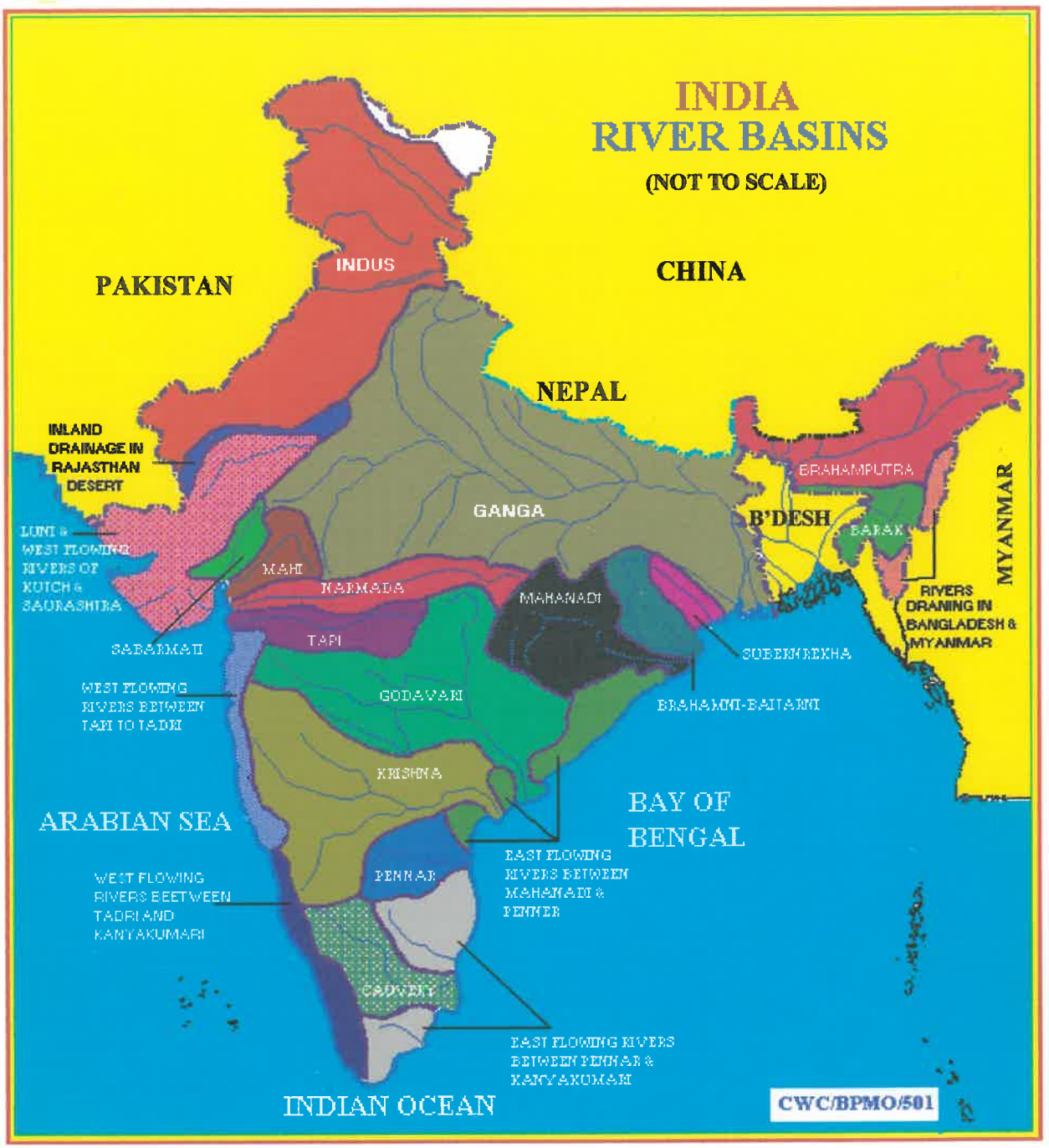
INDIA
RIVER BASINS
(NOT TO SCALE)
PAKISTAN
CHINA
NEPAL
INDUS
INLAND DRAINAGE IN RAJASTHAN DESERT
GANGA
BRAHAMPUTRA
B'DESH
BARAK
MYANMAR
LUNI & WEST FLOWING RIVERS OF KUTCH & SAURASHTRA
MAHI
NARMADA
MAHANADI
RIVERS DRANING IN BANGLADESH & MYANMAR
SABARMATI
TAPI
SUBERNREKHA
WEST FLOWING RIVERS BETWEEN TAPI TO TADRI
GODAVARI
BRAHAMANI-BAITARNI
KRISHNA
ARABIAN SEA
BAY OF BENGAL
EAST FLOWING RIVERS BETWEEN MAHANADI & PENNER
WEST FLOWING RIVERS BEETWEEN TADRI AND KANYAKUMARI
PENNAR
CAUVERY
EAST FLOWING RIVERS BETWEEN PENNAR & KANYAKUMARI
INDIAN OCEAN
CWC/BPMO/501

Fig:1

Table 1. Water Resources Potential of River Basins Of India

S. No.	River Basin	Catchment Area (Sq.Km.)	Average Water Resources Potential (BCM)	Utilisable Surface Water Resources (BCM)
1	2	3	4	5
1	Indus	321,289	73.3	46
2	Ganga-Brahmaputra-Meghna			
	(a) Ganga	861,452	525	250
	(b) Brahmaputra	194,413	537.2	24
	(c) Barak & others	41,723	48.4	
3	Godavari	312,812	110.5	76.3
4	Krishna	258,948	78.1	58
5	Cauvery	81,155	21.4	19
6	Subernarekha	29,196	12.4	6.8
7	Brahmani-Baitarni	51,822	28.5	18.3
8	Mahanadi	141,589	66.9	50
9	Pennar	55,213	6.3	6.9
10	Mahi	34,842	11	3.1
11	Sabarmati	21,674	3.8	1.9
12	Narmada	98,796	45.6	34.5
13	Tapi	65,145	14.9	14.5
14	West Flowing Rivers from Tapi to Tadri	55,940	87.4	11.9
15	West Flowing Rivers from Tadri to Kanyakumari	56,177	113.5	24.3
16	East Flowing Rivers between Mahanadi and Pennar	86,643	22.5	13.1
17	East Flowing Rivers between Pennar & Kanyakumari	100,139	16.5	16.5
18	West Flowing Rivers of Kutch and Saurashtra including Luni	321,851	15.1	15
19	Area of Inland Drainage in Rajasthan	-	Negl.	-
20	Minor Rivers draining into Myanmar (Burma) and Bangladesh	36,202	31	-
	Total		1,869.4	690

Source: **CWC Publication " Reassessment of Water Resources Potential of River Basins Of India ", March 1993**

Table 1A **Water Resources - Basinwise as assessed by National Commission on Integrated Water Resources Development Plan.**

S. No.	River Basin	Water Resources (BCM)	
		As per CWC 1993	As per NCIWRDP 1999
1	2	4	5
1	Indus	73.3	73.3
2	Ganga-Brahmaputra-Meghna		
	(a) Ganga	525	525
	(b) Brahmaputra	537.2	629.05
	(c) Barak & others	48.4	48.4
3	Godavari	110.5	110.5
4	Krishna	78.1	69.81
5	Cauvery	21.4	21.4
6	Subernarekha	12.4	12.4
7	Brahmani-Baitarni	28.5	28.5
8	Mahanadi	66.9	66.9
9	Pennar	6.3	6.3
10	Mahi	11	11
11	Sabarmati	3.8	3.8
12	Narmada	45.6	45.6
13	Tapi	14.9	14.9
14	West Flowing Rivers of Kutchh and Saurashtra including Luni	15.1	15.1
15	West Flowing Rivers from Tapi to Tadri	87.4	200.9
16	West Flowing Rivers from Tadri to Kanyakumari	113.5	
17	East Flowing Rivers Between Mahanadi & Godavari	17.08	17.08
18	East Flowing Rivers Between Godavari & Krishna	1.8	1.81
19	East Flowing Rivers between Krishna and Pennar	3.63	3.63
20	East Flowing Rivers Between pennar and Cauvery	9.98	9.98
21	East Flowing Rivers South of Cauvery	6.48	6.48
22	Area of North Ladakh not draining into Indus	0	0
23	Rivers draining into Bangladesh	8.57	8.57
24	Rivers draining intoMyammar	22.43	22.43
25	Drainage areas of Andaman, Nicobar and Lakshadweep islands	0	0
	Total	1,869.4	1,952.87
	Say	**1,870**	**1,953**

Source: Report of the National Commission on Integrated Water Resources Development Plan, September 1999.

Table 2. Basinwise Ground Water Resources Potential

S. No.	River Basin	Total Replenishable Ground Water Resources	Provision for domestic, industrial & other uses	Available for Irrigation	Net Draft	% Utilisation
1	2	3	4	5	6	7
1	Indus	26.5	3	23.5	18.2	68.68
2	Ganga-Brahmaputra-Meghna	206.07	31.26	174.81	49.65	24.09
2a	Ganga	171	26	145	48.6	28.42
2b	Brahmaputra	26.55	3.98	22.57	0.76	2.86
2c	Meghna	8.52	1.28	7.24	0.29	3.4
3	Godavari	40.6	9.7	30.9	6.1	15.02
4	Krishna	26.4	5.6	20.8	6.3	23.86
5	Cauvery	12.3	1.8	10.5	5.8	47.15
6	Subernrekha	1.8	0.3	1.5	0.15	8.33
7	Brahmani -Baitarni	4.05	0.6	3.45	0.29	7.16
8	Mahanadi	16.5	2.5	14	0.97	5.88
9	Pennar	4.93	0.74	4.19	1.53	31.03
10	Cambay Composite	7.2	1.1	6.1	2.45	34.03
11	Narmada	10.8	1.7	9.1	1.99	18.43
12	Tapi	8.27	2.34	5.93	1.96	23.7
13	Western Ghats Basin	17.7	3.2	14.5	3.3	18.64
14	Madras & Southern Basin	18.2	2.7	15.5	8.93	49.07
15	West Flowing rivers of Kutch and saurashtra	11.2	1.74	9.46	4.85	43.3
16	North-East Composite	18.8	2.8	16	2.75	14.63
	Total	431.32	71.08	360.24	115.22	26.71

Source: CGWB Publication " Ground Water Statistics- 1995 "

3.0 ASSESSMENT OF BASIN-WISE WATER REQUIREMENTS

3.1 Domestic Sector

3.1.1 Methodology Adopted

The assessment of domestic water requirements in a river basin in the present as well as future years needs to be based on the present and future population of the river basin and the present actual average water consumption per person and the estimated future water consumption. The water requirements for livestock also form a part of total domestic water requirements. Therefore the assessment of the latter should also include an assessment of the former which is done on the basis of the cattle population, present and projected, and an average rate of water requirement.

3.1.2 Estimation of Basin-wise Urban and Rural Population

3.1.2.1 Estimation of 1991 Population

The published reports on the Census of 1991 are used for estimating the river basin-wise urban and rural population in 1991 AD. In India, published census reports generally give population figures, urban and rural separately, district-wise. Population of individual urban centres is also published. For estimating the urban population in each river basin, the individual urban centres are located on the river basin map and thus all the urban centres lying in the river basin are listed out. Their populations are added up to get the total urban population in the basin. For estimating the rural population, first the areas of the districts falling in the river basin are found out. From the total rural population of a district, the rural population in the river basin is calculated on proportionate basis. Although this may not give an accurate estimation of the rural population of the basin, it is considered sufficient for the purpose of estimation of overall domestic water requirements.

3.1.2.2 Estimation of Future Population

For estimating the basin-wise urban and rural population in the years 2025 AD and 2050 AD, a suitable method of forecast of population has to be used. The forecast of population should give due regard to all the factors governing the future growth and development. Some of the mathematical methods being used for forecasting the population are briefly explained in Annex- II. In order to apply any of these methods for forecasting basin-wise future population, various parameters such as prevailing and anticipated birth and death rates in the area concerned, the effect of migration, etc. have to be taken into consideration which is beyond the scope of the present study.

The population projections for 2000 and 2010 have been taken from the published report on "Population Projections in India and States 1996-2016"

prepared by Registrar General of India, New Delhi. The rural population for these years has been taken from the projectins made by the Consultant, Rajiv Gandhi National Drinking Water Mission, New Delhi. Thereafter, the urban population for the year 2000 and 2010 has been worked out by deducting the rural population from the total population. The pro-rata growth rates have been applied to all river basins of India as worked out on the basis of 1991 census data to arrive at the figure of basinwise population for above periods after taking into account the individual urban centres and rural populace in existence in the particular river basins.

For projection of population for 2025 and 2050, the total population for these years have been taken from the UN Publication "Wolrd Population Prospects" 1994 Edition. The medium variant population as per this Publication for the years 1990, 2020 and 2050 are given in Table-3. The projection for rural population for these years has been adopted on the basis of the calculation furnished by Consultant of Rajiv Gandhi National Drink Water Mission, New Delhi. Based on this, India's urban and rural population for the year 2025 and 2050 are given in Table-4. For estimating the basin-wise population the pro-rata method as explained above has been adopted.

Table-3

The population projection of the country as per UN Publication "World Population Prospects" 1994 Revision

Year	Population as per medium variant (in million)	% Urban Population for medium variant
1990	851	26.7
2020	1327	37.2
2050	1640	48.4

On the basis of the population of 1991, and adopting the above procedure, India's total urban and rural population in the years 2025 and 2050 has been estimated as shown in Table 4

Table 4

India's Urban and Rural Population in the years 1991, 2025 and 2050

Year	Population in million					
	Total	% Growth	Urban	% Growth	Rural	% Growth
1991 (Actual)	844		217		627	
2025	1394	65.17	624	187.56	770	22.81
2050	1640	17.65	792	26.92	848	10.13

The number of urban centres under different categories in each river basin in the year 1991 are shown in Table 5

Table 5

Basinwise number of Urban Agglomerations/Towns

S. No.	River Basin	Number of Towns with population			Total
		up to 20000	20001 to 100000	More than 100000	
1	Indus	131	78	16	225
2	Ganga-Brahmaputra-Meghna				
	(a) Ganga	924	444	111	1479
	(b) Brahmaputra	93	36	5	134
	(c) Barak & others	32	9	3	44
3	Godavari	97	111	20	228
4	Krishna	109	116	25	250
5	Cauvery	86	59	13	158
6	Subernarekha	11	8	3	22
7	Brahmani-Baitarni	15	12	1	28
8	Mahanadi	79	30	10	119
9	Pennar	15	16	6	37
10	Mahi	29	12	3	44
11	Sabarmati	16	19	5	40
12	Narmada	61	22	3	86
13	Tapi	22	36	8	66
14	West Flowing Rivers from Tapi to Tadri	82	23	4	109
15	West Flowing Rivers from Tadri to Kanyakumari	63	63	19	145
16	East Flowing Rivers between Mahanadi and Pennar	40	39	12	91
17	East Flowing Rivers between Pennar & Kanyakumari	73	91	17	181
18	West Flowing Rivers of Kutch and Saurashtra including Luni	82	55	12	149
19	Area of Inland Drainage in Rajasthan	9	7	3	19
20	Minor Rivers draining into Myanmar (Burma) and Bangladesh	31	3	1	35
	Total	2100	1289	300	3689

Note: The number of urban agglomerations/towns is as per 1991 census and does not include number of towns in Jammu & Kashmir where the 1991 census was not carried out.

Table-6 Basinwise Rural and Urban population in the years 1991,2000,2010,2025 & 2050

S.No	Basin	Estimated Population in the year (in million)														
		1991			2000			2010			2025			2050		
		Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
1	Indus	30.6	11.3	41.9	34.13	15.32	49.45	35.5	22.2	57.69	37.63	31.57	69.2	41.39	40.02	81.41
2	Ganga-Brahmaputra-Meghna															
	(a) Ganga	275.8	83.3	359.1	307.62	116.21	423.82	319.92	174.55	494.47	339.12	253.92	593.04	373.03	324.66	697.69
	(b) Brahmaputra	25.6	3.5	29.1	28.55	5.79	34.34	29.7	10.37	40.07	31.48	16.58	48.06	34.63	21.91	56.54
	(c) Barak & others	5.2	1	6.2	5.8	1.52	7.32	6.03	2.51	8.54	6.39	3.85	10.24	7.03	5.01	12.05
3	Godavari	42	12	54	46.85	16.89	63.73	48.72	25.64	74.36	51.64	37.54	89.18	56.81	48.11	104.92
4	Krishna	42.2	18.6	60.8	47.07	24.69	71.76	48.95	34.77	83.72	51.89	48.52	100.41	57.08	61.05	118.13
5	Cauvery	21	8.3	29.3	23.42	11.16	34.58	24.36	15.99	40.34	25.82	22.57	48.39	28.4	28.52	56.93
6	Subernarekha	7.4	2	9.4	8.25	2.84	11.09	8.58	4.36	12.94	9.1	6.42	15.52	10.01	8.25	18.26
7	Brahmani-Baitarni	8.7	1.1	9.8	9.7	1.86	11.57	10.09	3.4	13.49	10.7	5.49	16.18	11.77	7.27	19.04
8	Mahanadi	21.8	4.8	26.6	24.31	7.08	31.39	25.29	11.34	36.63	26.8	17.12	43.93	29.49	22.2	51.68
9	Pennar	7.8	1.9	9.7	8.7	2.75	11.45	9.05	4.31	13.36	9.59	6.43	16.02	10.55	8.3	18.85
10	Mahi	8.3	2.2	10.5	9.26	3.13	12.39	9.63	4.83	14.46	10.21	7.13	17.34	11.23	9.17	20.4
11	Sabarmati	5.8	4.7	10.5	6.47	5.92	12.39	6.73	7.73	14.46	7.13	10.21	17.34	7.84	12.56	20.4
12	Narmada	12	2.7	14.7	13.38	3.97	17.35	13.92	6.32	20.24	14.76	9.52	24.28	16.23	12.33	28.56
13	Tapi	9.6	5.2	14.8	10.71	6.76	17.47	11.14	9.24	20.38	11.8	12.64	24.44	12.98	15.77	28.75
14	West Flowing Rivers from Tapi to Tadri	10.7	15.1	25.8	11.93	18.52	30.45	12.41	23.11	35.53	13.16	29.45	42.61	14.47	35.65	50.13
15	West Flowing Rivers from Tadri to Kanyakumari	23.5	9.1	32.6	26.21	12.26	38.48	27.26	17.63	44.89	28.9	24.94	53.84	31.78	31.55	63.34
16	East Flowing Rivers between Mahanadi and Pennar	18.1	5.5	23.6	20.19	7.67	27.85	21	11.5	32.5	22.26	16.72	38.97	24.48	21.37	45.85
17	East Flowing Rivers between Pennar & Kanyakumari	27.7	17.3	45	30.9	22.22	53.11	32.13	29.83	61.96	34.06	40.26	74.32	37.47	49.96	87.43
18	West Flowing Rivers of Kutch and Saurashtra including Luni	16.2	5.9	22.1	18.07	8.01	26.08	18.79	11.64	30.43	19.92	16.58	36.5	21.91	21.03	42.94
19	Area of Inland Drainage in Rajasthan	5.5	1.6	7.1	6.13	2.25	8.38	6.38	3.4	9.78	6.76	4.96	11.73	7.44	6.36	13.79
20	Minor Rivers draining into Myanmar (Burma) and Bangladesh	1.5		1.5	1.67	0.09	1.77	1.74	0.32	2.07	1.84	0.63	2.48	2.03	0.88	2.91
	Total	627	217.1	844.1	699.33	296.91	996.24	727.3	434.99	1162.29	768.83	623.05	1394	848.05	791.95	1640

3.1.3. Estimation of Cattle Population

The data on district-wise livestock population was collected and compiled for the census conducted in the years 1972, 1977 and 1982. Based on these figures, basin-wise livestock population has been assessed for various river basins in the country for these years (Table - 7).

The basin-wise cattle population is then projected for the years 1991,2000,2010, 2025 and 2050 based on the growth pattern during the years 1972, 1977 and 1982 except for the river basin of 'Minor rivers draining into Bangladesh and Myanmar' where the projected figures were abnormally high. In this basin, the growth rate of livestock population of adjoining Brahmaputra basin has been adopted in order to project the livestock population.

3.1.4 Per Capita Water Requirements

The quantity of water required for domestic purposes depends mainly on the habits, social status, climatic conditions and customs of the people. The estimation of per capita requirement is based on the water use for various activities such as drinking, bathing, cooking, washing, etc. The requirement in urban areas is more than that in rural areas because of the additional water used for flushing of latrines, provision for fire fighting, gardening, etc. On an average a requirement of 40 litres per capita per day (lpcd) may be assumed for rural population and a requirement of 140 lpcd may be assumed for urban population. The break up of these requirements for various activities is as given below:

S.No.	Item	Rural Areas		Urban Areas
		Higher	Lower	
1	Drinking	3	3	5
2	Cooking	5	5	5
3	Ablution	15	10	-
4	Bathing	20	15	55
5	Washing of utensils, cloths & house	12	7	45
6	Flushing of latrines	15	-	30
	Total	70	40	140

Source: Ministry of Rural Area & Employment/Urban Affairs & Employment

The Environment Hygiene Committee suggested certain optimum rates for communities based on population groups. In the Bureau of Indian Standards (BIS) code on Basic Requirements of Water Supply, Drainage and Sanitation (IS: 1172-1983) as well as the National Building Code, a minimum of 135 lpcd has been recommended for all residences with full flushing system for excreta disposal. The Manual on Water Supply and Treatment (1991) brought out by the Ministry of Urban

Development, recommends that while a minimum of 70 to 100 lpcd may be considered adequate for the domestic needs of the urban communities, the non-domestic needs vary depending on their size and economic importance, requiring 25 to 100 lpcd in addition. As a general rule, the following rates per capita per day are considered minimum for domestic and non-domestic needs :

(i) Communities with population upto 20,000	
(a) Water supply through standpost	40 lpcd
(b) Water supply through house service connection	70 to 100 lpcd
(ii) Communities with population 20,000 to 1,00,000	100 to 150 lpcd
(iii) For communities with population above 1,00,000	150 to 200 lpcd

The requirements of each case will have to be further studied with reference to local factors governing the different non-domestic needs before deciding the optimum rate of supply for the community.

The CPHEEO, Ministry of Urban Development has recently revised the per capita drinking water supply norms for municipal use, which ranges from 70 lpcd for towns provided with piped water supply but without sewerage system to 135 lpcd for towns provided with piped water supply and sewerage system. In case of metropolitan and mega cities, the recommended maximum water supply levels is 150 lpcd. However, the figure does not include unaccounted for water (UFW), which should be limited to 15% of the total demand. In urban areas where water is provided through public stand post, 40 lpcd has been considered. The above mentioned figures include requirement of water for commercial, institutional and minor industries. However, bulk supply to such establishments should be assessed and provided separately with proper justification as given in the Manual on Water Supply and Treatment published by CPHEEO.

The figure adopted in this report more or less tallies on this basis.

In the present study, the following rates of per capita water requirements have been adopted:

(i) Towns with population upto 20,000	100 lpcd
(ii) Towns with population 20,000 - 1,00,000	150 lpcd
(iii) Towns with population more than 1,00,000	200 lpcd

For rural areas a requirement of an average of 70 and 40 lpcd has been adopted. However, the existing actual rate of per capita water requirement (as supplied by some of the State Govts.) has been taken into consideration for assessing the domestic water requirements in 1991 for the urban centres wherever these figures are available. The basinwise rural and urban water requirements for

Table 7. Basin-wise Estimated Cattle Population based on the census of 1972, 1977 and 1982

S. No.	River Basin	Estimated Cattle Population in the Year		
		1972	1977	1982
1	Indus	23.1	24.6	28.5
2	Ganga-Brahmaputra-Meghna			
	(a) Ganga	136.7	140.6	158.9
	(b) Brahmaputra	11.0	12.5	13.2
	(c) Barak & others	2.0	2.2	3.1
3	Godavari	26.0	28.0	29.7
4	Krishna	29.1	29.8	32.2
5	Cauvery	14.4	14.6	16.0
6	Subernarekha	4.5	4.8	5.7
7	Brahmani-Baitarni	5.3	6.0	6.9
8	Mahanadi	12.9	13.1	14.9
9	Pennar	7.1	6.4	7.7
10	Mahi	6.3	6.3	6.5
11	Sabarmati	3.2	3.1	3.3
12	Narmada	8.1	8.2	8.9
13	Tapi	4.6	5.5	5.8
14	West Flowing Rivers from Tapi to Tadri	4.3	4.3	4.7
15	West Flowing Rivers from Tadri to Kanyakumari	6.7	6.8	7.3
16	East Flowing Rivers between Mahanadi and Pennar	10.1	9.9	11.1
17	East Flowing Rivers between Pennar & Kanyakumari	20.1	20.5	20.8
18	West Flowing Rivers of Kutch and Saurashtra including Luni	14.0	13.7	16.6
19	Area of Inland Drainage in Rajasthan	7.2	8.1	10.5
20	Minor Rivers draining into Myanmar (Burma) and Bangladesh	0.5	0.6	1.2
	Total	357.2	369.6	413.5

Source: Census of Cattle - 1972,1977 & 1982

the year 2000, 2010, 2025 and 2050 have been calculated on the basis of the prescribed norms for different categories of areas/ urban centres as indicated in above paras. The water requirement for rural and urban sectors for the year 1991 has been calculated on the basis of statistics of actual census data and multiplying with the norms adopted for different categories of urban centres and the total requirements for basinwise have been calculated by adding the water requirements of individual urban centres existing in a particular basin. The water requirements for rural areas has been worked out by multiplying rural population in a basin by the average norms for domestic water supply at the rate of 55 lpcd.

The water requirement for livestock vary for various categories of livestock. As such, an average rate of 30 lpcd has been adopted for estimating the drinking water requirements of livestock.

3.1.5. Basin-wise Domestic Water Requirements

Adopting the methodology indicated earlier, domestic water requirements in the years 1991,2000,2010,2025 and 2050 for human population and the water requirements for cattle have been worked out basin-wise. The basin-wise urban and rural domestic water requirements are shown in Table -8 . The basin-wise water requirements for cattle are given in Table -9. The basin-wise total domestic water requirements including requirements for cattle are summarised in Table - 10. It will be seen that the total domestic water requirement incuding for cattle which was 31.84 BCM in 1991, is expected to go up to 42.01 BCM in 2000, 55.71 BCM in 2010, 72.81 BCM in 2025 and 102.04 BCM in 2050 respectively.

3.1.6. Limitations of the Study

The norms of per capita water supply requirements adopted in the study are the average rates of water supply in various categories of towns. The actual service level of water supply is different from these and varies from town to town. In some of the towns, the service levels meet the actual norms whereas these are not even meeting the minimum requirements of 70 litres per capita per day in other towns which is required for sustaining the life at a minimum standard of hygiene. The norm of water supply in a city is prescribed by the planners after taking into account various factors such as water availability, climatic conditions, actual consumption in the past and the extent of non-domestic uses in the city. The consumption of domestic water depends to a large extent on the climatic conditions with a low consumption in cold climatic areas and a very high consumption in hot tropical climate. According to a study, in our country among the capitals of various states/UTs, the service level of water supply varies considerably. The States of Haryana, Tamilnadu, West Bengal, Uttar Pradesh, Karnataka, Rajasthan, Gujarat and Madhya Pradesh have a generally below average water supply to urban areas.

Table-8 **Basinwise Estimated Domestic Water Requirement in the Year 1991,2000,2010,2025,2050** **Unit-MCM**

S.No	Basin	Estimated Domestic Water Requirements in the year														
		1991			2000			2010			2025			2050		
		Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
1	Indus	614.27	715.8	1330.07	685.12	917	1602.12	712.55	1397.1	2109.65	803.37	2141.7	2945.07	830.87	2870.9	3701.77
2	Ganga-Brahmaputra-Meghna															
	(a) Ganga	5536.69	5377.7	10914.39	6175.3	7976.3	14151.6	6422.56	11904.04	18326.6	7241.12	17313.8	24554.92	7489.01	22229.4	29718.41
	(b) Brahmaputra	513.94	195.8	709.74	573.21	281.5	854.71	596.17	437.2	1033.37	672.15	653.3	1325.45	695.16	846	1541.16
	(c) Barak & others	104.42	56.4	160.82	116.47	79.8	196.27	121.13	1190	1311.13	136.57	178.5	315.07	141.24	231.5	372.74
3	Godavari	843.15	671.1	1514.25	940.4	1058.2	1998.6	978.05	1601.6	2579.65	1102.71	2364.8	3467.51	1140.46	3060.1	4200.56
4	Krishna	847.16	1071.5	1918.66	944.87	1713.1	2657.97	982.7	2584	3566.7	1107.95	3712.3	4820.25	1145.88	4787.5	5933.38
5	Cauvery	421.61	530.1	951.71	470.24	742	1212.24	489.07	1122.7	1611.77	551.41	1652	2203.41	570.28	2120.7	2690.98
6	Subernarekha	148.58	137	285.58	165.72	189.4	355.12	172.35	285.4	457.75	194.32	413.2	607.52	200.97	525.7	726.67
7	Brahmani-Baitarni	174.66	63.7	238.36	194.81	90.4	285.21	202.61	133.4	336.01	228.43	199.8	428.23	236.25	265	501.25
8	Mahanadi	437.72	301.9	739.62	488.21	421.8	910.01	507.76	649.7	1157.46	572.47	948.1	1520.57	592.07	1216.8	1808.87
9	Pennar	156.59	70.5	227.09	174.65	167.7	342.35	181.65	254.1	435.75	204.8	372.2	577	211.81	476	687.81
10	Mahi	166.65	141.9	308.55	185.87	198.5	384.37	193.31	298.9	492.21	217.95	454.6	672.55	225.41	580.6	806.01
11	Sabarmati	116.44	328.8	445.24	129.87	453.4	583.27	135.07	668.8	803.87	152.29	969	1121.29	157.5	1239	1396.5
12	Narmada	240.9	158.1	399	268.69	225.9	494.59	279.44	347.8	627.24	315.06	566.2	881.26	325.84	720.3	1046.14
13	Tapi	192.74	342.9	535.64	214.97	480.8	695.77	223.57	756.3	979.87	252.07	1083.2	1335.27	260.7	1378	1638.7
14	West Flowing Rivers from Tapi to Tadri	214.81	1056.9	1271.71	239.59	1456.4	1695.99	249.18	2156.1	2405.28	280.94	2101	2381.94	290.56	3961.4	4251.96
15	West Flowing Rivers from Tadri t Kanyakumari	471.74	596.1	1067.84	526.15	828.8	1354.95	547.22	1239	1786.22	616.97	1815.2	2432.17	638.09	2339	2977.09
16	East Flowing Rivers between Mahanadi an Pennar	363.39	212.4	575.79	405.31	494.4	899.71	421.54	742.6	1164.14	475.26	995.4	1470.66	491.53	1280.6	1772.13
17	East Flowing Rivers between Pennar & Kanyakumari	555.89	1153.2	1709.09	620.01	1619.1	2239.11	644.84	2431.9	3076.74	727.02	3515.9	4242.92	751.91	4504.1	5256.01
18	West Flowing Rivers of Kutch and Saurashtr including Luni	325.21	351.1	676.31	362.72	506.2	868.92	377.24	780.7	1157.94	425.32	1142	1567.32	439.88	1477	1916.88
19	Area of Inland Drainage in Rajasthan	110.39	109.2	219.59	123.13	150.6	273.73	128.06	227.4	355.46	144.38	329.6	473.98	149.32	423.5	572.82
20	Minor Rivers draining into Myanmar (Burma and Bangladesh	30.09	31.8	61.89	33.56	44.6	78.16	34.91	66.6	101.51	39.36	103.2	142.56	40.7	138.5	179.2
	Total	12587.06	13673.9	26260.96	14038.86	20095.9	34134.76	14600.99	31275.34	45876.33	16461.9	43025	59486.9	17025.44	56671.6	73697.04

Table-9 Basinwise Estimated Drinking Water Requirement for Cattle in the Year 1991,2000,2010,2025,2050 Unit- MCM

S.No.	Basin	Estimated of water Requirement in the year									
		1991		2000		2010		2025		2050	
		Estimated Livestock population in million	Estimated water Requirements in M.Cum	Estimated Livestock population in million	Estimated water Requirements in M.Cum	Estimated Livestock population in million	Estimated water Requirements in M.Cum	Estimated Livestock population in million	Estimated water Requirements in M.Cum	Estimated Livestock population in million	Estimated water Requirements in M.Cum
1	Indus	37.3	408.43	51.03	558.74	66.28	725.79	102.2	1119.09	214.7	2350.96
2	Ganga-Brahmaputra-Meghna										
	(a) Ganga	198.4	2172.48	271.41	2971.95	352.56	3860.5	457.3	5007.43	845.1	9253.84
	(b) Brahmaputra	14.7	160.96	20.11	220.2	26.12	286.03	22	240.9	29.7	325.21
	(c) Barak & others	5.6	61.32	7.66	83.89	9.95	108.97	50.1	548.6	250.1	2738.59
3	Godavari	33.1	362.44	45.28	495.82	58.82	644.06	49.7	544.22	66.9	732.56
4	Krishna	37	405.15	50.62	554.25	65.75	719.95	62.3	682.18	91.5	1001.93
5	Cauvery	19.1	209.15	26.13	286.11	33.94	371.65	36.9	404.05	59.9	655.9
6	Subernarekha	8	87.6	10.94	119.84	14.22	155.67	28.1	307.69	70.4	770.88
7	Brahmani-Baitarni	9	98.55	12.31	134.82	15.99	175.12	24.5	268.27	51.2	560.64
8	Mahanadi	18.7	204.76	25.58	280.12	33.23	363.87	43.9	480.7	82.1	898.99
9	Pennar	10.7	117.16	14.64	160.28	19.01	208.2	37.5	410.63	94.3	1032.58
10	Mahi	6.8	74.46	9.3	101.86	12.08	132.32	8.2	89.79	9.4	102.93
11	Sabarmati	3.7	40.52	5.06	55.42	6.57	72	5.7	62.41	7.9	86.5
12	Narmada	10.4	113.88	14.23	155.79	18.48	202.36	18.8	205.86	29.2	319.74
13	Tapi	6.3	68.98	8.62	94.37	11.2	122.59	8.7	95.26	11.1	121.54
14	West Flowing Rivers from Tapi to Tadri	5.5	60.22	7.52	82.39	9.77	107.02	10.3	112.79	16.2	177.39
15	West Flowing Rivers from Tadri to Kanyakumari	8.1	88.69	11.08	121.33	14.39	157.61	12.1	132.49	16.3	178.48
16	East Flowing Rivers between Mahanadi and Pennar	13.9	152.2	19.02	208.22	24.7	270.47	31.7	347.11	58.2	637.29
17	East Flowing Rivers between Pennar & Kanyakumari	21.3	233.23	29.14	319.07	37.85	414.46	23.4	256.23	25.1	274.84
18	West Flowing Rivers of Kutch and Saurashtra including Luni	23.3	255.13	31.87	349.02	41.4	453.37	83.6	915.42	213.8	2341.11
19	Area of Inland Drainage in Rajasthan	16.8	183.96	22.98	251.66	29.85	326.9	98.1	1074.19	359.7	3938.71
20	Minor Rivers draining into Myanmar (Burma) and Bangladesh	1.3	14.23	1.78	19.47	2.31	25.3	2.1	23	2.8	30.66
	Total	509	5573.55	696.31	7624.62	904.49	9904.2	1217.2	13328.34	2605.6	28531.32

Table-10 Basinwise Estimated Domestic Water Requirement including for Cattle in the Year 1991,2000,2010,2025,2050
Unit-BCM

S.No.	Basin	Estimated Water Requirements (BCM)													
		1991			2000			2010			2025			2050		
		Dom	Cattle	Total	Dom	Cattle	Total	Dom	Cattle	Total	Dom	Cattle	Total	Dom	Cattle	Total
1	Indus	1.33	0.41	1.74	1.6	0.65	2.25	2.11	0.72	2.83	2.95	1.12	4.07	3.7	2.15	5.85
2	Ganga-Brahmaputra-Meghna															
	(a) Ganga	10.91	2.17	13.08	14.15	2.97	17.12	18.33	3.86	22.19	24.55	5.01	29.56	29.72	9.25	38.97
	(b) Brahmaputra	0.71	0.16	0.87	0.85	0.22	1.07	1.03	0.28	1.31	1.33	0.24	1.57	1.54	0.33	1.87
	(c) Barak & others	0.16	0.06	0.22	0.2	0.08	0.28	1.31	0.11	1.42	0.32	0.55	0.87	0.37	2.74	3.11
3	Godavari	1.51	0.36	1.87	2	0.5	2.5	2.58	0.64	3.22	3.47	0.54	4.01	4.2	0.73	4.93
4	Krishna	1.92	0.41	2.33	2.66	0.55	3.21	3.57	0.71	4.28	4.82	0.68	5.5	5.93	1	6.93
5	Cauvery	0.95	0.21	1.16	1.21	0.29	1.5	1.61	0.37	1.98	2.2	0.4	2.6	2.69	0.66	3.35
6	Subernarekha	0.29	0.09	0.38	0.36	0.12	0.48	0.46	0.15	0.61	0.61	0.31	0.92	0.73	0.77	1.5
7	Brahmani-Baitarni	0.24	0.1	0.34	0.29	0.13	0.42	0.34	0.17	0.51	0.43	0.27	0.7	0.5	0.56	1.06
8	Mahanadi	0.74	0.2	0.94	0.91	0.28	1.19	1.16	0.36	1.52	1.52	0.48	2	1.81	0.9	2.71
9	Pennar	0.23	0.12	0.35	0.34	0.16	0.5	0.44	0.2	0.64	0.58	0.41	0.99	0.69	1.03	1.72
10	Mahi	0.31	0.07	0.38	0.38	0.1	0.48	0.49	0.13	0.62	0.67	0.09	0.76	0.81	0.1	0.91
11	Sabarmati	0.45	0.04	0.49	0.58	0.06	0.64	0.8	0.07	0.87	1.12	0.06	1.18	1.4	0.09	1.49
12	Narmada	0.4	0.11	0.51	0.49	0.15	0.64	0.63	0.2	0.83	0.88	0.21	1.09	1.05	0.32	1.37
13	Tapi	0.54	0.07	0.61	0.7	0.09	0.79	0.98	0.12	1.1	1.34	0.09	1.43	1.64	0.12	1.76
14	West Flowing Rivers from Tapi to Tadri	1.27	0.06	1.33	1.7	0.08	1.78	2.41	0.1	2.51	2.38	0.11	2.49	4.25	0.18	4.43
15	West Flowing Rivers from Tadri to Kanyakumari	1.07	0.09	1.16	1.35	0.12	1.47	1.79	0.15	1.94	2.43	0.13	2.56	2.98	0.18	3.16
16	East Flowing Rivers between Mahanadi and Pennar	0.58	0.15	0.73	0.9	0.21	1.11	1.16	0.27	1.43	1.47	0.35	1.82	1.77	0.64	2.41
17	East Flowing Rivers between Pennar & Kanyakumari	1.71	0.23	1.94	2.24	0.32	2.56	3.08	0.41	3.49	4.24	0.26	4.5	5.26	0.27	5.53
18	West Flowing Rivers of Kutch and Saurashtra includin Luni	0.68	0.26	0.94	0.87	0.35	1.22	1.16	0.45	1.61	1.57	0.92	2.49	1.92	2.34	4.26
19	Area of Inland Drainage in Rajasthan	0.22	0.18	0.4	0.27	0.25	0.52	0.36	0.32	0.68	0.47	1.07	1.54	0.57	3.94	4.51
20	Minor Rivers draining into Myanmar (Burma) an Bangladesh	0.06	0.01	0.07	0.08	0.2	0.28	0.1	0.02	0.12	0.14	0.02	0.16	0.18	0.03	0.21
	Total	26.28	5.56	31.84	34.13	7.88	42.01	45.9	9.81	55.71	59.49	13.32	72.81	73.71	28.33	102.04

In some of the large cities such as Chennai and Hyderabad, the water resources are not even adequate to meet the domestic requirements. With the fast increase in population and economic activities in the urban areas, the demand of water for domestic purposes is liable to increase and the existing norms of water supply will have to be revised in accordance with the then prevailing conditions of availability and management.

3.2 Irrigation Sector

The 'ultimate' irrigation potential of the country is assessed as 113.5 (Surface water- major, medium + Ground water+ Surface water,minor = 58.5 + 40 + 15) million hectares from the conventional sources of major and medium projects, surface minor projects and minor ground water sources including State and private ground water development. This estimate of the 'ultimate' is of course liable to change. Very recently ground water component of the ultimate potential has been revised from around 40 million hectares to about **64 million hectares** mainly due to the consideration of the additional recharge available to the ground water on account of the additional irrigation. The ultimate potential through conventional sources is reassessed as 139.5(Surface water- major, medium + Ground water+ Surface water,minor = 58.5 + 64 + 17) say 140 million hectares. If one assumes a low growth of population, a low growth of demand, coupled with improved irrigation management practices leading to very productive irrigated agriculture, this irrigation potential when achieved may be sufficient to meet the project requirements. However, this may become substantially short of the needs if one considers a reasonably high growth of population and demand. Shortages and large scale import of food grain is likely to be socially unacceptable even in a globalised economy. This makes it imperative to look for the other non-conventional methods of increasing irrigation potential. The non-conventional source thought of at present are:-

i. Artificial recharge of ground water to increase ground water potential and

ii. Inter basin water transfers

In regard to artificial recharge, the technology is not well established as yet. Also the areas of ground water shortage are also likely to be short of surface water for recharge. Considering this, the role of artificial recharge though likely to be very significant locally, may not be very large in the National context. On the other hand, the inter-basin transfers based on proven technology have a potential of additional irrigation of upto around 25 million hectares enhancing total ultimate irrigation to 165 M.ha. Even here, some of the links may not come up at all but still the links as can come up may be important in bridging the gap.

3.2.1 PER CAPITA REQUIREMENTS AND DIETARY CHANGES

In India at present the food grain availability is about 500 gms per capita per day. At about 600 gms per capita per day, the requirement of food grains by the year 2050 will be about 400 Million Tonnes. However, this does not seem to take into account that with economic prosperity, dietary changes leading to larger diversion of foodgrains towards animal husbandry may occur. In this context, it is seen that, at present the food grain availability in China & USA is 400 million tonnes

and 350 million tonnes for respective population of 1100 million and 250 million. thus the per capita per day availability of China is 996 gms and that of USA is 3800 gms.

3.2.2 DEMAND FOR FOODGRAINS and LAND

The futuristic demand for foodgrain upto 2050 AD would depend on (i) the population, (ii) the per capita requirement and (iii) the need for exports, The population and per capita requirements need to be viewed in the probabilistic context.

Considering per capita requirements projected above, 3 scenario of requirements can be as follows:

(1) LR - Low requirement scenario is based on 600 gms, per capita per day, which is almost the present level of consumption.

(2) MR - this scenario is based on the figure of 800 gram per capita per day which perhaps represents considerable dietary change towards animal products, but constrained by social preferences.

(3) HR - This scenario based on 1000 gms per capita per day assumes a higher shift in dietary preferences towards animal food consumption, corresponding to the current consumption level in China but far short of the current US consumption.

The three population projection (L,M and H) operating on the three consumption)LR, MR and HR) would produce 9 figures of foodgrain requirement as given below.

Case	Foodgrain requirement (Million tonnes)	Probability of Actual requirement being less than the Stated Value
L - LR	295	0.1
M - LR	359	0.2
L - MR	393	0.3
H - LR	434	0.4
M - MR	479	0.5
L - HR	491	0.6
H - MR	578	0.7
M - HR	599	0.8
H - HR	722	0.9
Average	483	0.53

Probability of food requirements

It is customary, although without much theoretical basis to consider the likely discrete and independent outcomes of a random variable as equally probable. If this somewhat gross assumption is made, the probability distribution of the foodgrain requirements for internal consumption would be as given in last column. The scenario is regard to population and those in regard to consumption are unlikely to be independent. For example a low population growth may involve better incomes and high consumption levels. This the L-HR scenario could have larger probability than the H-HR or the L-LR scenarios. This may tend to reduce the standard deviation of the distribution function as given above.

The table shows that a food production of 480 million tonnes in 2050 for internal consumption may have about 50% probability of falling short. The need for being more conservative in futuristic planning of the basic requirement has induced that planning be based on 550 million tonne which has around 33% probability of being still short. If as one hopes, the actual requirement is shorter the difference will come handy in exporting foodgrains.

The world market is gradually being integrated. this globalisation holds much promise for India in the field of export of agricultural produce. India is blessed with very large arable land, water resources and sunshine. This combined with large human resources puts India in an ideal position to enhance its agricultural production for export purposes. It is of interest to note that traditionally a major share of India's export was from agricultural produce like tea, cotton, jute, crashew, coir etc. this large requirement of agricultural produce for export calls for very good quality of additional irrigation. Considering the world market for food grain and the likely increases in the future, India may be able to export about 50 million tonnes of food grain or their equivalent in other agricultural products by the year 2050.

Considering both the aspects of the probability distribution of internal consumption requirement, and the desirability of exports, figure of 550 million tonne may be used for planning.

Even if we assume a national average productivity of 3.25 t/ha for irrigated and 1.5 t/ha for unirrigated area by year 2050 (against present normal average or 2.2 t/ha and 0.75 t/ha we would need to harness the entire irrigation potential of 165 million ha. to match these figures for food production. The planning for long term future would, therefore, have to necessarily include non-conventional sources like inter-basin transfers

3.2.3 Irrigation Water Requirements

The work of preparation of perspective plan for irrigation sector was entrusted to the Member of the Standing Sub-Committee from Ministry of Agriculture. In order to assess the quantum of water requirements in the sector, a

Working Group was constituted in the Minstry of Agriculture under the chairmanship of Joint Secretary (Crops) and members from Indian Council of Agriculture Research, Directorate of Economics & Statistics, Min. of Agr. & Coop., Horticulture Div. of Deptt. of Agriculture and Cooperation and Chief Engineer (BPMO), CWC. The Working Group held only one meeting and no feedback was received from the Ministry of Agriculture & Cooperation on the methodology to be adopted for working out the irrigation water requirements.

The standing sub-commiitte observed that without having any specific information regarding the gross agriculture area basinwise, the projection for the requirement of water for irrigation for the year 2025 and 2050 seems to be difficult to some extent. It was suggested that the Statewise Ultimate Irrigation Potential of 140 M.ha. may be taken as gross irrigated area for the year 2025 and the Ultimate Irrigation Potential plus the additional Irrigation Potential envisaged under the proposals of inter-basin transfer of water and the balance Irrigation Potential from the ground water sector which comes to about 165 M.ha. may be considered as gross irrigated area for the year 2050. With these information, basin-wise statistics for the Ultimate Irrigation Potential was worked out on pro-rata basis. The total irrigation water demands was then estimated by adopting suitable average delta for surface and ground water.

However, based on the district-wise statistical data on the land use in the country, an attempt has been made to estimate the basin-wise land use details in Table 11a which gives the basin-wise details of culturable area, net sown area, gross sown area, net irrigated area and gross irrigated area in the year 1992-93. Adopting an average delta of 0.65 m (0.8 m for surface water ,0.5 m for ground water) , the basin-wise irrigation water requirements in the year 1992-93 alongwith projected requirements for the year 2000, 2010, 2025 and 2050 have also been estimated in the Table 11b as decided in the third meeting held on 3.3.98. The basin-wise irrigation water requirements in the year 1992-93 has been estimated as 437 BCM. Irrigation water requirement for the year 2000, 2010 and 2025 have tentatively been estimated to be 541 BCM, 688 BCM and 910 BCM respectively. The water requirement in 2050 will be around 1072 BCM.

Table 11(a). Estimation of Basinwise Land Use Statistics (1992-93)

Sl. No.	River Basin	Culturable area '000 ha	Net Sown Area '000ha	Gross Sown Area '000ha	Net Irrg. Area '000 ha	Gross Irrg. Area '000 ha
1	2	3	4	5	6	7
1	Indus	14517	9592	14617	5800	9976
2	Ganga	57227	44049	73168	23410	30487
	Brahmaputra	5052	8139	5190	630	1262
	Barak	1375	1121	951	150	157
3	Godavari	17964	14387	16259	2730	3359
4	Krishna	17675	13187	16268	3330	4187
5	Cauvery	5418	4070	4464	1480	1576
6	Subernrekha	1399	1188	1685	208	337
7	Pennar	3240	2328	2497	491	568
8	Mahanadi	7191	5982	8152	2020	2572
9	Mahi	2353	1882	2357	397	495
10	Narmada	4436	4679	5236	1020	1100
11	Tapi	3847	3751	2522	376	380
12	Sabarmati	1875	1555	1836	564	685
13	Brahmani-Baitarni	2768	1940	1158	490	699
14	EF-I	4534	3514	4992	1568	2053
15	EF-II	6367	4164	4901	2000	2366
16	WF-I	2700	2058	2184	310	381
17	WF-II	3135	2617	3453	510	585
18	Luni & Rivers of Kutch	11359	7805	9225	1708	2195
19	Desert Rivers	6768	4202	4601	1100	1785
20	Rivers draining into B'desh, Myanmar	593	196	257	60	65
	Total	**181793**	**142406**	**185975**	**50351**	**67270**

Table11 b. Basinwise Irrigation Water Requirements of the year for 1992-93, 2000, 2010, 2025 & 2050 (BCM)

S.No	River Basin	1992-93		2000		2010		2025		2050	
		Gross Irrigated Area '000 ha.	Estimated water Requirements in BCM	Gross Irrigated Area '000 ha.	Estimated water Requirements in BC M.	Gross Irrigated Area '000 ha.	Estimated water Requirements in BCM.	Gross Irrigated Area '000 ha.	Estimated water Requirements in BCM.	Gross Irrigated Area '000 ha.	Estimated water Requirements in BCM.
1	Indus	9976	64.84	12335.32	80.18	15705.91	102.09	20761.71	134.95	24469.15	159.05
2	Ganga-Brahmaputra-Meghna										
	(a) Ganga	30487	198.17	37697.18	245.03	47997.79	311.99	63448.49	412.42	74778.58	486.06
	(b) Brahmaputra	1262	8.2	1560.46	10.14	1986.85	12.91	2626.43	17.07	3095.44	20.12
	(c) Barak & others	157	1.02	194.13	1.26	247.18	1.61	326.74	2.12	385.09	2.5
3	Godavari	3359	21.83	4153.4	27	5288.31	34.37	6990,63	45.44	8238.96	53.55
4	Krishna	4187	27.22	5177.23	33.65	6591.88	42.85	8713.84	56.64	10269.88	66.75
5	Cauvery	1576	10.24	1948.72	12.67	2481.21	16.13	3279.92	21.32	3865.62	25.13
6	Subernarekha	337	2.19	416.7	2.71	530.56	3.45	701.35	4.56	826.59	5.37
7	Brahmani-Baitarni	699	4.54	864.31	5.62	1100.48	7.15	1454.73	9.46	1714.51	11.14
8	Mahanadi	2572	16.72	3180.28	20.67	4049.28	26.32	5352.76	34.79	6308.61	41.01
9	Pennar	568	3.69	702.33	4.57	894.24	5.81	1182.1	7.68	1393.19	9.06
10	Mahi	495	3.22	612.07	3.98	779.31	5.07	1030.18	6.7	1214.14	7.89
11	Sabarmati	685	4.45	847	5.51	1078.44	7.01	1425.6	9.27	1680.17	10.92
12	Narmada	1100	7.15	1360.15	8.84	1731.81	11.26	2289.28	14.88	2698.08	17.54
13	Tapi	380	2.47	469.87	3.05	598.26	3.89	790.84	5.14	932.06	6.06
14	West Flowing Rivers from Tapi to Tadri	381	2.48	471.11	3.06	599.83	3.9	792.92	5.15	934.52	6.07
15	West Flowing Rivers from Tadri to Kanyakumari	585	3.8	723.35	4.7	921.01	5.99	1217.48	7.91	1434.89	9.33
16	East Flowing Rivers between Mahanadi and Pennar	2053	13.34	2538.53	16.5	3232.18	21.01	4272.63	27.77	5035.6	32.73
17	East Flowing Rivers between Pennar & Kanyakumari	2366	15.38	2925.56	19.02	3724.96	24.21	4924.04	32.01	5803.33	37.72
18	West Flowing Rivers of Kutch and Saurashtra including Luni	2195	14.27	2714.12	17.64	3455.74	22.46	4568.16	29.69	5383.9	35
19	Area of Inland Drainage in Rajasthan	1785	11.6	2207.15	14.35	2810.25	18.27	3714.88	24.15	4378.25	28.46
20	Minor Rivers draining into Myanmar (Burma) and Bangladesh	65	0.42	80.37	0.52	102.33	0.66	135.28	0.87	159.43	1.04
	Total	67270	437.24	83179.35	540.67	105907.81	688.4	140000	910	165000	1072.5

3.3 Industrial Sector

All industries need water. The actual requirement varies from industry to industry and depends on the type of industry and production technology used. The water requirement for industries is quite small compared to the quantity of water needed for agriculture. However, when the industrial demand is in specific locations, heavy point loads are created on available water resources. With availability of quality water becoming scarce, drought conditions in certain locations force some industries to shut down and statutory environmental regulations becoming more stringent, optimisation in use of water demands a closer monitoring by industrial sector.

The quantity of water required in industrial production varies greatly from commodity to commodity. The amount of water required to produce any particular commodity also varies from country to country and even between different plants in the same country. The manufacturing process which is followed affects water requirement in the same country. It has been observed that appreciable amounts of water can be saved by substituting certain processes by others. Limited water resources may thus become a deciding factor in the choice of the manufacturing process or may force a change from one process to another as expansion increases the strain on the available water. The water intake by the industries is also affected by the extent to which water is reused. Reuse of water is common in large scale industries using substantial quantities of water.

In industries, it is not always easy to distinguish the water use scheme from the production process. Electrical power generation in nuclear and thermal power plants require water for condenser cooling and for boiler feed water. Water is extensively used for cooling of various types of equipment and as process fluid in chemical and metallurgical industries. Water serves as an input material in beverage industries and becomes a part of the final product. Water is used as processing agent in mining and beneficent operations. A significant use of water in industries is in the wet scrubbing of flue gases and dusty air for controlling pollution. Water finds another use in hydraulic disposal of solid wastes like boiler ash, tailings, mill scales etc.. Water is widely used for washing and cleaning of premises and for horticulture, for sanitary systems, for drinking purposes and for fire fighting.

Because of the very nature of the use, there is no fixed water demand for any industry but rather a range of values determined by the technology employed, selection of plants and processes, and practice of providing maximum recycling to reduce water demand and pollution. Make up water is needed to maintain quality of circulation water by providing bleed off to maintain cycle of concentration.

Likewise, quality requirement of industrial water is dictated by the process needs for which it has to be used. The water quality demands may be stringent as for feed water for high pressure boiler and inferior as in the case of water used for flushing of mill scale in rolling mills. Since a number of processes and operative are usually

involved in given industrial activity, there are several opportunities for direct and sequential uses of water, for example, cascade use of bleed off water where inferior quality of water is required for direct usages.

3.3.1 Classification of Industries

The Ministry of Water Resources constituted a group of Officers in February, 1988 representing Ministries/Departments of Industrial Development, Mines, Chemicals and petrochemicals, Fertilizers, Petroleum and Bureau of Industrial Coasts and Prices and Central Water Commission with a view to identify water intensive industries by taking into consideration, inter-alia, the consumptive use, quantum of effluent, production per unit of water, quality of effluent etc. The Group collected data from 68 industrial units comprising of 21 units of paper and pulp industry. 7 iron and steel industries, 21 non-ferrous metal industries, 4 fertiliser industries and 15 chemical industries. The study broadly classified the industry as below:

(i)	Paper and Pulp	Highly water intensive and highly polluting.
(ii)	Iron & Steel	Highly Water intensive & moderately polluting
(iii)	Non-ferrous mining plants	Low water intensive and moderately polluting
(iv)	Non-ferrous smelter plants	Moderately Water intensive and highly polluting
(v)	Fertilizer	Low water intensive and moderately polluting
(vi)	Chemicals	Moderately water intensive and highly polluting

The CWC study indicated ample scope for reduction in the consumption of fresh water. It was noticed that there is vast scope for recycling of effluents by all the industries thereby saving fresh water intake. This observation has also been corroborated by water auditing of select industries undertaken by the Bureau of Industrial Costs and Prices and by the studies conducted by the National Productivity Council and also by the Central Pollution Control Board.

Apart from the above major industries, a host of other industries like mining, oil refineries, caustic soda, Petro-chemicals, pesticide, tanneries, drugs & pharmeceutical, dye, zinc, copper and aluminium, starch, glucose and other maize processing industries, brewery, distillery, automobile industry etc., use large quantity of water in their production processing. The industry specific standards for water use and waste water generated as per Central Pollution Control Board for some of the industries are given in Annex-III.

In addition to the major and medium industries mentioned above, there are a large number of small scale industries located all over the country for which there is neither amount of water consumption nor estimates of effluents generated.

3.3.2 Industrial requirement water

Regarding water usage for various sectors of industry, Ministry of Industry was asked to co-ordinate the data with concerned ministries. For the purpose, a sub-Group was constituted in the Department of Industrial Development. Since the subject of water requirement for various sectors of industries was being handled for the first time and projections were required to be made for the next 50 years or so, the task at hand was quite gigantic. Every user Ministry was supposed to apply their mind for the major sectors and project the scenario keeping in view the industrial growth coupled with associated technological changes as could be envisaged at this stage.

During the deliberations of the Sub-Group, it was noted that the requirement of water will depend upon so many factors i.e. freedom for location of a unit, type of technology being used, local infrastructures, requirements regarding disposal of effluent, policy of recirculation, use of appropriate technology requiring least quantity of water, quality of raw materials and resources, sources of water i.e. fresh water/ground water/river etc., etc.

Though the intention was initially to collect the information river basinwise, to draw a proper strategy plan, yet in the liberalised scenario and existing policy guidelines, it is difficult to project the industrialisation in the country based on water resources availability alone. Besides, the selection of location of a unit also depends upon proximity to resources and infrastructures, markets, ports, availability of skilled manpower etc. At this juncture it was therefore difficult to project future water requirement river basinwise though in some sectors like mining, coal and steel, zonal consideration could play a significant role.

Presently, the stress was therefore laid on collation of water requirement and project the estimates upto a period of next 50 years based on which some sort of strategic planning has to be evolved for the future location of industry. Some thought has also to be given to the reprocessing of water for recirculation apart from strict effluent treatment measures being imposed. One has also to adopt technologies which will use water conservation measures specially in areas which are water intensive. All these factors will gain importance in times to come and a national consensus will have to be evolved in due course of time.

The sub-group of Ministry of Industry considered norms for various sectors (Annex-IV) to work out the water requirement for next fifty years in respect of 13 major industrial sectors and submitted its report (Annex-V). In the report an attempt has been made to project the best possible projections as would be worked out on available data both for production and technological trends as may emerge during the coming years. There could be variations in the estimates in view of the dynamic industrial situation that may emerge in future. There would, therefore, be need for having review from time to time. The report highlights that one has to stress on

conservation measures and need for evolving appropriate policy for selected key sectors of industry, which are water intensive.

The water requirement for the 13 major water intensive sectors of industry are given below in Table 12.

Table-12

Estimated Requirement Of Water For Various Sectors OF Industries

(IN MCM)

S.No	Sector	1996	2000	2010	2025	2050
1	Sugar	145	182	316	775	3463
2	Chemical and petro-chemical	976	1112	1714	4362	11641
3	Fertilizer	374	411	453	498	568
4	Paper	642	735	959	1416	4567
5	Textiles	331	608	1216	3650	14601
6	Coal	257	565	916	1424	2335
7	Cement	59	94	180	463	2319
8	Building (Incl. Bricks)	186	248	501	1591	10226
9	Steel	682	1140	1440	1890	2700
10	Small Scale Industries	1866	2268	3694	5755	9441
11	Food Processing	306	350	460	637	954
12	Non-ferrous Metals Chemicals.	185	217	301	401	452
13	Automobile	23	27	50	66	84
	Total	6032	7957	12200	22928	63351

From the above, the estimated requirement of water for various sectors of industries would be around 8 BCM in the year 2000, 12.2 BCM, 22 BCM and 63 BCM in the year 2010, 2025 and 2050 respectively.

3.4 Energy Sector

At the time of independence, the total installed capacity of power projects in the country was about 1362 MW while the present installed capacity is 96682 MW as on 31.3.2000 out of which only 23816 MW is contributed by hydro-power projects. Hydel share has declined continuously to the present level of 24.6% from the maximum proportion of 50.62% in year 1962-63, India is endowed with vast hydro potential of about 84000 MW at 60% load factor, equivalent to 1,50,000 MW installed capacity. At present(31.3.2000 only 25.71% of the assessed potential has either been developed or is under various stages of construction and cleared by Central Electricity Authority. The Regionwise summary of the status of Hydro Electric Potential development at 60% Load factor as on 31.3.2000 is given below:

S.No.	Basin	Assessed Potential (MW)	Potential Developed (MW)	Potential under Development (MW)	Potential of CEA cleared schemes (MW)	Untapped Potential (%)
1	Northern	30155	4353.23	2516.67	1443.62	72.43
2	Western	5679	1845.33	1500.22	234.45	36.96
3	Southern	10763	5678.75	746.50	93.90	39.43
4	Eastern	5590	1369.28	338.76	353.33	63.12
5	North Eastern	31857	332.50	365.72	443.42	96.42
	Total	84044	13579.10	5467.55	2568.52	308.36

The availability of substantial untapped hydro potential needs special attention and is a matter of concern. It is evident that suitable strategies need to be formulated for its accelerated development.

As per 15th Electric Power Survey carried out by Central Electricity Authority, it is estimated that by the end of year 2012, the energy requirements of the country will reach a figure of 1058440 Million Kwh, whereas peak load requirement is anticipated as 1,76,647 MW approx. According to 4th National Power Plan prepared by CEA capacity addition of about 49530 MW is envisaged during 9th Plan (1997-2002). It comprises 17380 MW hydro, 31270 MW thermal and balance 880 MW from Nuclear Power Stations. As per the programme, the total installed capacity at the end of 9th Plan should thus be 134549 MW, out of which 39025 MW would be from hydro stations. As per mid-term appraisal of Planning Commission, total capacity addition during 9th Plan is envisaged as 40245 MW of which 8399 MW is by Hydro.

As per 4th National Power Plan for 10th Plan Period (2002-2007) capacity addition of 45682 MW comprising 18822 MW hydro, 21980 MW thermal and balance 4880 MW from nuclear sources also has been envisaged. The total installation at the end of 10th Plan would thus be about 1,80,000 MW of which 57800 MW would be from

hydro stations. However, as per present indications, capacity addition of only 9019 MW is likely to be added during 9th Plan.

Since the Water resources are limited and their use is committed for other priority sectors also e.g., irrigation, drinking water supply, industrial use etc., it would be appropriate to evolve ways and means for improving the efficiency of use and management of available water resources for meeting the ever increasing requirements.

3.4.1 Thermal and Nuclear Power Plants

Normally, water is drawn for thermal and nuclear power stations from the rivers canals and ponds and the cooling water system could either be direct cooling system for condenser i.e., without cooling towers where a substantial quantity of water is returned back to the source or an indirect cooling system i.e., with cooling towers which is a closed circuit system and all the make up water drawn from the source ultimately becomes consumptive. The Nuclear Power Stations handles much large quantities of cooling water for condenser and other auxiliaries as also for the heat transport system between the reactor and the steam generator.

A 500 MW power plant requires approximately 700 cusecs of cooloing water in the case of fossil fuel type and 1000 cusecs of cooloing water in the case of nuclear type. The cooling water requirement, for example in the case of Singrauli Super Thermal Power Project Stage-II in 800 cusecs per 500 MW and in the case of Korba Super Thermal Power Project it is 660 cusecs per 500 MW. Conservative estimate for water requirement of Kaiga Nuclear Power Station is 1200 cusecs per 500 MW.

On an average consumptive water requirement of thermal power units works out to about 3 to 4.5 cusecs per 100 MW with once through system pond cooling systems and 5 to 6.5 cusecs per 100 MW with cooling tower system. The Central Electricity Authority has worked out net consumptive water requirements for the existing thermal power plants in the country on the basis of total installed capacity as on January 1998. As per the information given by it, the water requirements for the thermal plants as on January, 1998 has been worked out as 2 BCM. The water requirements for the thermal plants likely to be commissioned by the end of 11th Five Year Plan i.e. 2012 AD have been worked out as 5 BCM. Considering 9% annual growth of demand of energy, the water requirements at the end of 2025 AD and at the end of 2050 AD for thermal power plants, gas turbines and nuclear power stations shall be of the order of 15 BCM and 130 BCM respectively. The study needs to be carried out for the river basins in the country.

3.4.2 Hydropower Plants

In contrast to thermal and nuclear power plants, the hydro-electric plants hardly consume any water except negligible consumption mainly by way of evaporation losses.

3.5 Navigation

Navigation is another water related activity which requires attention for future demands. Due to general expansion of industry and production, inland navigation together with other means of transportation, may well emerge as a viable mode of transportation especially for goods. The National Transport Policy Committee (May 1980) has recommended that certain important rivers be declared as national waterways to help develop this third mode of surface transport. Accordingly, ten important waterways have been identified for consideration for being declared as national waterways. The total navigable length of inland water ways is nearly 14,500 kms. about 80% of this lies in 10 of the important rivers in the country.

i) The Ganga-Bhagirathi-Hoogly river System
ii) The Brahmaputra
iii) The West Coast Canal
iv) The Godavari
v) The Sunderbans
vi) The Mandovi, Zuari and Cumberjua Canal in Goa
vii) The Krishna
viii) The Mahanadi
ix) The Narmada
x) The Tapi

Of these, the following have so far been declared as National Waterways:-

National Waterway No.1 (Ganga-Brahmaputra-Hooghly River System)

Total Length 1620 km (Haldia to Allahabad
Stretches: a. Haldia to Farakka (560 km)
b. Farakka to Patna (460 km)
c. Patna to Allahabad (600 kms)

National Waterway No.2 (The Brahmaputra)

Total Length 891 km (Dhubri to Sadiya)
Stretches a. Dubri (Border) to Pandu (Guwahati) (260 kms)
b. Pandu to Dibrugarh (508 kms)
c. Dibrugarh to Sadiya (123 kms)

National Waterway No.3 (West Coast Canal)

Total length: 205 km
Stretches a. Champakara Canal (14 kms)
b. Udyogmandal Canal (23 km)
c. West Coast Canal (168 kms)

Apart from the Waterways identified by the National Transport Policy Committee, the other waterways are:

1.	Godavari	Proposed for declaration as National Waterway for the sector Cherla to Rajmundary alongwith Delta Canal system (length 208 km)
2.	Sunderbans	Proposed for declaration of international steamer route in Sunderbans as National Waterway, (Length 191 km)
3.	Goa Waterways	Proposed for declaration of Mandovi, Zuari rivers and Cumberjua canal of Goa (Length 122 km)

4. Mahanadi Brahmani & East Coast Canal (Length 895 km)
5. Kakinada-Madras Canal System (Length 618 km)
6. D.V.C. Canal (Length 136 km)
7. Barak River (Length 149 km)
8. Narmada River (Length 640 km)

9.	Extension of N.W.3	Extension of NW-3 towards north upto Kasergode and towards south upto Kovalam (Length 469 km.)

3.5.1 Water requirements for Navigational Purposes

Inland navigation is considered to be an energy saving mode of transport. It requires the maintenance of a specified water depth and width depending upon the size of vessels expected to use that waterway. This necessitates the release of adequate discharges. The detention of water in upstream storages may put some of the existing navigable waterways out of use unless adequate provision is made to release sufficient water downstream. Therefore, the discharge required to be made for maintaining the required water depth in the reaches of river planned for inland navigation should be made. Sometimes water released for some other purposes may simultaneously serve the requirements of navigation. Efforts should be made to plan such complimentary uses as far as possible.

3.5.2 Prevention of run off and preservation of water should be planned in all rivers to retain the present discharge level and to augment the lean season discharge which would not only facilitate improved navigability but also result in availability of water for other purposes. In all multi-purpose projects in water resource management, the navigational component should be identified at the inspection stage and provisions made to derive the maximum navigational potential. This is applicable in case of dams canalisation and also in planning of diversions as part of flood control.

3.5.3 Preservation of existing canals, lakes etc. is an essential ingredient of environmental protection.

3.6 Other Uses

Apart from the consumptive use of water for irrigation, domestic and industrial uses, thermal power plants, there are several other non-consumptive water uses, viz. minimum flow requirement in the river, recreational activities such as boating, swimming, water skiing etc., and for aquatic and wild life.

3.6.1 Minimum Flow Requirement

Maintenance of minimum flow in river has also to be considered as a water use since it restricts the quantity of water that can be diverted for other uses. Necessity for maintaining minimum flow may arise out of the necessity to maintain water quality, river regime, maintenance of river eco system or other public necessities such as bathing etc. Tentatively 10 cumecs of fresh water has to be maintained through out the river course. The quantity will vary according to river regimes.

3.6.2 Recreation

Recreational activities which require direct use of water include boating, ice skating, swimming, water skiing and fishing. For such uses, water should of sufficient quality. Normally reservoir sites are selected keeping in mind the possible recreational aspects. The recreation requires a certain range of water level to be maintained in the reservoir.

3.6.3 Aquatic Life

Water bodies are natural habitats for aquatic life. In planning water resources development projects, due consideration needs to be given to the development of fish and other forms of aquatic life. The irrigation and flood releases from the reservoirs should be favourable to fish culture.

3.7 Total Water Requirement For Various Sectors

Considering the water requirement for various sectors. as detailed in para 3 above, the total demand of water for different sectors for different years have been compiled and tabulated below :

Sector	Water Demand (BCM) in the year				
	1990	2000	2010	2025	2050
Irrigation	437	541	688	910	1072
Drinking (incl. livestock)	32	42	56	73	102
Industrial	-	8	12	23	63
Energy	-	2	5	15	130
Others	33	41	52	72	80
	634	813	1093	1442	

From the above statement it is observed that it will be difficult to meet the water demand beyond 2010 by available means and additional requirement of water would have to be met from inter-basin transfer of water from water surplus basins to water deficit basins and therefore immediate action for implementation of few of schemes may have to be initiated around this time. Against the total utilisable water resources of 1122 BCM, the projected demand during the year 2025 and 2050 comes to around 1092 and 1446 respectively. The scenario indicates water deficiency in the overall National Perspective. The deficiency may have to be managed by using the return flows from various uses which may be around 80% from domestic uses (58 and 81 BCM in the year 2025 & 2050 respectively). The return flows from irrigation sector will be around 10% i.e. 91 and 107 BCM in the year 2025 and 2050 AD. The return flow from industry sector is estimated to be 65 %. Besides water has to be made available through inter-basin transfer of river waters estimated to yield additional 200 BCM of utilisable water by 2050. The demand of Industry and energy sector may have to be managed by reuse and recycling of return flows and reuse of water from treated waste water. Proper treatment of effluent will have to be ensured to use the water in irrigation and industry sector. The water requirement for water deficit areas will be met by inter basin transfer of water from surplus basins after developing the untapped water resources . For demand management of supply of domestic water for cities and rural area it should be **74:26 and 50:50** respectively in respect of surface and ground water resources.

3.8 Basin wise Demand Management

In view of the fact that domestic and irrigation water requirements are essential for sustenance of life, these requirements bear the top priority on any water available. The industrial, energy and other requirements may then be met/planned out of the balance water available in the basin. Accordingly the basinwise demand of water requirements for irrigation and domestic sectors in years 2000, 2010, 2025 and 2050 ADs highlighting the status of availability of water resources for industries and other sectors by estimating the net requirement of water for irrigation and domestic sectors after accounting for return flow of 80% from domestic uses and 10% from irrigation water uses which can be reused are given in the tables at Nos.,13, 14, 15, 16 . The tables give the idea of total requirements of water during different years pertaining to irrigation and domestic water needs including for cattle and the balance water available for other sectors viz., energy, industries etc. vis-à-vis the average water resources potential in the country both the utilisable surface and replenishable ground water resources. The tables also show the availability against the total water requirements for irrigation and domestic, deficienty/surplus of water available for other sectors in each basin. Suggestions for adopting possible crisis management techniques for overcoming of the deficiency in the respective basins have also been discussed .

3.8.1. Scenario in 2000 AD

Deficiency of water will be felt in the area of inland drainage in Rajasthan, basins of Indus and Sabarmati. This situation can be managed by the conventional

method of water-shed management and minor irrigation planning. These deficit basins can be fed with water by inter basin transfer from neighbouring surplus basins.

3.8.2. Scenario in 2010 AD

Water deficiency will be felt in the Indus, Sabarmati and area of inland drainage in Rajasthan. The water deficiency in this area for other sectors has to be managed by conventional method of recycling and reuse of return flow from domestic sector along with conventional method of water-shed management, minor irrigation planning and some of the inter-basin transfer of water have to be taken up for meeting the demands of deficit regions from neighbouring surplus basins.

3.8.3. Scenario in 2025 AD

The following basins will be water deficit namely, Indus, Sabarmati and East flowing rivers between Mahanadi & Pennar and Pennar & Kanyakumari and West flowing rivers in Kutch and Saurashtra including Luni and area of inland drainage in Rajasthan. The river basins of Subernarekha, Pennar, Mahi, Barak, Krishna, Cauvery and Ganga will have less than 50% water of total utilisable water resources available for industry, energy and other uses. Along with the adoption of conventional method of water conservation and management, implementation of some of the inter-basin transfer of water proposals from the surplus basins are of utmost necessity to manage the water deficiency in the areas.

3.8.4. Scenario in 2050 AD

The following basins will be water deficit in namely, Indus, Ganga, Sabarmati, Mahi, Penner, East flowing rivers between Mahanadi and Pennar, Pennar and Kanyakumari, west flowing rivers in Kutch and Saurashtra including Luni and area of inland drainage in Rajasthan. The river basins of Barak, Krishna, Cauvery and Subernarekha will be highly water stressed with less than 50% of total utilisable water resources available for uses in the other sectors like industry, energy etc.. The overall picture in the country in 2050 is very grim as the total water requirement for various uses would not be adequate to meet the demands of the sectors other than irrigation and domestic with the balance available water of 136 BCM through conventional means. The situation can only be managed by different methods of conservation of water and adopting all measures for exploring/tapping the remaining water resources in the country. The inter-basin transfer of water will be the need of the day and almost all the identified proposals have to be given priority so that additional water is available to meet the demand for all sectors by 2050. Conventional methods of conservation, recycling/reuse etc. has to be enforced to tide over the crisis. The demand may be prioritised and the allocation has to be made according to the urgency and priority of the demands. A national debate should be initiated to manage and overcome the water crisis by 2050 so that the Perspective Plan for Integrated Development of Water Resources in the country may be attempted on solid and holistic approach.

The methods of water conservation like creation of surface storages, ground water exploitation, prevention of evaporation losses from reservoirs and conveyance losses, introducing rain water harvesting, proper water supply system in the urban area, renovation of tanks, de-salination and use of saline water, better water pricing policy and over and above water consciousness etc. should be adopted vigorously.

The measures which will yield significant benefit from overcoming the water crisis are

(1) Emphasis on activities requiring less water

(2) Ensuring quality of water by use of latest treatment techniques

(3) Strategy based on agro-climatic regional planning

(4) Integrated Basin Planning

(5) Change of cropping pattern

(6) Equitable distribution of water

(7) Maintenance of Irrigation system and better Irrigation practices

(8) Irrigation scheduling

(9) Conjunctive use of surface and ground water

(10) Sprinkler and drip irrigation

(11) Integration of small reservoirs with major reservoirs

4.0 LIMITATIONS

(i) Inadequate Data - Due to inadequate response of the State Governments/ concerned Ministry/ departments in furnishing the basic data for assessing the water requirements in different sectors, the available information on the population as per 1991 census, existing land use pattern, basic norms for water use by different sectors have been adopted for the study.

(ii) In preparation of perspective plans for water requirements of different sectors , one weightage of the important parameter is population forecast. The forecast of population should give due emphasis to all the factors governing the future growth and development and would require various parameters. In the absence of data on these parameters, basinwise population forecasts have been made based on UN Publications on World Population prospects, Registrar General of India and Ministry of Rural Area and Employment .

(iii) The domestic water requirements have been assessed based on the average rate of water supply in various categories of towns. The actual service level of water supplies varies from town to town. In the absence of the data on actual service level of water supply, the study may have to be revised when detailed information on water supply is received.

(iv) In the irrigation sector, methodology for projecting the land use pattern in future needs to be evolved in association with Ministry of Agriculture. The water requirements have been worked out adopting an average delta of 0.65 m. A suitable criteria has to be worked out for assessing the water requirements.

(v) In industrial sector the representatives of various Ministries/Departments of concerned Industrial sector indicated dificulties in projecting water requirement statewise or river Basinwise. Since it was difficult to predict where Industries would finally be setup in future, as there is hardly any controls, excercised at present, overall water requirement were only projected. state-wise data on production of various major industrial commodities has been made use

(vi) In energy sector, it has been mentioned by the CEA that hydro-power plants hardly consume any water except negligible consumption by way of evaporation losses. The energy sector therefore includes water requirement for Thermal and Nuclear Power Plants only.

Table 13. BASIN-WISE DEMAND MANAGEMENT IN THE YEAR 2000

Unit:BCM

S. No.	Basin	Average water Resources Potential (BCM)	Utilisable Surface water resources (BCM)	Replenish-able Ground water Resources (BCM)	Total Surface + Gorund Water Resources (BCM)	Estimated Demand of water in 2000 (BCM)					
						Irrigation	Domestic	Total	Return flow (80% ofDom. +10% of Irr.)	Net for Irr. & Dom.	Balance availble foe Industries &other uses
1	Indus	73.3	46	26.5	72.5	80.18	2.25	82.43	9.82	72.61	-0.11
2	Ganga-Brahmaputra-Meghna										
	(a) Ganga	525	250	171	421	245.03	17.12	262.15	38.2	223.95	197.05
	(b) Brahmaputra	537.2	24	26.55	50.55	10.14	1.07	11.21	1.87	9.34	41.21
	(c) Barak & others	48.4	0	8.52	8.52	1.26	0.28	1.54	0.35	1.19	7.33
3	Godavari	110.5	76.3	40.6	116.9	27	2.5	29.5	4.7	24.8	92.1
4	Krishna	78.1	58	26.4	84.4	33.65	3.21	36.86	5.93	30.93	53.47
5	Cauvery	21.4	19	12.3	31.3	12.67	1.5	14.17	2.47	11.7	19.6
6	Subnrnarekha	12.4	6.8	1.8	8.6	2.71	0.48	3.19	0.65	2.54	6.06
7	Brahmani-Baitarni	28.5	18.3	4.05	22.35	5.62	0.42	6.04	0.89	5.14	17.21
8	Mahanadi	66.9	50	16.5	66.5	20.67	1.19	21.86	3.02	18.84	47.66
9	Pennar	6.3	6.9	4.93	11.83	4.57	0.5	5.07	0.85	4.21	7.62
10	Mahi	11	3.1	4.2	7.3	3.98	0.48	4.46	0.78	3.68	3.62
11	Sabarmati	3.8	1.9	3	4.9	5.51	0.64	6.15	1.06	5.09	-0.18
12	Narmada	45.6	34.5	10.8	45.3	8.84	0.64	9.48	1.4	8.08	37.22
13	Tapi	14.9	14.5	8.27	22.77	3.05	0.79	3.84	0.93	2.9	19.87
14	West Flowing Rivers from Tapi to Tadri	87.4	11.9	8.7	20.6	3.06	1.78	4.84	1.73	3.11	17.49
15	West Flowing Rivers from Tadri to Kanyakumari	113.5	24.3	9	33.3	4.7	1.47	6.17	1.65	4.52	28.78
16	East Flowing Rivers between Mahanadi and Pennar	22.5	13.1	9	22.1	16.5	1.11	17.61	2.54	15.07	7.03
17	East Flowing Rivers between Pennar & Kanyakumari	16.5	16.5	9.2	25.7	19.02	2.56	21.58	3.95	17.63	8.07
18	West Flowing Rivers of Kutch and Saurashtra including Luni	15	15	11.2	26.2	17.64	1.22	18.86	2.74	16.12	10.08
19	Area of Inland Drainage in Rajasthan	0		0	0	14.35	0.52	14.87	1.85	13.02	-13.02
20	Minor Rivers draining into Myanmar (Burma) and Banglades	31	0	18.8	18.8	0.52	0.28	0.8	0.27	0.52	18.28
	Total	1,869.2	690.1	431.32	1,121.42	540.67	42.01	582.68	87.67	495.01	626.41

Table 14. **BASIN-WISE DEMAND MANAGEMENT IN THE YEAR 2010** **Unit: BCM**

S. No.	Basin	Average water Resources Potential (BCM)	Utilisable Surface water resources (BCM)	Replenish-able Ground water Resources (BCM)	Total Surface + Gorund Water Resources (BCM)	Estimated Demand of water in 2010 (BCM)					
									Return flow	Net for Irr. & Dom.	Balance availble foe Industries &other uses
						Irrigation	Domestic	Total	(80% of Dom. +10% of Irr.)		
1	Indus	73.3	46	26.5	72.5	102.09	2.83	104.92	12.47	92.45	-19.95
2	Ganga-Brahmaputra-Meghna										
	(a) Ganga	525	250	171	421	311.99	22.19	334.18	48.95	285.23	135.77
	(b) Brahmaputra	537.2	24	26.55	50.55	12.91	1.31	14.22	2.34	11.88	38.67
	(c) Barak & others	48.4	0	8.52	8.52	1.61	1.42	3.03	1.3	1.73	6.79
3	Godavari	110.5	76.3	40.6	116.9	34.37	3.22	37.59	6.01	31.58	85.32
4	Krishna	78.1	58	26.4	84.4	42.85	4.28	47.13	7.71	39.42	44.98
5	Cauvery	21.4	19	12.3	31.3	16.13	1.98	18.11	3.2	14.91	16.39
6	Subnrnarekha	12.4	6.8	1.8	8.6	3.45	0.61	4.06	0.83	3.23	5.37
7	Brahmani-Baitarni	28.5	18.3	4.05	22.35	7.15	0.51	7.66	1.12	6.54	15.81
8	Mahanadi	66.9	50	16.5	66.5	26.32	1.52	27.84	3.85	23.99	42.51
9	Pennar	6.3	6.9	4.93	11.83	5.81	0.64	6.45	1.09	5.36	6.47
10	Mahi	11	3.1	4.2	7.3	5.07	0.62	5.69	1	4.69	2.61
11	Sabarmati	3.8	1.9	3	4.9	7.01	0.87	7.88	1.4	6.48	-1.58
12	Narmada	45.6	34.5	10.8	45.3	11.26	0.83	12.09	1.79	10.3	35
13	Tapi	14.9	14.5	8.27	22.77	3.89	1.1	4.99	1.27	3.72	19.05
14	West Flowing Rivers from Tapi to Tadri	87.4	11.9	8.7	20.6	3.9	2.51	6.41	2.4	4.01	16.59
15	West Flowing Rivers from Tadri to Kanyakumari	113.5	24.3	9	33.3	5.99	1.94	7.93	2.15	5.78	27.52
16	East Flowing Rivers between Mahanadi and Pennar	22.5	13.1	9	22.1	21.01	1.43	22.44	3.25	19.2	2.91
17	East Flowing Rivers between Pennar & Kanyakumari	16.5	16.5	9.2	25.7	24.21	3.49	27.7	5.21	22.49	3.21
18	West Flowing Rivers of Kutch and Saurashtra including Luni	15	15	11.2	26.2	22.46	1.61	24.07	3.53	20.54	5.66
19	Area of Inland Drainage in Rajasthan	0		0	0	18.27	0.68	18.95	2.37	16.58	-16.58
20	Minor Rivers draining into Myanmar (Burma) and Bangladesh	31	0	18.8	18.8	0.67	0.12	0.79	0.16	0.62	18.17
	Total	1,869.2	690.1	431.32	1,121.42	688.42	55.71	744.13	113.41	630.72	490.7

Table 15. BASIN-WISE DEMAND MANAGEMENT IN THE YEAR 2025

Unit: BCM

S. No.	Basin	Average water Resources Potential	Utilisable Surface water resources	Replenish-able Ground water Resources	Total Surface + Gorund Water Resources	Estimated Demand of water in 2025 (BCM)					
						Irrigation	Domestic	Total	Return flow (80% of Dom. +10% of Irr.)	Net for Irr. & Dom.	Balance availble foe Industries &other uses
1	Indus	73.3	46	26.5	72.5	134.95	4.07	139.02	16.75	122.27	-49.77
2	Ganga-Brahmaputra-Meghna										
	(a) Ganga	525	250	171	421	412.42	29.56	441.98	64.89	377.09	43.91
	(b) Brahmaputra	537.2	24	26.55	50.55	17.07	1.57	18.64	2.96	15.68	34.87
	(c) Barak & others	48.4	0	8.52	8.52	2.12	0.87	2.99	0.9	2.08	6.44
3	Godavari	110.5	76.3	40.6	116.9	45.44	4.01	49.45	7.75	41.7	75.2
4	Krishna	78.1	58	26.4	84.4	56.64	5.5	62.14	10.06	52.08	32.32
5	Cauvery	21.4	19	12.3	31.3	21.32	2.6	23.92	4.21	19.71	11.59
6	Subnmarekha	12.4	6.8	1.8	8.6	4.56	0.92	5.48	1.19	4.29	4.31
7	Brahmani-Baitarni	28.5	18.3	4.05	22.35	9.46	0.7	10.16	1.51	8.65	13.7
8	Mahanadi	66.9	50	16.5	66.5	34.79	2	36.79	5.08	31.71	34.79
9	Pennar	6.3	6.9	4.93	11.83	7.68	0.99	8.67	1.56	7.11	4.72
10	Mahi	11	3.1	4.2	7.3	6.7	0.76	7.46	1.28	6.18	1.12
11	Sabarmati	3.8	1.9	3	4.9	9.27	1.18	10.45	1.87	8.58	-3.68
12	Narmada	45.6	34.5	10.8	45.3	14.88	1.09	15.97	2.36	13.61	31.69
13	Tapi	14.9	14.5	8.27	22.77	5.14	1.43	6.57	1.66	4.91	17.86
14	West Flowing Rivers from Tapi to Tadri	87.4	11.9	8.7	20.6	5.15	2.49	7.64	2.51	5.13	15.47
15	West Flowing Rivers from Tadri to Kanyakumari	113.5	24.3	9	33.3	7.91	2.56	10.47	2.84	7.63	25.67
16	East Flowing Rivers between Mahanadi and Pennar	22.5	13.1	9	22.1	27.77	1.82	29.59	4.23	25.36	-3.26
17	East Flowing Rivers between Pennar & Kanyakumari	16.5	16.5	9.2	25.7	32.01	4.5	36.51	6.8	29.71	-4.01
18	West Flowing Rivers of Kutch and Saurashtra including Luni	15	15	11.2	26.2	29.69	2.49	32.18	4.96	27.22	-1.02
19	Area of Inland Drainage in Rajasthan	0		0	0	24.15	1.54	25.69	3.65	22.04	-22.04
20	Minor Rivers draining into Myanmar (Burma) and Bangladesh	31	0	18.8	18.8	0.88	0.16	1.04	0.21	0.82	17.98
	Total	1,869.2	690.1	431.32	1,121.42	910	72.81	982.81	149.25	833.56	287.86

Table 16. **BASIN-WISE DEMAND MANAGEMENT IN THE YEAR 2050** **Unit: BCM**

S. No.	Basin	Average water Resources Potential (BCM)	Utilisable Surface water resources (BCM)	Replenish-able Ground water Resources (BCM)	Tota Surface Gorund Water Resources (BCM)	Estimated **Demand of water in 2050** (BCM)					
						Irrigation	Domestic	Total	Return flow (80% of Dom. +10% of Irr.)	Net for Irr. & Dom.	Balance availble foe Industries &other uses
1	Indus	73.3	46	26.5	72.5	159.05	5.85	164.9	20.59	144.32	-71.81
2	Ganga-Brahmaputra-Meghna										
	(a) Ganga	525	250	171	421	486.06	38.97	525.03	79.78	445.25	-24.25
	(b) Brahmaputra	537.2	24	26.55	50.55	20.12	1.87	21.99	3.51	18.48	32.07
	(c) Barak & others	48.4	0	8.52	8.52	2.5	3.11	5.61	2.74	2.87	5.65
3	Godavari	110.5	76.3	40.6	116.9	53.55	4.93	58.48	9.3	49.18	67.72
4	Krishna	78.1	58	26.4	84.4	66.75	6.93	73.68	12.22	61.46	22.94
5	Cauvery	21.4	19	12.3	31.3	25.13	3.35	28.48	5.19	23.29	8.01
6	Subnrnarekha	12.4	6.8	1.8	8.6	5.37	1.5	6.87	1.74	5.13	3.47
7	Brahmani-Baitarni	28.5	18.3	4.05	22.35	11.14	1.06	12.2	1.96	10.24	12.11
8	Mahanadi	66.9	50	16.5	66.5	41.01	2.71	43.72	6.27	37.45	29.05
9	Pennar	6.3	6.9	4.93	11.83	9.06	1.72	10.78	2.28	8.5	3.33
10	Mahi	11	3.1	4.2	7.3	7.89	0.91	8.8	1.52	7.28	0.01
11	Sabarmati	3.8	1.9	3	4.9	10.92	1.49	12.41	2.28	10.13	-5.23
12	Narmada	45.6	34.5	10.8	45.3	17.54	1.37	18.91	2.85	16.06	29.24
13	Tapi	14.9	14.5	8.27	22.77	6.06	1.76	7.82	2.01	5.81	16.96
14	West Flowing Rivers from Tapi to Tadri	87.4	11.9	8.7	20.6	6.07	4.43	10.5	4.15	6.35	14.25
15	West Flowing Rivers from Tadri to Kanyakumari	113.5	24.3	9	33.3	9.33	3.16	12.49	3.46	9.03	24.27
16	East Flowing Rivers between Mahanadi and Pennar	22.5	13.1	9	22.1	32.73	2.41	35.14	5.2	29.94	-7.84
17	East Flowing Rivers between Pennar & Kanyakumari	16.5	16.5	9.2	25.7	37.72	5.53	43.25	8.2	35.05	-9.35
18	West Flowing Rivers of Kutch and Saurashtra includ-ing Luni	15	15	11.2	26.2	35	4.26	39.26	6.91	32.35	-6.15
19	Area of Inland Drainage in Rajasthan	0		0	0	28.46	4.51	32.97	6.45	26.52	-26.52
20	Minor Rivers draining into Myanmar (Burma) and Bangladesh	31	0	18.8	18.8	1.04	0.21	1.25	0.27	0.97	17.82
	Total	1,869.2	690.1	431.32	1,121.42	1,072.5	102.04	1,174.54	188.88	985.66	135.76

5.0 SUGGESTED YARDSTICKS AND GUIDELINES FOR ASSESSMENT OF AVAILABILITY AND DEMAND OF WATER FOR DIVERSE USES

Water Availability

The appraisal of available resources is a basic requirement in all resource planning exercises. Water resources planning is no exception. The purpose of appraising water resources is to determine the source., extent and dependability of supply and the character of water on which an evaluation of their future control and utilisation is to be based.

Three aspects should be considered in appraising water resources, i.e. the quantity, the quality and the reliability of available water. In appraising the quantity, it is important to ascertain not only the total quantity available within a certain period of time, but also the distribution of the available quantity with respect to both space and time. Another factor which is also important is the utilisable quantity. In planning the utilisation of water resources, the real distribution of available water often dictates the location of the various structures while seasonal distribution dictates their size. Quality of water is important especially for uses such as irrigation, domestic and industrial water supplies. Reliability of supply is an important aspect in deciding the value of water.

Water occurs as surface water and ground water. The appraisal of surface water resources generally includes estimation of (i) annual run-off and its monthly/ten daily distribution (ii) aerial distribution of water resources within the basin, (iii) flood flows, (iv) low flows, (v) return flows and (vi) sediment load. Where applicable, snow melt studies should also be carried out.

In early periods of water resources development the supply was in plenty and demand limited. Most of the development was in the lower reaches of the river system and in such situations the supply was almost always ensured and the question of dependability of supply was not important. As the demand increased and the demand points also shifted to the upper reaches in comparison to demand became more important. Thus the concept of having some uniform yardsticks for the dependability of yield for planning various water resources projects were developed.

As per present practices the availability of water is generally assessed at 75% and 50% dependabilities. However, general factors for design of storages adopted are that the storage provided in the irrigation project should be able to meet the demand for 75 percent of the time whereas in power and water supply projects the storage should meet the demand for 90 percent and 100 percent of the time respectively. In drought prone areas the criteria is being relaxed to about 50% provided adequate carry over storage capacity has been provided to ensure 75% reliability to irrigation besides meeting other demands at prescribed reliability.

Ground water is an important source of water and its development is crucial especially in areas where surface water resources are scarce. In many

regions, ground water is the only dependable water source for drinking as well as for irrigation. It is also important as a supplementary source to surface water.

The appraisal of ground water is much more complicated than that of surface water, because unlike surface water, ground water is not confined to any channel or exposed to vision for a direct measurement/assessment.

An appraisal of water resources is not complete without a mention of the quality of the available water. The quality of water is greatly affected by the presence of minerals in soils and rocks through which the surface and ground water flows. But, with rapid industrialiation and urbanisation, the greatest threat to the quality of water is from urban and industrial waste effluents. Run-off from agricultural fields contaminated with pesticides and chemicals further aggravate the situation.

The work of further refining the assessment of water resources of various basins and collect reliable data pertaining to observed flows, utilisation from surface and ground water resources for irrigation, domestic and industrial uses and evaporation losses should be undertaken. The return flows from irrigation and from other uses from surface as well as ground water resources should be assessed after considering the prevailing irrigation efficiency of the system. More accurate observations on irrigation efficiencies are needed. The State Governments and other relevant Central agencies collecting data should also be associated with these studies. It is desirable that such reassessment is carried out periodically, say once in 5 to 10 years. State-wise assessment of surface water resources would also be desirable as the states are primarily responsible for planning and development of water resources.

Water Use

Man uses water for multiple purposes. The important uses of water are: domestic, irrigation, hydropower generation, industrial use, inland navigation, fish and wild life preservation, and recreation. Flood management, though not a water use in the strict sense, may also be added to this, since it involves regulation of water and hence affects the availability of water for other uses. The estimation of future water demand by the various user sectors in the basin is an important aspect. According to the National Water Policy the priorities of water use should be: (1) Drinking water, (ii) Irrigation, (iii) Hydropower, (iv) Industrial, (v) Navigation and other uses. However, these priorities might be modified if necessary in particular regions with reference to area specific considerations.

While considering the uses of water one should differentiate between consumptive and non-consumptive uses. Under non-consumptive use is the generation of hydroelectric power, development of navigation and recreation, for which a certain rate of supply is required but not consumed except incidentally in evaporation and seepage losses.

Irrigation, industrial and domestic water supply are examples of consumptive use of water. Here also, a distinction should be made between actual consumption and water requirement. Taking the case of irrigation, all the water

supplied is not consumed by plants. Quite a portion is wasted as surface run-off and lost through percolation which ultimately may return to the stream or add to the ground water storage. Similar is the case with other consumptive uses such as domestic and industrial use. The return flows from domestic and industrial uses are generally considered on an average as 80% of the uses. In case of irrigation, the return flows may vary depending on various factors such as local soil characteristics, meteorological conditions, method of irrigation, types of crops grown etc. The return flow from irrigation use has been considered as 10%.

The return flow from consumptive uses described above join the stream at a downstream point and is available for further use. However, the quality of the return flow may be substantially different from the quality of intake water and may cause deterioration in water quality of the stream. This aspect requires to be considered while accounting for the return flow as an available supply downstream.

Another aspect to be looked into is whether consumptive and non-consumptive uses are complementary or not. If these are complementary in time and space, much saving of water can be effected and the water use will be most optimal or nearly so. This will also result in considerable saving in the capacity requirements of dams, barrages etc.

Domestic

Domestic water requirement should include drinking water requirements and other daily needs of urban and rural population, industrial needs, commercial needs, public needs such as fire hydrants and miscellaneous needs such as livestock, poultry, gardening etc. Out of all water uses, the drinking water supply has been given the highest priority by the Government in the National Water Policy adopted in 1987. Irrigation and multipurpose projects should invariably include drinking water component wherever there is no alternate source of drinking water.

Assessment of future demand for domestic water supply has to be based on the growth of population in the area to be served and its likely per capita consumption of water. The per capita consumption of water will depend on standard of living of the people, social customs and habits, accessibility of supply, quality available, climate, tariffs and economic and educational background. The per capita water requirement norms as recommended by the Ministry of Urban Development and Rural Development should be adopted. The planning for domestic water needs to be done separately for urban and rural regions/areas considering the pattern of their development.

The break up of these requirements (lpcd) for various activities is as given below:

S.No.	Item	Rural Areas Higher	Lower	Urban Areas
1	Drinking	3	3	5
2	Cooking	5	5	5
3	Ablution	15	10	-
4	Bathing	20	15	55
5	Washing of utensils, cloths & house	12	7	45
6	Flushing of latrines	15	-	30
	Total	70	40	140

The CPHEEO, Ministry of Urban Development has recently revised the per capita drinking water supply norms for municipal use, which ranges from 70 lpcd for towns provided with piped water supply but without sewerage system to 135 lpcd for towns provided with piped water supply and sewerage system. In case of metropolitan and mega cities, the recommended maximum water supply level is 150 lpcd. However, the figure does not include unaccounted for water (UFW), which should be limited to 15% of the total demand. In urban areas where water is provided through public stand post, 40 lpcd has been considered. The above mentioned figures include requirement of water for commercial, institutional and minor industries. However, bulk supply to such establishments should be assessed and provided separately with proper justification as given in the Manual on Water Supply and Treatment published by CPHEEO. The extracts of per capita norms are as under:-

The Environmental Hygiene Committee suggested certain optimum service levels for communities based on population groups. In the Code of Basic Requirements of Water Supply, Drainage and Sanitation (IS: 1172-1983) as well as the National Building Code, a minimum of 135 lpcd has been recommended for all residences provided with full flushing system for excreta disposal. Though the Manual on Sewerage and Sewage Treatment recommends a supply of 150 lpcd wherever sewerage is existing/contemplated, with a view to conserve water, a minimum of 135 lpcd is now recommended.

It is well recognised that the minimum water requirements for domestic and other essential beneficial uses should be met through public water supply. Other needs for water including industries etc. may have to be supplemented from other systems depending upon the constraints imposed by the availability of capital finances and the proximity of water sources having adequate quantities of acceptable quality which can be economically utilised for public water supply.

Based on the objectives of full coverage of urban communities with easy access to potable drinking water in quantities recommended to meet the domestic and other

essential non-domestic needs, the following recommendations are made:

(1) Domestic and non-domestic needs

The recommended values for domestic and non-domestic purposes are given below.

RECOMMENDED PER CAPITA WATER SUPPLY LEVELS FOR DESIGNING SCHEMES

S.No.	Classification of towns/cities	Recommended Maximum Water Supply Levels (lpcd)
1	Towns provided with piped water supply but without sewerage system	70
2	Cities provided with piped water supply where sewerage system is existing/contemplated	135
3	Metropolitan and Mega cities provided with piped water supply where sewerage system is existing/contemplated	150

Notes:

(i) In urban areas, where water is provided through public standposts, 40 lpcd should be considered;

(ii) Figures exclude "Unaccounted for Water (UFW)" which should be limited to 15%

(iii) Figures include requirements of water for commercial, institutional and minor industries. However, the bulk supply to such establishments should be assessed separately with proper justification.

(2) Institutional Needs

The water requirements for institutions should be provided in addition to provisions indicated in (1) above, where required, if they are of considerable magnitude and not covered in the provisions already made. The individual requirements would be as follows:

S.No.	Institutions	Litres per head per day
1	Hospital (including laundry)	
	(a) No. of beds exceeding 100	450 (per bed)
	(b) No. of beds not exceeding 100	340 (per bed)
2	Hotels	180 (per bed)
3	Hostels	135
4	Nurses' homes and medical quarters	135
5	Boarding schools/colleges	135
6	Restaurants	70 (per seat)
7	Air ports and sea ports	70
8	Junction Stations and intermediate stations where mail or express stoppage (both railways and bus stations) is provided	70

9	Terminal stations	45
10	Intermediate stations (excluding mail and express stops)	45 (could be reduced to 25 where bathing facilities are not provided)
11	Day schools colleges	45
12	Offices	45
13	Factories	45 (could be reduced to 30 where no bathrooms are provided)
14	Cinema, concert halls and theatre	15

(3) Fire Fighting Demand

It is usual to provide for fire fighting demand as a coincident draft on the distribution system along with the normal supply to the consumers as assumed. A provision in kilolitres per day based on the formula of 100 p where, p = population in thousands may be adopted for communities larger than 50,000. It is desirable that one third of the fire fighting requirements form part of the service storage. The balance requirement may be distributed in several static tanks at strategic points. These static tanks may be filled from the nearby ponds, streams or canals by water tankers wherever feasible. The high rise buildings should be provided with adequate fire storage from the protected water supply distribution.

(4) Pressure Requirements

Piped water supplies should be designed on continuous 24 hours basis to distribute water to consumers at adequate pressure at all points. Intermittent supplies are neither desirable from the public health point of view nor economical. For towns where one-storeyed buildings are common and for supply to the ground level storage tanks in multi-storeyed buildings, the minimum residual pressure at ferrule point should be 7m for direct supply. Where two-storeyed buildings are common, it may be 12m and where three-storeyed buildings are prevalent 17 m or as stipulated by local byelaws. The pressure required for fire fighting would have to be boosted by the fire engines.

The strategy in the urban supply is to change the incentive structure so that organisations and people in the sector provide sustained & efficient service to consumers. There should be proper accounting of water requirement with consumer consultation. The tariff structure should be rationalised imposing some incentives and sanctions so as to avoid wasteful use of water and better recovery for maintaining delivery system. The institutional arrangement for water supply should be restructured and involving private sector participation should be induced. There should be a better service for the disadvantaged groups. Water demand of slum areas should be planned along with mainstream requirement of the urban areas planning.

For better water assessment of the demand of rural sector, improvements in the functioning of the sector is necessary. Ground water is the chief source of water in rural region, protecting both the sustainable yield and quality of GW should be given due care. Cost of providing good quality drinking water to the

rural areas should be within reasonable range. Effective legislation and mechanism to regulate and manage ground water should be implemented. Widespread public awareness compaignes should be taken up to promote water as an economic good. The Government role should be reduced in rural water supply sector and people's participation should be encouraged.

Irrigation and multipurpose projects should invariably include a drinking water component wherever there is no alternative source of drinking water. Water supply requirement to public facilities are mostly in urban centres. These include requirement of fire hydrants, public parks and gardens, public buildings, public sanitary facilities, public drinking water facilities, etc.

To reduce the gap between demand and supply, water conservation measures be accorded highest priority, specially in areas facing water quality and scarcity problems, with emphasis on recycling/reuse of treated waste water for non-domestic uses.

Poor maintenance of the systems by the utilities results in leakage of costly treated waters. The discipline of maintenance should be instilled in the utilities and they should be held accountable for it. The importance of maintenance should also be impressed upon consumers, since considerable leakage and waste take place in households also. Tariff rates in the urban areas have to be so revised as to cover not only the O&M costs but also part of the capital cost, debt service plus some reserve fund.

Water for meeting the minimum requirements of the urban poor may be supplied at least at a nominal charge, so that they also realise the importance of treated water supply. The affluent sections of society should be changed higher rates based on meeting quantity so as to stop wasteful use of water.

Public Awareness needs to be created for reducing water consumption. Women's participation is to be encouraged to the maximum as they are major users. Wherever feasible, artificial recharge and rain water harvesting have to be encouraged.

In rural areas where piped water scheme is operational or is proposed to be developed, the local governments and users' committee should participate in the development and maintenance of water supply systems.

Irrigation

Irrigation being the largest consumer of fresh water. The aim should be to get more crop yield per unit of water. Irrigation of land for agriculture represents one of the oldest and most important uses of water, next only to providing water for domestic purposes. The requirement of irrigation water arises out of the necessity to supplement water to the crops either due to aridity and drought or for ensuring the best possible crop returns. Estimates of future irrigation water requirement should be backed by a detailed land and agricultural survey. This should consider the suitability

of land for irrigation, suitability and acceptability of cropping pattern and farming practices. Climate and type of soil are other related factors.

The existing cropping pattern may undergo changes with the introduction of irrigation. The projected cropping pattern should take into account the agricultural productivity of land, climate and above all the farmer's choice. Experience in areas with similar characteristics will be a guidance in this regard. The cropping pattern is also likely to change with changing market conditions over the life of the project or the planning period. Such possible changes should be visualised and incorporated. In a large basin, different cropping patterns may have to be adopted for different regions or sub-basins. It may even vary from project to project.

The term water requirement of crops implies the total amount of water required at the field to mature the crop. It includes evapo-transpiration (ET), application of losses and special needs and does not include transit losses. Special needs include requirement for puddling, transplanting, leaching salts etc.

The crop water requirement may be determined from data collected on yield vs. applied water from fields or experimental plots for specific crops in a specific locality having characteristic values of consumptive use and effective precipitation. If such data are available at field experiment stations in the basin or nearby areas with comparable characteristics, these should be used.

Irrigation water requirement of crops is the gross amount of water required to be applied through irrigation. Usually, it is only a part of the total crop water requirement and its amount will depend on the contribution from rainfall and the soil profile. The irrigation requirement of various crops (according to Ministry of Agriculture) in millimetres is as under:

Crop	Maximum	Minimum
Rice	1640	750
Wheat	600	220
Maize	1250	100
Bajra	600	150
Barley	360	75
Groundnut	700	140
Mustered	180	70
Linseed	200	75
Cotton	837	140
Sugarcane	1960	450

The gross irrigation water requirement will include the seepage and other losses during conveyance. The conveyance losses will mainly depend on soil through which the canal runs and whether the canal is lined or unlined. The conveyance losses may amount to 30% to 40% of the water released at canal head and the total losses including field losses may be as high as 50% to 80%. Therefore, these issues should be critically examined and suggest suitable measures to reduce

losses and increase irrigation efficiency. Lining of canals and alternate methods of irrigation like sprinkler irrigation may be costly propositions, but are worth considering for economical use of water specially in water scarce areas. Whenever land resources are available and water is scarce, if economically advantageous, deficit irrigation may be practiced.

The irrigation intensity should be such as to extend the benefits of irrigation to a large farm facilities as far as possible, keeping in view that water allocation in an irrigation system should be done with due regard to equity and social justice. For better assessment of demand of irrigation water requirement, the importance should be given to: promoting irrigation management transfer to Water User's Association (WUA), restructuring irrigation institutions, involving private sector participation, other guiding aspects for meeting demands and development for irrigation could be achieving technical viability (prioritising expenditure, cost recovery, etc), upgrading maintenance and modernising the system, improve agricultural technology etc.

There is need for periodical reappraisal of potential of irrigation projects and figures of actual irrigation, in order to take measures to accelerate the utilisation of the potential created and make improvements in utilisation.

There is need for a paradigm shift in emphasis towards improving the performance of existing irrigated agriculture. Water so saved should be utilised to increase irrigation intensity and farming practices improved with modern inputs and technologies. Operation and maintenance have to be substantially improved through participatory management.

Heavy subsidies in electricity consumed for agriculture have tended to encourage wasteful use of energy and also wasteful use of water.

Irrigation operators should educate farmers with pilot experiments and demonstration plots, in respect of the advantages of less than optimal consumption of water. After each modernisation project is completed, a performance review should be carried out, which should assess the benefits and costs. Canal automation which is a new technology should be introduced in some projects in country.

Reuse is an important method of managing drainage water. The options for reuse of drainage water would include direct use for irrigation, blending with canal water, cyclic or rotational use, saline agriculture, forestry system and solar evaporators, aqua culture and use of saline water through salt tolerant crops.

Power Generation

The water use related to power generation comes under two categories: (i) the water requirement for hydroelectric power generation and (ii) the cooling water requirement for thermal and nuclear power plants. The first one is mostly non-consumptive except for evaporation and seepage in storage whereas the second one is partly consumptive and partly non-consumptive.

Before planning for power, a power demand survey to predict the likely demand for power in the basin or other selected geographical areas to be served by the basin development, may be carried out. The projection should consider per capita usage at present, anticipated technological change and projected population and industrial growth. The projected demand in excess of the potential of existing projects (hydro, thermal and nuclear) is to be used for planning.

The second consideration is the available hydropower potential in the basin. The Central Electricity Authority has been carrying out survey in this regard and publishing them and these can be utilisd. It is a predominantly economic problem and a matter of policy to determine the extent of hydropower and thermal power generation to be planned in the basin. Other related factors to be considered in taking a decision in this regard are the available quantity and quality of fossil fuel, complementary needs of water for power generation and other uses and the power demand and pattern such as base load and peak load, etc.

In hydropower projects there is hardly any consumptive water requirement except by way of evaporation losses considered as 15% of live storage capacity at reservoir. The water requirement for hydropower generation should consider the total water available for generation, the amount and pattern of anticipated power loads and amount of regulation needed to meet load fluctuations and the quantum and pattern of water demand for other purposes. The estimates may be general in character, but should be reliable and in coordination with other water uses.

For thermal and nuclear power plants, the water requirement should be based on plant capacities and cooling water arrangements. A distinction may also be made between consumptive and non-consumptive uses. Measures for economical water use including recycling should also be undertaken. The norms for water requirement according to CEA are as under:

	System	Water requirement (Cumecs per 100 MW)
(i)	For once through cooling	0.12 - 0.17
(ii)	For cooling Tower	0.20 - 0.23

Unlike other water uses, the planning for power cannot usually be restricted to the demand within a basin alone. The demand for a region or the nation as a whole is important rather than demand in a basin. Therefore, as a general rule, the planning should attempt to generate hydroelectric power where feasible. The excess power, if any, can always be used elsewhere through regional grids.

Industry

Industrial water use varies widely among industries. Statistics on average use per unit of production may be available with industries or concerned Government departments. Efforts should be made to collect such data at least for these industries which are water intensive such as paper and newsprint, coal, mining, petrochemicals, etc. The norms for water requirement for 13 major industrial sectors

according to the Ministry of Industries are given in Annexure I. Also the industry specific standards of water use and waste water generated as per Central Pollution Control Board some of the industries are given in Annexure II. Water demand projection for industries should be coordinated with studies of anticipated industrial expansion and should indicate the location, types of use as well as the amount, quality and location of effluent discharge. Industries when set up will also create an accompanying demand of domestic supply to cater to the needs of new concentration of workers and their colonies. This demand should also be taken into account. The scope for industrial expansion in the basin will primarily depend on the availability of cheap raw material and labour, transport facilities to demand centres and the general industrial policy of State Govt. Information available with industry department and National Plan Document will provide some idea of the regional industrial growth prospects which may be utilised.

Commercial water requirements are computed on the number of commercial establishments that are existing and are likely to come up to serve the projected population. As average rate per commercial establishment may be worked out based on survey on existing water use.

Tariff rates to be prescribed such that the industry feels compelled to look into technological interventions leading to reduced use per unit production. For effecting maximum conservation, production process have to be modified, to have lesser generation of effluent water.

Waste utilisation technologies/clean production technologies with emphasis on waste minimisation, recycling and reuse have to be encouraged for adoption.

Instead of allowing location of hazardous industries and insisting on zero effluent condition in semi-arid areas, industrial zoning be done in a manner that in such areas water intensive industries are not permitted especially those releasing toxic effluents. Hazardous waste treatment and disposal need to be so planned and sited as to protect people and environment from adverse impacts.

Minimum National Standards (MINAS) evolved by the Central Pollution Control Board based on minimum treatment concept have to be strictly followed while clearing proposals for locating industries in polluted stretches of water bodies. Apart from obtaining clearance from SPCB, CPCB, concurrence of Ministry of Water Resources on water availability/inter-state aspects may be obtained for discharging effluents in the drainage system.

Navigation

Navigation is another water related activity which requires attention for future demands. Due to general expansion of industry and production, inland navigation, together with other means of transportation, may well emerge as a viable mode of transportation especially for goods. The planner should study such possibilities. The National Transport Policy Committee (May, 1980) has recommended that certain important rivers be declared as national waterways to help

develop this third mode of surface transport. Accordingly, ten important waterways have been identified for consideration for being declared as national waterways and three of them, namely, Ganga-Bhagirathi-Hoogli, Brahnmaputra river and West Coast Canal have already been declared so. It is also considered to be an energy saving mode of transport.

Inland navigation requires the maintenance of a specified water depth and width depending upon the size of vessels expected to use that waterways. This necessitates the release of adequate discharges. The detention of water in upstream storages may put some of the existing navigable waterways out of use unless adequate provision is made to release sufficient water downstream. Therefore, the discharge required to be made for maintaining the required water depth in the reaches of river planned for inland navigation should be made. Sometimes water released for some other purposes may simultaneously serve the requirements of navigation. Efforts should be made to plan such complimentary uses as far as possible.

Other Uses

Maintenance of minimum flow in river is also to be considered as a water use since it restricts the quantity of water that can be diverted for other uses. Necessity to maintain minimum flow in river may arise out of the necessity to maintain water quality, river regime, maintenance of river eco-system or other public necessities such as bathing, drinking water for cattle, etc. Minimum flow requirements at different points in the river system should be assessed and adequate provision should be made to ensure this.

The norms for maintenance of minimum flow may depend on the type of river, availability of water in various seasons, development of structures on the river etc. In perennial river there may be regulated flows to maintain lean flows or minimum flows and in case of seasonal rivers where storage structures are constructed, the minimum flow should be available to at least maintain ecology of the river. In river Ganga and Yamuna the minimum flow has been considered as 10 cumecs.

The water resources planner is interested in outdoor recreation, activities associated with the presence or proximity of water, particularly reservoirs. Activities which require direct use of water include boating, ice skating, swimming water, skiing and fishing. Shoreline activities such as picnicking do not use water directly.

The key facility for recreation is the body of water created by the dam. It should present a pleasing appearance and the water should be of sufficient quality. Similar to navigation, recreation also requires that a certain range of water level be maintained in the reservoir. However, this should not normally be done to the detriment of other more important water uses. Therefore, it will be most ideal to keep in mind the possible recreational aspects while selecting sites for reservoirs and also while studying the operation of reservoirs to see the range of possible reservoir levels.

The effects of the development and management of water resources on the environment, available to aquatic and wild life need to be carefully considered in planning. Species are adversely affected by changes in environment to which they are accustomed. Cold water fish inhabit rapidly flowing stream. Reservoirs provide good habitat for warm water fishes while destroying habitat of cold water fishes.

No. 2/3/86-PP (Vol. V)
Government of India
Ministry of Water Resources

New Delhi, the 4th September, 1996.

OFFICE MEMORANDUM

Subject :-Constitution of a Standing Sub-Committee for assessment of availability and requirement of water for diverse uses in the country.

Under the Government of India (Allocation of Business) (Two hundred and twenty seventh amendment) Rules, 1993, the Ministry of Water Resources is charged, inter alia, with the responsibility of national perspective of water planning and co-ordination in relation to diverse uses of water. With a view to enable the Ministry to discharge its mandated role mentioned above, it has been decided to constitute a Standing Sub-Committee in the Ministry of Water Resources for assessment of availability and requirement of water for diverse uses in the country with the following composition and terms of reference:-

2. Composition

(i)	Member (WP&P), Central Water Commission	Chairman
(ii)	Representative of Ministry of Urban Affairs & Employment (Not below the rank of Joint Secretary)	Member
(iii)	Representative of Ministry of Rural Areas & Employment (Not below the rank of Joint Secretary)	Member
(iv)	Representative of Ministry of Agriculture & Co-operation (Not below the rank of Joint Secretary)	Member
(v)	Representative of Ministry of Industry (Not below the rank of Joint Secretary)	Member
(vi)	Representative of Ministry of Environment & Forests (Not below the rank of Joint Secretary)	Member

(vii)	Representative of Ministry of Power (Not below the rank of Joint Secretary)	Member
(viii)	Representative of Ministry of Surface Transport (Not below the rank of Joint Secretary)	Member
(ix)	Commissioner (Policy & Planning) Ministry of Water Resources	Member
(x)	Chief Engineer (BPMO) Central Water Commission	Member-Secretary

Representatives of other concerned Central/State Government Departments, Academic Institutions and Non-Governmental Organisations may be invited as special Invitees in case of specific issues coming up for consideration of the Committee.

3. Terms of Reference

i) To assess the present and long term availability of utilisable water in the country: river basin/ sub-basinwise.

ii) To determine the quantum of water being presently used and future demand during the next 25-50 years for diverse uses of water in the country: river basin/ sub-basinwise.

iii) To suggest various yardsticks for assessment of availability and demand of water for diverse uses and prepare guidelines on various related aspects in the matter.

4. The committee will meet as and when required but atleast once in three months.

Sd/-
(R.C. Batra)
Under Secretary to the Govt. of India

Annex - II

Mathematical Models for Forecast of Population

a) Demographic method of population projection

Population change can occur only in three ways :-

- by birth (population gain)
- by deaths (population loss)
- migration (population loss or gain depending on whether movement out or movement in occurs in excess). Annexation of an area may be considered as a special form of migration. Population forecasts are frequently obtained by preparing and summing up of separate but related projections of natural increases and of net migration and is expressed as below.

The net effect of births and deaths on population is termed natural increase (natural decrease, if deaths exceed births).

Migration also affects the number of births and deaths in an area and so, projections of net migration are prepared before projections for natural increase.

This method thus takes into account the prevailing and anticipated birth rates and death rates of the region or city for the period under consideration. An estimate is also made of the emigration from and immigration to the city, growth of city area-wise and the net increase of population is calculated accordingly considering all these factors by arithmetical balancing.

b) Arithmetical Increase Method

This method is generally applicable to large and old cities. In this method the average increase of population per decade is calculated from the past records and added to the present population to find out population in the next decade. This method gives a low value and is suitable for well settled and established communities.

c) Incremental Increase Method

In this method the increment in arithmetical increase is determined from the past decades and the average of that increment is added to the average increase. This method increases the figures obtained by the arithmetical increase method.

d) Geometrical Increase Method

In this method percentage increase is assumed to be the rate of growth and the average of the percentage increase is used to find out future increment in population. This method gives much higher value and mostly applicable for growing towns and cities having vast scope for expansion.

e) **Decreasing Rate of Growth**

In this method it is assumed that rate of percentage increase decreases and the average decrease in the rate of growth is calculated. Then the percentage increase is modified by deducting the decrease in rate of growth. This method is applicable only in such cases where the rate of growth of population shows a downward trend.

f) **Graphical Method**

In this approach there are two methods. In one, only the city in question is considered and in the second other similar cities are also taken into account.

i) **Graphical Method Based on Single City**

In this method the population curve of the city (i.e. the population Vs. past decades) is smoothly extended for getting future value. This extension has to be done carefully and it requires vast experience and good judgement. The line of best fit may be obtained by the method of least squares.

ii) **Graphical Method Based on Cities with Similar Growth Pattern**

In this method the city in question is compared with other cities which have already undergone the same phases of development which the city in question is likely to undergo and based on this comparison, a graph between population and decades in plotted.

g) **Logistic Method**

The S shaped logistic curve for any city gives complete trend of growth of the city right from beginning to saturation limit of population of the city.

h) **Method of Density**

In this approach, trend in rate of density increase of population for each sector of a city is found out and population forecast is done for each sector based on above approach. Addition of sector-wise population gives the population of the city.

Annex-III

INDUSTRIAL SPECIFIC STANDARDS FOR WATER USE AND WASTE WATER GENERATION

NAME OF INDUSTRY	WATER USE	WASTEWATER GENERATION
1	2	3
Integrated Iron Steel	20 m^3/t of finished	16 m^3 /t of finished
Sugar	2 m^3 /t of cane crushed	0.4 m^3 /t of cane crushed
Fertiliser: Straight nitrogenous fertilisers	15 m^3 /t of urea of equivalent produced	5m^3 /t of urea of equivalent
Straight phosphatic fertilisers (SSP & TSP) excluding manufacture of any acid	2 m^3 /t of SSP/TSP	0.5m^3/t of SSP/TSP
Complex Fertiliser	Standard of nitrogen and phosphatic fertiliser applicable depending on primary product	
Small pulp & paper Agro-residue based	200 m^3 /t of paper	150 m^3 /t of paper
Waste paper based	75 m^3 /t of paper	50 m^3 /t of paper
Large Pulp and Paper	250 m^3 /t of paper	175 m^3 /t of paper
Rayon grade pulp	200 m^3 /t of paper	150 m^3 /t of paper
Fermentation Maltryk	8.5 m^3 /t of grain processed	3.5 m^3 /t of grain processed
Brewery	1 m^3 /t of beer produced	0.25 m^3 /kl of beer produced
Distillery	15 m^3 /kl of alcohol produced	12 m^3 /kl of alcohol produced
Caustic Soda: Mercury Cell process	5 m^3 /t of caustic soda produced (excluding cooling water) & 5 m^3 /t bearing) of caustic soda produced for cooling water	4 m^3 /kl of caustic soda (mercury 10% blow down permitted for cooling water
Membrane CEll Process	5m^3/t of caustic soda including cooling water	120 m^3/t of caustic soda
Textile i) Nylon & Polyster	170 m^3/t of fibre produced	120 m^3/t of fibre produced
ii) Viscos rayon	Limits specified in rayon grade pulp and paper applicable	
Tanneries	30 m^3/t of raw hider.	28 m^3/t of raw hider.
Natural rubber	6 m^3/t of rubber	4 m^3/t of rubber
Starch, glucose and related products	10 m^3/t of maize crushed.	8 m^3/t of maize crushed.

Annex-IV

NORMS FOR WATER REQUIREMNENT FOR VARIOUS SECTORS OF INDUSTRIES

S.No.	Sector	Water Requirement
1	Small scale industries i) Food items ii) Chemical iii) Hosiery	 5400 kilo litres/unit/annum 2640 -do- 1050 -do-
2	Chemical & Petro chemicals i) Caustic soda ii) Soda ash	 5 cubic metre/metric tonne 3 -do-
3	Steel	30 cubic metre/tonne of finished steel
4	Paper	196 cubic metre/tonne
5	Fertiliser i) Small size (Phosphate units) ii) Large size (Nitrogenous units)	 2 cubic metre/tonne 15 cubic metre/tonne
6	Textiles i) Yarn processed ii) Fabric processed iii)Jute processed	 10 litre per kg 10 litre per sq.m. 1 litre per kg
7	Food processing	10 litres per kg
8	Coal	1000 litres per tonne
9	Building i) For cement ii) For bricks	 2 cubic metre/tonne 0.67 million cubic metre per thousand million
10	Non-ferrous metals i) Alluminium a) Alumina Plant b) Smelter & Fabrication c) Captive mines ii) Zinc and Lead a) Mining & Ore Treatment b) Zinc smelting c) Lead smelting d) By-products iii) Copper	 20 cubic metre/onne 40 cubic metre/tonne 1240 cubic metre per day 3.5 cubic metre/metric tonne 40-45 -do- 13-15 -do- 6 -do- 780 cubic metre/metric tonne
11	Sugar	1000 litres/tonne of cane
12	Cement	0.8 million cubic metre/million tonne
13	Automobiles i)Two/three wheelers ii) Passenger car iii) LCV/HCV	 1 cubic mertre/vehicle 20 -do- 32 -do-

Annex – V

REPORT OF THE SUB-GROUP FOR ASSESSMENT OF INDUSTRIAL WATER REQUIREMENT

Ministry of Industry
Department of Industrial Development
(Technical Support Wing)
Udyog Bhawan, New Delhi.

EXECUTIVE SUMMARY ON WATER REQUIREMENT FOR INDUSTRY

Ministry of Water Resources had constituted a Standing Sub-Committee for Overall National Perspective of Water Planning & Coordination in relation to diverse uses of Water as a follow up to their mandated note under allocation of business rules. Department of Industrial Development's representative was a Member of that Committee. A copy of the Office Memorandum No. 2/3/86-PP (Vol.V) dated 4.9.96 regarding the Constitution of Sub-Committee is enclosed at Annexure-I. Terms of Reference of the Committee are given below :-

(i) To assess the present and long term availability of utilisable water in the country river basin/sub-basinwise;

(ii) To determine the quantum of water being presently used and future demand during the next 25-50 years for diverse uses of water in the country river basin/sub-basinwise;

(iii) To suggest various yardsticks for assessment of availability and demand of water for diverse uses and prepare guidelines on various related aspects in the matter.

2. In the second meeting of the Standing Sub-Committee held on 14th May, 1997, it was decided that the Ministry of Industry as a nodal Ministry for Industrial Development should coordinate with other related Ministries and furnish a consolidated information on the requirement of water for the industrial sector as a whole. This task was, therefore, assigned to Department of Industrial Development, who is otherwise responsible for coordinating the assessment of demand for critical raw materials by sectors, industries and

large units.

3. Accordingly, a Sub-Group for working out the requirement of Water for key industries was set up under the Chairmanship of Shri Balraj Bhanot, Deputy Director General, Department of Industrial Development, Ministry of Industry. A copy of the circular dated 12.6.97 along with the composition of the Sub-Group is given at Annexure II.

4. Three Sub-Group meetings were held as follows, to finalise the report :-

i) 30.6.1997;
ii) 3.9.1997; and
iii) 9.2.1998

BACKGROUND:

Water is a key element in the socio-economic development of a country. All industries need water. The actual requirement varies from industry to industry. The water requirement for industries, is quite small as compared to the quantity of water needed for agriculture. However, when the industrial demand is in specific locations, heavy point loads are created on available water resources. With the quality of water becoming poor, availability of water being scarce and statutory environmental regulations becoming more stringent, optimisation in use of water demands a closer monitoring by industrial sectors. Because of the very nature of use, there is no fixed water demand for an industry but rather a range of values determined by the technology used, selection of plants and processes; practice in providing maximum recycling to reduce water demand and pollution etc.

6. With the rapid growth in population coupled with overall economic development due to industrialisation and urbanisation, the demand of water for domestic and industrial uses, is increasing at an enormous rate. Efficient planning and management of water resources call for an accurate assessment of the present and future demands of water. India's National Water Policy has recommended development and management of water resources at the basin or sub-basin level. After discussions and deliberations, during the first meeting of the Sub-Group, Ministries / Departments concerned with the intensive use of water, were requested to identify the industries having bulk requirement of water and prepare write-ups pertaining to relvant sectors, containing information in the following format :-

(a) Norms and methodologies adopted in calculating the present water use and future projections for water demand;

(b) Estimated quantity of current use of water i.e. for the year 1996 as the base year;

(c) Projections for water demand (Statewise/river basinwise, if feasible) for the period 2000, 2010, 2025 and 2050 AD; and

(d) Limitations and presumptions made.

7. Reports prepared by each Department concerned, were deliberated in detail and necessary modifications carried out, based on best possible projections as could be made on date, both for production and technological trends as may

emerge in the next fifty years. By making 1996 as the base year for production and consumption of water, future calculations were based on IXth and Xth Plan tentative targets of industry. Further projections were best possible estimates of individual department and industry concerned. Water requirements for major user sectors are summarised in Annexure III, for the terminal years 2000, 2010, 2025 and 2050. Industrywise Brief write-ups are given in Annexure-IV. The representatives of the various Ministries / Departments indicated difficulties in projecting water requirement - Statewise/river basinwise. In a liberalised scenario, it is difficult to predict where industries would finally be set up in future as there are hardly any controls exercised, at present. Selection of location will depend on various factors such as proximity to resources, infrastructure, market, ports etc. apart from availability of water and skilled man-power. Therefore, overall requirements have been predicted industrywise except for few Raw Material-based industrial sectors like coal, steel etc. who have worked out water requirements zone/river basinwise.

8. It has been observed by the group that there would be a quantum jump in water consumption level from 2010 onwards. Therefore, it is recommended that liberal use of water should be avoided in coming years. There would be need for mandating recycling of water in certain sectors including measures like effluent treatment etc. Perhaps some measures like incentive for water conservation or adopting such technologies using least amount of water, may also be necessary, in the time to come. States may also have to come out with their industry policy based on availability of water in certain sectors of industry.

9. World Bank (Rural Development Unit, South Asia Region) in cooperation with Ministry of Water Resources, had recently organised a Workshop on Inter Sectoral Water Allocation, Planning & Management. Salient features of the deliberations therein, have bearing on water management in relation to industrial sector as given below, may be taken into cognizance while framing any future policies:-

(a) Major changes are required in the system of prices and other economic incentives affecting water use and allocation. Although, price instruments exist, the levels of existing incentives and the form in which they are applied result in minimal and in some cases negative impact. There is an urgent need to bridge these incentives gap.

(b) Technology improvement, water ~~conservation,~~ reuse and other forms of demand management need to be given much more emphasis rather than the traditional supply side oriented approaches of the past. A major drive should be launched to:-

(i) Increase water use efficiency;

(ii) Improve productivity of end use; and

(iii) Improve water conservation, water treatment and water reuse technologies.

(c) Water use efficiency in India in the industrial sector is quite poor as compared to use by similar industries in other countries. Substantial water and often cost savings, can be obtained by introducing water saving technologies, treatment, reuse of waste water and changing industrial processes.

(d) The existing system of subsidies and tax structure on investment in pollution control, water conservation and water recycling technologies should be reviewed. Particular attention needs to be paid to introduce a significant and punitive variable tax on the act of pollution based on "Polluter Pays Principle".

(e) The CETP (Common Effluent Treatment Plant) Schemes have already been implemented in a few states like Maharashtra, Tamilnadu and Andhra Pradesh. The investment in CETP is shared by Central Government, State Government and by the industrial units. The Common Effluent Treatment Plant Scheme should be encouraged in other industrial areas and clusters of industries particularly in SSI Sector.

10. Brief reports on the projections made by each Department concerned, is contained in the following enclosures:-

i) SSI
ii) Chemicals & Petrochemicals
iii) Steel
iv) Paper
v) Fertilizer
vi) Textiles
vii) Food Processing
viii) Coal
ix) Building (including Bricks)
x) Non-ferrous Metals
xi) Sugar
xii) Cement
xiii) Automobile

No 2/3/86-PP (Vol V)
Government of India
Ministry of Water Resources

New Delhi, the 4th September, 1996.

OFFICE MEMORANDUM

Subject :-Constitution of a Standing Sub-Committee for assessment of availability and requirement of water for diverse uses in the country.

Under the Government of India (Allocation of Business) (Two hundred and twenty seventh amendment) Rules, 1993, the Ministry of Water Resources is charged, inter alia, with the responsibility of national perspective of water planning and co-ordination in relation to diverse uses of water. With a view to enable the Ministry to discharge its mandated role mentioned above, it has been decided to constitute a Standing Sub-Committee in the Ministry of Water Resources for assessment of availability and requirement of water for diverse uses in the country with the following composition and terms of reference:-

2. Composition

(i)	Member (WP&P), Central Water Commission	Chairman
(ii)	Representative of Ministry of Urban Affairs & Employment (Not below the rank of Joint Secretary)	Member
(iii)	Representative of Ministry of Rural Areas & Employment (Not below the rank of Joint Secretary)	Member
(iv)	Representative of Ministry of Agriculture & Co-operation (Not below the rank of Joint Secretary)	Member
(v)	Representative of Ministry of Industry (Not below the rank of Joint Secretary)	Member
(vi)	Representative of Ministry of Environment & Forests (Not below the rank of Joint Secretary)	Member

(vii)	Representative of Ministry of Power (Not below the rank of Joint Secretary)	Member
(viii)	Representative of Ministry of Surface Transport (Not below the rank of Joint Secretary)	Member
(ix)	Commissioner (Policy & Planning) Ministry of Water Resources	Member
(x)	Chief Engineer (BPMO) Central Water Commission	Member-Secretary

Representatives of other concerned Central/State Government Departments, Academic stations and Non-Governmental Organisations may be invited as special Invitees in case of ecific issues coming up for consideration of the Committee.

Terms of Reference

i) To assess the present and long term availability of utilisable water in the country: river basin/ sub-basinwise.

ii) To determine the quantum of water being presently used and future demand during the next 25-50 years for diverse uses of water in the country: river basin/ sub-basinwise.

iii) To suggest various yardsticks for assessment of availability and demand of water for diverse uses and prepare guidelines on various related aspects in the matter.

The committee will meet as and when required but atleast once in three months.

Sd/-
(R.C. Batra)
Under Secretary to the Govt. of India

Annexure

Telegram : INDMINISTRY
Telex : 031-66565
Fax : 011-3012626
011-3011770
011-3015411

संख्या
No. DDG(PR)/109/97

भारत सरकार
उद्योग मंत्रालय
(औद्योगिक विकास विभाग)
GOVERNMENT OF INDIA
MINISTRY OF INDUSTRY
(DEPARTMENT OF INDUSTRIAL DEVELOPMENT)
उद्योग भवन
नई दिल्ली-110011
UDYOG BHAWAN,
NEW DELHI-110011, the 12. 6. 97

To

Dear Sir,

Ministry of Water Resources has constituted a Standing Sub-Committee for Overall National Perspective of Water Planning & Coordination in Relation to Diverse Use of Water. A copy of the Office Memorandum No.2/3/86-PP(Vol.V) dt. 4.9.96 regarding the Constitution of Sub-Committee is enclosed herewith for information. Terms of Reference of the Committee are given below :-

(i) To assess the present and long term availability of utilisable water in the country River basin/sub-basinwise;

(ii) To determine the quantum of water being presently used and future demand during the next 25-50 years for diverse uses of water in the country river basin/sub-basinwise;

(iii) To suggest various yardsticks for assessment of availability and demand of water for diverse uses and prepare guidelines on various related aspects in the matter.

2. The second meeting of the Standing Sub-Committee was held on 14th May, 1997, wherein it was decided that the Ministry of Industry as a nodal Ministry for Industrial Development will coordinate with other related Ministries so as to compile and furnish consolidated information on the

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subject for the industries. This task has, therefore, been assigned to Department of Industrial Development, who is responsible for coordinated assessment of demand for raw materials by sectors, industries and large units. Background note as prepared by the Ministry of Water Resources is annexed herewith.

3. In view of the foregoing, Secretary (ID) has set up a Sub-Group for working out the requirement of water for key industries under the Chairmanship of Shri Balraj Bhanot, Deputy Director General. Composition of the Sub-Group and the Background Note in this context is also enclosed. The first meeting of the Sub-Group is scheduled to be held on 30.6.97 at 10.30 AM in Room No. 36, Udyog Bhavan, New Delhi. It is requested that a senior officer may be deputed to attend the meeting to work out and project the water demand for the sector/s dealt by your Ministry. In order to facilitate correspondence and further follow-up Telephone/Fax No. of the nominated officer may please be communicated at an early date.

Yours faithfully,

(S.K. JAIN)
Additional Industrial Adviser

Encl: As above.

Annexure-II

COMPOSITION OF SUB-GROUP TO ASSESS THE INDUSTRIAL WATER REQUIREMENT.

1. Shri B. Bhanot, — CHAIRMAN
   Deputy Director General,
   Department of Industrial Development
   Udyog Bhavan, New Delhi.

2. Shri G.S. Singh, General Manager(Civil),
   Coal India Ltd. (CMPDIL),
   Gondwana Place, Kanke Road,
   Ranchi 834008 (Bihar).

3. Dr. R.L. Munshi, Director,
   Ministry of Mines,
   Shastri Bhavan, N. Delhi.

4. Shri N.K. Kumar, Dy.Economic Adviser,
   Ministry of Textiles,
   Udyog Bhavan, N. Delhi.

5. Joint Secretary (S),
   Deptt. of Sugar& Edible Oil,
   Ministry of Food, Krishi Bhavan,
   N. Delhi.

6. Shri Jasbir Singh, Addl.Director,
   Department of Chemicals,
   Shastri Bhavan, N. Delhi.

7. Dr. R.P. Saxena, Director(Basin Planning),
   R.No.901 (South), Sewa Bhavan,
   R.K. Puram, N. Delhi 110066.

8. Shri S.C. Ray, Director (Sugar Tech.),
   Deptt. of Sugar & Fertilizer,
   Shastri Bhavan, N. Delhi.

9. Shri S.Chandra, Dy.Adviser(F),
   Department of Fertilizer,
   R.No.407, 'B' Wing,
   Shastri Bhavan, N.Delhi.

10. Shri S.P. Ghosh, Director General,
    National Council for Cement & Building Materials,
    P-21, South Extn.Part II, N.Delhi 110049.

11. Mr. Ravi Kant, Dy.Secretary,
    Ministry of Food Processing,
    Panchsheel Bhavan, Khel Gaon Marg,
    New Delhi.

12. Shri Satish Chander, Dy.Director(Electronics),
    O/o The D.C.(SSI), Nirman Bhavan (South Wing),
    7th Floor, N. Delhi.

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13. Shri S.S. Saha, Industrial Adviser,
Department of Steel,
Udyog Bhavan, N. Delhi.

14. Shri G.M. Bhupathy, Jt.Director, MSSO(CPD),
Ministry of Planning & Programme Implementation,
Department of Statistics,
Sardar Patel Bhavan, Parliament Street,
N. Delhi.

15. Shri S.P. Veer, Desk Officer,
Deptt. of I.P.& P.
Udyog Bhavan, N. Delhi.

16. Shri P.K. Jain, Industrial Adviser,
Deptt. of Industrial Development,
Udyog Bhavan, N. Delhi.

17. Shri S.K. Jain, Addl.Industrial Adviser — MEMBER SECRETARY
Deptt. of Industrial Development,
Udyog Bhavan, N. Delhi.

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ANNEXURE III

ESTIMATED REQUIREMENT OF WATER FOR VARIOUS SECTORS OF INDUSTRIES

(In Million Cu.Mtrs

S.No.	SECTOR	1996	2000	2010	2025	2050
1.	SSI	1866	2268	3694	5755	9441
2.	Chemicals & Petro-chemicals	976	1112	1714	3462	11641
3.	Steel	682	1140	1440	1890	2700
4.	Paper	642	735	959	1416	4567
5.	Fertilizer	374	411	453	498	568
6.	Textiles	331	608	1216	3650	14601
7.	Food Processing	306	350	460	637	954
8.	Coal	257	565	916	1424	2335
9.	Building(Incl.Bricks)	186	248	501	1591	10226
10.	Non-Ferrous Metals	185	217	301	401	452
11.	Sugar	145	182	316	775	3463
12.	Cement	59	94	180	463	2319
13.	Automobile	23	27	50	66	84

1. SMALL SCALE SECTOR:

In addition to units in the organised sector, there are a large number of small scale industries located all over the country. The water intensive industries in the small scale sector basically belong to following sectors:

i) Food Items;

ii) Hosiery & Garments;

iii) Paper Product & Printing;

iv) Chemical & Chemical products;

v) Iron & Steel Industry.

The relevant SSI units in iron & steel industry are engaged in the manufacture of metal products, machinery and parts. It has been estimated that a total of 22.35 lakh units were existing in the SSI sector as on 31st Dec., 1992.

Water consumption varies depending upon the nature of the sector. While the Average Water Consumption per unit per annum has been estimated around 5400 Kilolitres for food items, the consumption norm in chemical and hosiery sectors are 2640 and 1050 KL/Unit/Annum respectively. In the changing Industrial Scenario, Globalization and WTO stipulations Growth Rate in the SSI Sector has been estimated to reduce as follows:

(a) 5% Growth Rate during 1996-2010;

(b) 3% Growth Rate during 2011-2025; &

(c) 2% Growth Rate during 2026-2050.

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Consolidated requirement of water for SSI-Sector has been projected as under:

Year	Water (MCM)
1996	1866
2000	2268
2010	3694
2025	5755
2050	9411

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2. CHEMICAL SECTOR

Requirement of water by Pharmaceutical & Pesticide Industry is insignificant due to recycling as the chemical reactions take place in solvent media. The major water intensive industries are dyes, caustic soda and soda ash. The manufacture of dyes/dye-intermediates/dyestuffs accounts for major consumption of water. A number of dyes are reserved for the manufacture in Small Scale Sector. About 50 units are there in organised sector and approximately 1500 units are operating in SSI-Sector which accounts for nearly 50% of country's production. Production trend of the water intensive industries during the recent past was as under:

Production (In Lakh tonnes)

Year	Dye	Caustic Soda	Soda Ash
1994-95	0.307	11.6	14.1
1995-96	0.315	12.3	15.2
1996-97	0.373	12.2	15.1

In respect of dyes industry, water is required in huge quantities, for the production of steam, ice and for facilitation of chemical reactions in aqueous media. As compared to large scale units, SSI-Units require relatively larger quantities of water. Units in SSI-Sector have limited number of reactors. Change of product mix necessitates extensive cleaning and flushing with water. The sub-group of Dyes & Dye Intermediates constituted by Deptt. of Chemicals &

projections are based on 5% growth in dye production.

For Caustic Soda Industry, estimates have been made assuming a norm of 5 CM/MT and for Soda Ash industry as 3 CM/MT. For calculation purpose, 3% growth rate has been considered in respect of Caustic Soda & Soda Ash. Accordingly, the estimated water requirement for chemical sector in MCM are summarised below:

	Dyes/Dye-stuffs	Others	Total
1996-97	966	10	976
1999-00	1100	12	1112
2009-10	1700	14	1714
2024-25	3440	22	3462
2049-50	11600	41	11641

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3. WATER REQUIREMENT FOR STEEL INDUSTRY

Steel is being manufactured in the country, primarily by two major routes, namely:

(i) BF - BOF Route; and

(ii) Electric arc furnace or Induction Furnace Route.

Water consumption varies depending upon the process and production technology used.

(A) Norms of Estimation of water requirement for Iron and Steel Industry.

(i) Mining of Iron Ore : 0.39 Cubic Metre per tonne of Iron Ore.

(ii) Integrated Steel Plants following B.F.-B.O.F. Route : 10/50 Cubic Metre per tonne of Finished Steel.

(iii) Secondary Steel Sector following DRI-E.A.F. Route : 3.5 Cubic Metre per tonne of Finished Steel.

(iv) Hence, the average water consumption may be taken as 30 Cubic Metre per tonne of Finished Steel.

(B) Water Consumption for 1996-97

The water consumption based on the above consumption

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norms works out as under:-

S.No.	Item	Production during the year 1996-97 (Million Tonnes)
1.	Iron Ore	66.67
2.	Finished Steel through B.F.-B.O.F. Route	10.54
3.	Secondary Steel Sector following D.R.I.-E.A.F. Route	12.18

Thus, the total water consumption during the year 1996-97 works out to 681.60 Million Cubic Metre.

(C) Estimation of water requirement in the future and its basis.

The report of the working group on Iron and Steel for the IXth Five Year Plan prepared under the aegis of Ministry of Steel envisages the finished steel production during different years as given below:

S.No.	Year	Production of Finished Steel (Million Tonnes)		Total Steel Production (Million Tonnes)
		B.F.-B.O.F.Route of Steel Making	Electric Arc Furnace/ Induction Furnace Route	
1.	2001-02	25	13	38
2.	2005-06	-	-	43
3.	2010-11	-	-	48

From this data, it may be observed that the Working Group Report has envisaged a growth-rate of 1 million tonne of steel every year. Taking the same growth-rate, the production of Finished Steel during the different years

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works out as under:

S.No.	Year	Estimated Production of Finished Steel (Million Tonnes)
1.	2024-25	63
2.	2049-50	90

(i) Taking the norms of water consumption as given earlier, the water requirement for different years works out as under:

S.No.	Year	Requirement of water (Million Cubic Metre/year)
1.	2000-2001	1140
2.	2005-2006	1290
3.	2010-2011	1440
4.	2024-2025	1890
5.	2049-2050	2700

(ii) Based on the present concentration of Iron and Steel Industry in India, the area-wise steel plant distribution in India is in the ratio of 50:25:20:5 for Eastern, Western, Southern and Northern regions.

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Taking the same ratio, the area-wise water requirement for steel plants in India work out as under:

(In Million Cu.Metre/Year)

S. No.	Area	Year	Water re-quire-ment	Year	Water re-quire-ment	Year	Water Re-quire-ment	Year	Water re-quire-ment	Year	Water re-quire-ment
1.	Eastern India	2000-2001	570	2005-2006	64.5	2010-2011	720	2024-2025	94.5	2049-2050	1350
2.	Western India	2000-2001	285	2005-2006	322.5	2010-2011	360	2024-2025	472.5	2049-2050	675
3.	Southern India	2000-2001	228	2005-2006	258	2010-2011	288	2024-2025	378	2049-2050	540
4.	Northern India	2000-2001	57	2005-2006	64.5	2010-2011	72	2024-2025	94.5	2049-2050	135

4. ASSESSMENT OF INDUSTRIAL WATER REQUIREMENT FOR PAPER INDUSTRY

Water is an integral part of Paper making and used for transporting fibre from raw material section to the finished section of paper making. The Paper Industry in India utilises 40-400 CM water/MT of paper depending upon the type of raw materials used.

Since there is large variation in consumption of water in paper industry and it depends upon type of paper material, it would be appropriate to consider average norms of water requirement for the industry. Based on demand estimates for paper industry and average norms of consumption of water, the projected demand estimates of water for paper industry from 2000 to 2050 are given as under:-

1.	Production projected for the year 2000	4.2 million tonne
	Average water consumption	175 M^3/tonne
	Water requirement in year 2000	735 million M^3
2.	Production projected for the year 2010	6.85 million tonnes
	Average Water consumption	140 M^3/tonne
	Water consumption in year 2010	959 million M^3
3.	Production projected for the year 2020	11.12 million tonnes
	Average water consumption	112 M^3/tonne
	Water requirement in year 2020	1245 million M^3
4.	Production projected for the year 2025	14.16 million tonne
	Average Water consumption	100 M^3/tonne
	Water consumption in year2025	1416 million M^3
5.	Production projected for the year 2050	45.67 million tonnes
	Average water consumption	100 M^3/tonne
	Water consumption in year 2050	4567 million M^3

ASSUMPTIONS:

1. The projected growth rate from 2000 onwards is taken @ 5% compounded annually.
2. Water Consumption is likely to reduce due to conservation measures.
3. Future assumption has been calculated taking consideration of 1996 as base year wherein average consumption of water was 196 M^3/tonne of production.

Indian Paper and Pulp Mills extensively use intra plant recycle and re-use of waste water from washing, screening and bleaching operation. Recycling of water depends upon effluent treatment and type of the mills i.e. small and large and also depend on the raw materials use. Water consumption can be reduced by system closures or zero discharge of effluents, recycling of water by effluent treatment by various methods. There is also need to reduce energy requirements in pulping by using new technology and equipments and thereby reducing steam consumption and corresponding water requirement.

5. ASSESSMENT OF INDUSTRIAL WATER REQUIREMENT IN FERTILIZER PLANTS

Fertilizer plants need water for manufacturing the fertilizers. The requirement varies from plant to plant. Consumption depends on the type of plant product and the process technology employed. Whereever possible water is recycled in the plants.

2. The major portion of water is required for cooling purpose and boiler feed water. There are about 80 medium and small scale single super phosphate units (SSP) whose actual consumption are not available with us. However, the consumption of water in some of the SSP units has been analysed and conclusions drawn that more or less average consumption for these plants works out to 2 M3/tonne of SSP. We have also analysed the actual consumption of water in some of the large size fertilizer plants manufacturing nitrogenous fertilizers. We have drawn the conclusion that more or less water consumption in these plants works out to 15 M3/ tonne of urea.

Consumption also varies with respect to plants percentage capacity utilisation. All these factors come across while assessing the future demand of consumption. Therefore, we have taken number of assumptions and applied our vision, while estimating the future requirement of water in fertilizer industry. Efforts have been made to give estimation as realistic as possible without having any yardstick.

3. Presently, 59 large size fertilizer plants are manufacturing a wide range of nitrogenous, phosphatic and complex fertilizers. The installed capacity as on 31.3.96 reached a level of 121.28 lakh tonnes per annum in terms of nutrients, comprising 93.06 lakh tonnes of Nitrogen (N) and 28.22 lakh tonnes of phosphate (P). The sector-wise installed capacity is given in the table below;

SECTOR-WISE NUTRIENT-WISE INSTALLED CAPACITY OF FERTILIZER AS ON 31.3.1996

SECTOR	CAPACITY (IN LAKH TONNES)	
	N	P
1. Public Sector	41.35	7.92
2. Cooperative Sector	15.31	3.09
3. Private Sector	36.40	17.21
Total	93.06	28.22

4. There is a possibility that there would be number of new fertilizer plants/expansions in the coming 25-50 years. The installed capacities may be more than double. However, the consumption of water after 25-50 years would not be double because plants will be based on technology having zero effluent.

5. The current trend and future estimates of water requirement for fertilizer industry is given as under. These estimates are based on long term vision in respect of growth of fertilizer industry based on demand-supply gap over a period of 25-50 years.

ASSESSMENT OF WATER REQUIREMENT M3/day

(in lakh M3/day)

	YEAR			
CURRENT	2000	2010	2025	2050
10.25	11.27	12.4	13.64	15.55

6. There is a wide scope to recycle used water after treating it well for reuse in the plant. We have to carry out cost benefit analysis in this regard. The future plants should be based on latest technology having zero effluent.

*****

6. TEXTILE AND JUTE INDUSTRY

The textile industry is well diversified with a wide range of products involving different stages of manufacture and processing. The unique feature of the industry is that it is spread across the different regions in the country and exists in both the organised sector such as mills and decentralised and small units including village and household activities.

2. The basic stages in the manufacture of fabric and garments consists of spinning, weaving, processing and finishing. The raw material and the fabric base is both organic as well as non-organic namely cotton, cellulose and petro-chemical based fibres. The processing sector is one of the major consumers of water in the textile industry. Ideal processing requires softness upto 20 PPM hardness while in extreme cases water hardness upto 300 PPM is tolerated. However, for optimal results water should be of good quality for processing.

3. Precise estimates on the use and availability of water for the textile sector is not available. The complexity of estimating the water requirement can be gauged from the fact that in addition to the diversified and heterogenous structure of the production, the water requirement also varies in tune with the complexity of

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the chemical operations and stages of processing etc. The chemical processing of textiles, involves a number of chemical operations including dying, printing and finishing in sequential manner in order to get desired quality of the final product.

4. The main sources of water are municipal supply and tubewell water. The following consumption of water during 1996-97 has been estimated in the Textile Industry:

Sector	Production	Water consumption in m.cu.m.
1. Yarn	3182 m.kgs	0.95
2. Fabrics	31706 m.sq.m.	190.24
3. Jute	140100 m.kgs.	140.10
		331.29

The aforesaid requirement is based on the following assumptions and norms:

(a) % of yarn processed	3%
Consumption of water	10 lit/kg.
(b) % of fabric processed	60%
Consumption of water	10 lit/sq.m.
(c) Consumption of water for processing of jute goods	1 lit/kg.

Combined requirement of Textile and Jute Sector for the future has been projected as under:

Year	M.Cu.m.
2001	608.38
2010	1216.76
2025	3650.28
2050	14601.12

5. By the end of the terminal year of the 9th plan i.e. 2001-2002, it is envisaged that the percentage of processed fabric would go upto 90%. The total production of fabric is envisaged to be 44000 million sq.mtrs., considering 90% of it to be processed, the total processed fabric during the year 2001-2002 would be 39,600 million sq.mtrs. The requirement of water @ 10 litres per sq.mtr during the year 2001-2002 for processing of fabrics only would be 3,96,000 million litres. Total production of yarn by 2001-2002 is envisaged at 4752 million kgs. Considering the processing of yarn @ 5%, the total production of processed yarn would be 238 million kgs., requirement of water for processing of yarn @ 10 litres per kg. by 2001-2002 would be 2380 million litres. Similarly, water requirement for ~~the production~~ Jute Goods of 210,000 million kgs. would be 210000 million litres. The total requirement of water for the Textile Sector during the year 2001-2002 estimated by the Textile Commissioner would be 608,380 million litres. Based on this methodology, the estimates till 2050 are summarised in Annexure 'A'.

6. The textile industry is generally aware that availability of water in the coming years would be a major constraint in the development of industry. Accordingly, the main strategy for reduction in the consumption of water is waste-minimisation and to

conserve water from natural sources. The waste-minimisation programme could cover the following:

1. Chemical/dye substitution;
2. Conservation/optimisation of dyes/chemicals;
3. Process modification;
4. Equipment modification;
5. Re-use and recovery.

Most of the research projects in the Textile Research Associations are directed on the above lines and dyes/chemicals and machinery manufacturers have initiated the steps in this direction to reduce the consumption of water in the textile processing sector and it is expected that within near future, the consumption of water may be reduced than the present standard norms.

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ANNEXURE 'A'

PROJECTED ESTIMATES PRODUCTION/WATER REQUIREME

Items	1996-97	2001-02	2010	2025	2050
Production of cloth (in M.Sq.Mtrs)	1706	44000	4400000	11000000	38500000
Water requirement (in Million Ltrs)	190240	396000	792000	2376000	9504000
Production of Yarn (in M.kgs.)	3182	4752	475200	1188000	5158000
Water requirement (in Million ltrs.)	950	2380	4760	14280	57120
Production of Jute goods (in Million kgs.)	140100	210000	2100000	53500000	187250000
Water requirement (in Million Ltrs)	140100	210000	420000	1260000	5040000
Total water requirement for Textile Sector (in Million Litres)	331290	608380	1216760	3650280	14601120

8. ASSESSMENT OF INDUSTRIAL WATER REQUIREMENT FOR COAL INDUSTRY UPTO YEAR 2050

1. Major Water Consumption in Coal Mining Sector is in the following areas :-
   1. Industrial Water Consumption in Coal Washeries
   2. Industrial Water Consumption for washing and cleaning of mining buildings and equipments
   3. Dust supression in mines and mining related structures, equipments and areas including watering of the roads in townships and industrial areas
   4. Drinking Water for employees and associated population
   5. Fire fighting in mines and mining related areas

2. Coal mines are located mainly in the States of Bihar, West Bengal, Assam, Orissa, Madhya Pradesh and to some extent in Meghalaya. These coal fields fall mainly in the Catchment of Damodar (Lower Ganga Basin), Sone (upper Ganga Basin), Mahanadi, Brahmputra and Godavari river basins.

3. The total coal reserves in India have been estimated at 206 billion tonnes (BT) as on 1.1.98 upto a depth of 1200 metres. However the proven reserves are only 75.1 BT and out of which only 68.9 BT coal reserves are at depth within 600 metres. The present operating mines have a reserve of 17.2 BT of coal corresponding to a depth of 300 metres.

4. The growth in demand of coal has been assumed at an average rate of 3% per annum upto the year 2025-26 and 2% beyond 2025-26 upto 2050-51. The projected coal production in the years 2001-02, 2025-26 and 2050-51 is 347 MT/year, 891 MT/year and 1460 MT/year respectively.

5. The water consumption varies from mines to mines. In some of the group of mines, the water consumption is to the tune of 2400 litres/tonnes of coal production,

litres/tonnes of coal production. The All India average consumption figure of water at present has been taken as 1000 litres/tonnes of coal production.

6. The total coal production and corresponding water consumption in the year 1996-97 has been 285.28 million tonnes and 256.86 million cubic metres respectively. The water consumption is estimated to rise to 565, 1424 and 2335 million cubic metres per annum by the year 2001-02, 2025-26 and 2050-51 respectively.

9. WATER REQUIREMENT FOR BUILDING SECTOR (INCLUDING BRICKS)

Brick industry is predominantly in the unorganised sector. Based on the published data/information, the NCCBM has estimated that the current level of annual production is around 50,000 million bricks. There is an acute housing shortage in the country at present. The future demand of bricks for the housing sector is expected to be around 5% till the year 2000 and 8% for the period 2001-2050. It has been estimated that about 750 CM of water is required for the manufacture of one million bricks. Accordingly, the estimated of water consumption by the brick sector during the year 1996 was of the order of 38 MCM. Cement is also required for the building activities in addition to brick manufacture. On an average 2 CM of water is required for use of one tonne of cement. About 666 CM of water is required for construction purposes while using one million bricks. Based on the above assumptions, the water requirement at the consumption end for the use of cement and bricks are as under:

S.No.	Item	1996	2000	2010	2025	2050
1.	Cement					
	i) Production(MT)	76	104	207	658	4170
	ii) Water Consumption (MCM)- 2.0M/t of cement	152	208	414	1316	8340
2.	Bricks					
	i) Production ('000 million)	50	60	130	411	2815
	ii) Water Consumption (MCM) at the rate of 0.67 MCM/ 1000 million	34	40	87	275	1886

10. ASSESSMENT OF INDUSTRIAL WATER REQUIREMENT FOR NON-FERROUS METALS INDUSTRY

Indian Non-Ferrous Metal Industry is basically confined to production of Aluminium, Zinc, Lead and Copper. Bulk of the production of N.F. Metals is confined to Public Sector Units. Average consumption pattern of Public Sector Units under the purview of Deptt. of Mines has been considered as an Industry Norm including private sector.

ALUMINIUM:

Industrial Aluminium production in India has completed five decades to reach half a million metric tonne production level per year. BALCO and NALCO are the public sector units and HINDALCO, INDAL and MALCO are the private sector units in the aluminium sector. The production in the country during 1995-96 and 1996-97 was 5,27,000 M.T. and 5,08,000 M.T. respectively. Industrial water requirement projections for the Aluminium sector are given in Annexure I.

For Aluminium Sector following norms have been considered:

a) Alumina Plant : 20 Cu.M./T of Alumina

b) Smelter & Fabrication ; 40 Cu.M/T of Aluminium

c) Captive Mines (1995/96) : 1240 Cu.M/day

d) Captive Mines (upto 2010) : 650 Cu.M/day

Assumptions for the Aluminium Sector:

(i) No expansion programme is envisaged beyond 2025.

(ii) 20% additional water requirement has been considered for the period beyond 2025 to take care of diversification/unspecified requirement.

ZINC & LEAD:

The present smelting capacity for zinc and lead metal in the country are 1,79,000 MT and 89,000 MT per annum respectively. The above capacity is made up of 1,49,000 MT Zinc and 65,000 MT lead of HZL: 30,000 MT of zinc of Binani Industries Limited (BIL), 24,000 MT of lead of Indian Lead Limited (ILL). While Hindustan Zinc Limited (HZL) is a Public Sector Undertaking, BIL and ILL are in Private Sector. BIL produces Zinc from imported concentrates at their Alwaye (Kerala) plant. ILL has two units, one at Calcutta and the other at Thane (Maharashtra), having 12,000 MT per annum capacity each. Both units are based on imported concentrates/scraps. The table below indicates the production for primary producers of zinc and lead during the last two years:

	Production in Tonnes	
Year	Zinc	Lead
1995-96	141374	45655
1996-97 (Est)	162000	48000

Following norms have been followed for calculation of water requirement for the Lead and

Zinc Sector:

a) Mining & Ore Treatment : 3.5 m^3/MT

b) Zinc Smelting : 40-45 m^3/MT

c) Lead Smelting : 13-15 m^3/MT

d) By-products : 6.0 m^3/MT

The growth rates considered for the Zinc and Lead Sector are as follows:

Period	Zinc	Lead
1999/2000	6%	7%
2009/2020	5%	6%
2024/2025	4%	4%
2049/2050	3%	3%

COPPER:

Hindustan Copper Ltd. (HCL) is the sole indigenous producer of primary copper in the country. Its smelters and refineries are at Khetri in Rajasthan and Ghatsila in Bihar. The production of copper during the last two years are given below:

1995-96 : 41153 MT

1996-97 : 38640 MT

The actual water requirements has been assessed in the copper sector on the basis of water meter readings, pump capacity and running hours. Future requirements as given below, have been calculated on the basis of additional requirement of water

against the enhanced capacity and production envisaged:

Year	Water Requirement (In MCM)
1996	31.8
2000	32.5
2010	34.3
2025	34.3
2050	34.3

SUMMARY:

It is pertinent to mention that water requirement will depend on location and size of Mines/Smelter, grade of metal contained in the ore and technology used. Future requirement of water gets reduced due to recycling of process water in the case of Zinc, Lead and Copper Sectors.

Based on various limitations and assumptions, the water requirement in million cu.mtrs. for the three major non-ferrous sectors are summarised below:

N.F. Metal	1996	2000	2010	2025	2050
Aluminium	134.2	143.3	192.9	244.3	294.7
Zinc & Lead	19.2	37.8	73.4	122.8	122.8
Copper	31.8	32.5	34.3	34.3	34.3
Total	185.2	213.6	300.6	401.4	451.8

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Industrial Water Requirement Projection - Aluminium Sector

Unit : Lakh/Cu.M

Aluminium	1996 Base	2000	2010	2025	2050
BALCO	113	121	224	258	322
NALCO	468	500	650	836	1000
HINDALCO	468	500	650	836	1000
INDAL	234	250	325	418	500
MALCO	59	62	80	105	125

...

11- WATER REQUIREMENT FOR SUGAR INDUSTRY

In the Sugar Industry water is required for cooling and processing purposes, as per details given in Annexure 'A'.

2. Indian Council of Medical Research and National Sugar Institute, Kanpur had carried out certain studies and placed the water requirement to the tune of 1300 - 4360 litres per tonne per day for a plant size of 2500 tonnes crushing per day (TCD). The mean value was assumed as 2,830 litres per day. According to National Federation of Cooperative Sugar Factories Ltd., Nehru Place, New Delhi, requirement of water per tonne of cane was estimated as 1.5 cu.m. for processing, 0.4 cu.m for compensating evaporation loss in spray pond and 0.1 cu.m. for laboratory and toilet etc. The total requirement thus worked out to 2,000 litres per tonne of cane. A view was also expressed that since some of the factories reecycle the water, the base could be assumed as 1 cu.m. per tonne cane. According to Indian Sugar Mills Association, the requirement should be around 0.5 cu.m. per tonne cane, which was considered a rather low figure. It may thus be seen that the requirement of water varies according to different estimates depending upon the size of the plant, technology being followed and the recycling process used.

...2

3. Out of 453 installed sugar factories upto September, 1997, 209 factories are having capacity more than 2500 TCD and the rest below it and are not modernised. Modern plants have recirculation arrangements for cooling. According to final estimates the range of consumption of water should vary between 400 litres to 1600 litres depending upon the condition of the plant. The average was finally concluded as 1000 litres per tonne cane. The total installed capacity as on 30.9.97 was 9,54,560 TCD. The future requirement of water was assessed based on the projections given in the tentative 9th Plan assuming a GDP growth rate of 7% working out to a compound growth rate of 6.17% for water. The future projections are also based on these assumptions. A chart indicating projection of water requirement for the 9th Plan and the subsequent period is given in Annexure 'B'.

4. A Statewise existing installed capacity and water requirement is given in Annexure 'C'.

5. The consumption of water in sugarcane production can be reduced to 200 to 250 litres per tonne cane production provided the following measures are adopted:

(i) Reduction in windage loss in cooling and condensation through the use of cooling tower;

(ii) Reduction of steam consumption at vacuum pans leading to reduction in water loss through

(iii) Cooling of surplus condensates;

(iv) Restricting use of process water at vacuum filters, vacuum pans and centrifugals through technology improvements;

(v) Installation of water meters at different consumption points to monitor and control the use of water;

(vi) Recycling of surplus water available from cooling system after proper treatment;

(vii) Application of common header system in pan;

(viii) Application of MIPMOS system in pan boilding.

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ANNEXURE 'A'

EQUIPMENTS AND PROCESSES REQUIRING WATER IN SUGAR INDUSTRY

A:

(i) Water consumption for cooling purposes and

(ii) Water consumption during processing.

Cooling Water Requirement:

Water is generally utilised for cooling purposes for the following equipment:

1. Mills:

a) Cooling of mill turbines and reduction gears.

b) Cooling of mill bearings.

2. Power House Turbines:

Turbine and reduction gear cooling.

3. Diesel Generating Set:

Cooling of Diesel Generating set.

4. Sulphitation station:

a) Water cooling jacket.

b) Scrubber for cooling.

5. Electrically driven air compressor:

Cooling of air compressor.

6. Vacuum Filter:

a) For condenser

b) For vacuum pump bearing

7. Crystallizers:

For cooling of C-Massecuite.

8. Centrifugals:

For cooling of break-drum.

9. Hot liquor pumps:

For gland cooling.

B: Water for process consumption:

1. Imbition
2. Make up water for boiler
3. Milk of lime preparation
4. Oliver Filter
5. At pans
6. Make up water for condensing systems:
   i) 3% loss on evaporation
   ii) 2% windage loss.
7. Cleaning and washing purpose.
8. Water for drinking and other purposes:
   a) For factory
   b) For colony
9. Laboratory etc.

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ANNEXURE 'B'

PROJECTION OF WATER REQUIREMENT FOR 9TH PLAN

Plan period	Sugar Year	Sugar Production Targets (Million tonnes)	Estimated cane crushed @ 10.2% recovery (Million tonnes)	Standard Norms (1.0 cu.m)	Estimated water requirement (m.cu.m.)	Compound consumption growth rate (%)
9th Plan	Base Year 1996-97	14.788	144.98	1.0	144.98	--
9th Plan	1997-98	15.863	155.52	1.0	155.52	7.27
7%	1998-99	16.695	163.68	1.0	163.68	6.25
	1999-2000	17.574	172.29	1.0	172.29	5.92
	2000-2001	18.503	181.40	1.0	181.40	5.76
	2001-2002	19.483	191.01	1.0	191.01	5.67
					Av. =	6.17%

At 7% GDP during 9th Plan average growth rate of water requirement works out to 6.17% with this average growth rate requirement at:

(i) 2010 A.D. = 315.74 (m.cu.m.)

(ii) 2025 A.D. = 775.10 (m.cu.m.)

(iii) 2050 A.D. = 3462.62 (m.cu.m.)

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Annexure-'C'

Statment showing the Statewise break-up of installed capacity and water requirement thereof.

As on 30.9.1997

S.No.	Name of State	Installed capacity (in TCD)	Norms of water consumption (1.00 cu.m./TCD	Estimated total requirement pf water (inM.c.m.)
1.	Punjab	44766	1.0	6.27
2.	Haryana	30300	1.0	4.58
3.	Rajasthan	3766	1.0	0.25
4.	Uttar Pradesh	273375	1.0	38.82
5.	Madhya Pradesh	11075	1.0	1.07
6.	Gujarat	52600	1.0	8.68
7.	Maharashtra	247278	1.0	39.32
8.	Bihar	42450	1.0	4.46
9.	Assam	3313	1.0	0.24
10.	Orissa	12919	1.0	1.20
11.	West Bengal	1819	1.0	0.09
12.	Nagaland	1000	1.0	0.08
13.	Andhra Pradesh	76520	1.0	8.19
14.	Karnataka	65905	1.0	8.70
15.	Tamil Nadu	81950	1.0	14.10
16.	Pondicherry	2750	1.0	0.44
17.	Kerala	1524	1.0	0.13
18.	Goa	1250	1.0	0.10
	Total:	954560		136.72

12. WATER REQUIREMENT FOR CEMENT INDUSTRY

Cement like steel, is one of the basic material for the economic development of a country. Its consumption is universally recognised as an index of of the economic development. India is the fourth largest cement producing country in the world after China, Japan and USA.

Cement is manufactured by two processess - wet process and dry process. In the wet process, the limestone is crushed to a suitable size and clay is washed in water in a wash mill where the foreign substance, e.g. flint etc. are removed and a slurry containing about 60% water is obtained. Crushed limestone and the clay slurry are mixed in proper proportions and pulverised in a special mill. The raw slurry is obtained after homogenisation.

In dry process, the mixture of raw materials in proper proportion is dried, pulverised and homogenised to produce RAW MEAL. The raw slurry (from wet process) or raw meal (from dry process) is introduced into a Rotatary Kiln. The resulting product in the form of small greenish block or grey coloured hard balls is called CEMENT CLINKER. In order to adjust setting time, Gypsum (2-3%) is added and then pulverised by cement pulverizer and final product CEMENT is obtained.

The production of the cement during the year 1996-97 was 76 million tonnes. This production was from 115 large cement plants and about 300 mini cement

INDUSTRIAL WATER REQUIREMENT FOR AUTO INDUSTRY

Production and Industrial Water Requirement

Type of Vehicle	1996-97 Production (Nos.)	1996-97 Ind.Water millm^3	1999-2000 Production (Nos.)	1999-2000 Ind.Water millm^3	2009-2010 Production (Nos.)	2009-2010 Ind.Water millm^3	2024-25 Production (Nos,)	2024-25 Ind.Water millm^3	2049-50 Production (Nos.)
Two wheelers/ Three wheelers	31,95,778	3.2	38,79,100	3.88	55,57,600	5.560	55,65,900	5.570	65,79,800
Passenger Cars/multi utility vehicles.	4,84,519	9.69	7,02,900	14.058	14,02,200	28.044	19,26,500	38.53	24,70,600
LCVs	1,47,537	9.70	2,72,200	8.71	4,95,700	15.862	6,67,100	21.347	8,55,500
HCVs	1,55,696								
	39,83,530	22.59	48,54,200	26.648	74,55,500	49.466	81,59,500	65.447	99,06,000

Two/three wheelers @ $1m^3$/vehicle

Passenger car @ $20m^3$/vehicle

LCV/HCV @ $32m^3$/vehicle

Projection for Indian Automobile Industry : 2001, 2010, 2025 & 2050

(In Numbers)

Year	Multi Utility Vehicles	Passenger Cars	Comml Vehicles	2 Wheelers	3 Wheelers
1997-98	84600	433900	225000	3098300	231700
1998-99	91400	512000	247500	3348300	247900
1999-2000	98700	604200	272200	3613900	265200
2000-2001	**106600**	**700000**	**300000**	**3903000**	**283800**
2001-02	115200	757000	323400	4098200	292300
2002-03	124400	817500	349300	4303100	301100
2003-04	134300	882900	377200	4518300	310100
2004-05	**145100**	**953600**	**407400**	**4744200**	**319400**
2009-2010	**185200**	**1217000**	**495700**	**5238000**	**319600**
2024-2025	**288500**	**1638000**	**667100**	**5245800**	**320100**
2049-2050	**370000**	**2100600**	**855500**	**5259000**	**320900**

File No.I-12011/41/2019-WPP Coord.

भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन नदी विकास एवं गंगा संरक्षण विभाग
केंद्रीय जल आयोग
जल आयोजन एवं परियोजनासमन्वय निदेशालय

सत्यमेव जयते

Government of India
Ministry of Jal Shakti
Deptt. of Water Resources, RD&GR
Central Water Commission
WP&P COORDINATON DIRECTORATE

विषय: सूचना का अधिकार, 2005 के अंतर्गत Shri R Muralimohan, A/26/1- Algesan Nagar, Chingepet, Tamilnadu, Pin 603001 email.: natrajanmuralimohan@gmail.com के दिनांक 31-10-2019 का आवेदन (CWCND/R/2019/80197) द्वारा मांगी गई सूचना के संबंध मे।

With reference to above RTI Application, which is received in this office on 05-11-2019 on transfer from Under Secretary & Nodal Officer for RTI, CWC, New Delhi, (No A-49012/8/2019/RTI/449 dt 01-11-2019), it is to information that the information asked vide point No 1, to 9 may be treated as Nil, as far as WP&P Wing of CWC is concern. **It is also to intimate that, the above said application has already been transferred to concern wing of CWC i.e. R&M Wing of CWC by Under Secretary and Nodal RTI of CWC New Delhi.**

How ever, it is to inform that the Palar is an inter state River, originates from kolar Distt of Karnataka. It travels through Andhra Pradesh and then enters Tamilnadu State and finally joins the Bay of Bengal, south of Mahbalipurram. Water being the subject matter of State Government, applicant is advised to contact concern Ministry of state/ water resources Department.

Digitally signed by PADMA DORJE
Date:Mon Nov 18 17:50:52 IST 2019
Reason:Approved

निदेशक Director
ज.आ.एवं प. स.नि. तथा मुख्य जनसूचना अधिकारी WP&P (C) & CPIO

Shri R Muralimohan, A/26/1- Algesan Nagar, Chingepet, Tamilnadu, Pin 603001

प्रति अवर सचिव एवं सूचना के अधिकार के नोडल अधिकारी, केंद्रीय जल आयोग, सेवा भवन, रामकृष्ण पुरम, नई दिल्ली-110066 को उनके पत्र सं. A-49012/8/2019/RTI/449 दिनांक 01-11-2019 के संदर्भ में सूचना एवं आवश्यक कार्यवाही हेतु ।

In case you are not satisfied with the information/ reply provided by this office, you may directly prefer an appeal within 30 days from the receipt of this letter to the first appellate authority whose address is given as under. **Name, designation & address of Appellate Authority for WP&P wing of CWC is Chief Engineer (PAO), Central Water Commission, 7th Floor (S), Sewa Bhawan, R. K. Puram, New Delhi – 110066. Phone No. 26103561 Fax No.26103561. email-ceprjap@nic.in**

तृतीय तल (द0), सेवा भवन, रामकृष्ण पुरम
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♦Conserve Water- Save Life♦

File No.I-12011/41/2019-WPP Coord.

भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन नदी विकास एवं गंगा संरक्षण विभाग
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सत्यमेव जयते

Government of India
Ministry of Jal Shakti
Deptt. of Water Resources, RD&GR
Central Water Commission
WP&P COORDINATON DIRECTORATE

विषय: सूचना का अधिकार, 2005 के अंतर्गत श्री धीरज मिश्रा, F-44-45, शहीद भगत सिंह मार्ग, लेन जैन भवन के सामने, गोल मार्केट, नई दिल्ली--110001 के दिनांक 04-11-2019 का आवेदन (MOWRC/R/2019/80328 एवं MOWRC/R/2019/90042) द्वारा मांगी गई सूचना के संबंध मे।

With reference to above RTI Application, which is received in this office on 07-11-2019 on transfer from Under Secretary & Nodal Officer for RTI, CWC, New Delhi, (No A-49012/8/2019/RTI/454 & 455 dt 06-11-2019), it is to inform that the information asked is not available in WP&P Wing of CWC, the information may please treated as NIL as far as WP&P Wing of CWC, New Delhi is concerned..

Digitally signed by PADMA DORJE
Date:Fri Nov 15 09:18:10 IST 2019
Reason: Approved

निदेशक Director
ज.आ.एवं प. स.नि. तथा मुख्य जनसूचना अधिकारी WP&P (C) & CPIO

अंतर्गत श्री धीरज मिश्रा, F-44-45, शहीद भगत सिंह मार्ग, लेन जैन भवन के सामने, गोल मार्केट, नई दिल्ली--110001

प्रति अवर सचिव एवं सूचना के अधिकार के नोडल अधिकारी, केंद्रीय जल आयोग, सेवा भवन, रामकृष्ण पुरम, नई दिल्ली-110066 को उनके पत्र सं. A-49012/8/2019/RTI/454 & 455 दिनांक 06-11-2019 के संदर्भ में सूचना एवं आवश्यक कार्यवाही हेतु ।

In case you are not satisfied with the information/ reply provided by this office, you may directly prefer an appeal within 30 days from the receipt of this letter to the first appellate authority whose address is given as under. **Name, designation & address of Appellate Authority for WP&P wing of CWC is Chief Engineer (PAO), Central Water Commission, 7th Floor (S), Sewa Bhawan, R. K. Puram, New Delhi – 110066. Phone No. 26103561 Fax No.26103561. email-ceprjap@nic.in**

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♦Conserve Water- Save Life♦

File No.I-12011/41/2019-WPP Coord.

भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन नदी विकास एवं गंगा संरक्षण विभाग
केंद्रीय जल आयोग
जल आयोजन एवं परियोजनासमन्वय निदेशालय

सत्यमेव जयते

Government of India
Ministry of Jal Shakti
Deptt. of Water Resources, RD&GR
Central Water Commission
WP&P COORDINATON DIRECTORATE

विषय: सूचना का अधिकार, 2005 के अंतर्गत श्री Shri Sanjay Singh, Vill-Baghrachaka, Post-Gandghora, Distt- Jharsuguda, Odisa, Pin 768216 sksinghcbt@gmail.com के दिनांक 09-11-2019 का आवेदन (CWCND/R/2019/50176 & CWCND/R/2019/50179) द्वारा मांगी गई सूचना के संबंध मे।

With reference to above RTI Application, which is received in this office on 15-11-2019 on transfer from Under Secretary & Nodal Officer for RTI, CWC, New Delhi, (No A-49012/8/2019/RTI/463 &464 dt 14 -11-2019), the information available in WP&P Wing of CWC, is as under:

SNo	Information sought	reply
1	I live in village Baghrachaka which has a Government owned pond	Water being a State subject, steps for augmentation, conservation and efficient management to ensure sustainability of water resources are undertaken by the respective State Government. In order to supplement the efforts of the State Governments, Government of India provides technical and financial assistance to State Governments to encourage sustainable development and efficient management of water resources through various schemes and program, Ministry of Jal Shakti (erstwhile Ministry of Water Resources, RD & GR), Government of India is implementing the scheme "Repair, Renovation & Restoration (RRR) of water bodies" under Har Khet ko Pani component of Pradhan Mantri Krishi Sinchayee Yojana (PMKSY). The Scheme RRR of Water Bodies is a conhnuing scheme since X Plan, Urban water bodies having water spread area from 2 hectares to 10 hectares are eligible to be included under the scheme. Rural water bodies having minimum water spread area of 5 hectares will be included under the scheme. For more information about the scheme, step by step guidelines & criteria, kindly visit the website link: http://pmksymowr.nic,in /documents/RRR_P MKSY,G u idelines_2077 .pdf
2	That some people are using the above said pond as their personal fish pond and preventing other people to use water for irrigation purpose	
3	I want to know whether it is illegal or not and if illegal then what step can be taken	

- The applicant is advised to contact local administrative department /department of water resources of the State Government.

Digitally signed by PADMA DORJE
Date:Mon Nov 25 11:40:35 IST 2019
Reason:Approved

निदेशक Director
ज.आ.एवं प. स.नि. तथा मुख्य जनसूचना अधिकारी WP&P (C) & CPIO

Shri Sanjay Singh, Vill-Baghrachaka, Post- Gandghora, Distt- Jharsuguda, Odisa, Pin 768216

प्रति अवर सचिव एवं सूचना के अधिकार के नोडल अधिकारी, केंद्रीय जल आयोग, सेवा भवन, रामकृष्ण पुरम, नई दिल्ली-110066 को उनके पत्र सं. A-49012/8/2019/RTI/463 & 464 दिनांक 14-11-2019 के संदर्भ में सूचना एवं आवश्यक कार्यवाही हेतु ।

In case you are not satisfied with the information/ reply provided by this office, you may directly prefer an appeal within 30 days from the receipt of this letter to the first appellate authority whose address is given as under. **Name, designation & address of Appellate Authority for WP&P wing of CWC is Chief Engineer (PAO), Central Water Commission, 7th Floor (S), Sewa Bhawan, R. K. Puram, New Delhi – 110066. Phone No. 26103561 Fax No.26103561. email-ceprjap@nic.in**

तृतीय तल (द 0), सेवा भवन, रामकृष्ण पुरम
नई दिल्ली-110066
दूरभाष : 011 29583225 , फैक्स : 011 29583209
ई मेल: wppcdte@nic.in
♦जल संरक्षण - सुरक्षित भविष्यΣ

3rd FLOOR (S), SEWA BHAWAN, R.K.PURAM
NEW DELHI-110066
Tel.: 01129583225
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Email :- wppcdte@nic.in

♦Conserve Water- Save Life♦

File No.I-12011/41/2019-WPP Coord.

भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन नदी विकास एवं गंगा संरक्षण विभाग
केंद्रीय जल आयोग
जल आयोजन एवं परियोजनासमन्वय निदेशालय

सत्यमेव जयते

Government of India
Ministry of Jal Shakti
Deptt. of Water Resources, RD&GR
Central Water Commission
WP&P COORDINATON DIRECTORATE

विषय: सूचना का अधिकार, 2005 के अंतर्गत Shri Kasirajan M, 2/277A, East Street Irukkangudi, Sattur(tk), Viruthunagar Distt,Tamilnadu , Pin 626202 email.: kasirajanmuthuvairavan@gmail.com के दिनांक 04-11-2019 का आवेदन (MOWRC/R/2019/50451) द्वारा मांगी गई सूचना के संबंध मे।

With reference to above RTI Application, which is received in this office on 07-11-2019 on transfer from Under Secretary & Nodal Officer for RTI, CWC, New Delhi, (No A-49012/8/2019/RTI/456 dt 06-11-2019), the information asked available in WP&P Wing of CWC, is as under:

SNo	Information sought	reply
1	I Want the details about Irukkangudi dam in Viruthunagar district at Tamil Nadu. I want the full details about the Irukkangudi dam including construction cost, maintenance cost, maintenance authority and officers. Maintenance action per year, Irukkangudi dam location and map of Irukkangudi map before and after dam construction and also the map of Irukkangudi(melamadai) map before 1965. The details in Tamil format is useful to reference. I kindly request you to provide the details.	Irukkangudi Reservoir Project was considered and accepted by the Advisorry Committee of MoWR,RD & Gr in the 80th meeting held on 07/02/2003 for an estimated cost of Rs 62 Cr. Price level 2000-01. Decision taken during 80th meeting of TAC is attached. For more information alicant is advised to contact concern state Govt/ water resources Department/ Project authorities .

Digitally signed by PADMA DORJE
Date:Tue Nov 19 10:17:53 IST 2019
Reason:Approved

निदेशक Director
ज.आ.एवं प. स.नि. तथा मुख्य जनसूचना अधिकारी WP&P (C) & CPIO

Shri Kasirajan M, 2/277A, East Street Irukkangudi, Sattur(tk), Distt -Viruthunagar, Tamilnadu , Pin 626202

प्रति अवर सचिव एवं सूचना के अधिकार के नोडल अधिकारी, केंद्रीय जल आयोग, सेवा भवन, रामकृष्ण पुरम, नई दिल्ली-110066 को उनके पत्र सं. A-49012/8/2019/RTI/456 दिनांक 06-11-2019 के संदर्भ में सूचना एवं आवश्यक कार्यवाही हेतु ।

In case you are not satisfied with the information/ reply provided by this office, you may directly prefer an appeal within 30 days from the receipt of this letter to the first appellate authority whose address is given as under. **Name, designation & address of Appellate Authority for WP&P wing of CWC is Chief Engineer (PAO), Central Water Commission, 7th Floor (S), Sewa Bhawan, R. K. Puram, New Delhi – 110066. Phone No. 26103561 Fax No.26103561. email-ceprjap@nic.in**

तृतीय तल (द0), सेवा भवन, रामकृष्ण पुरम
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ई मेल: wppcdte@nic.in
♦जल संरक्षण - सुरक्षित भविष्यΣ

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4. IRUKKANGUDI RESERVOIR PROJECT (NEW MEDIUM) - TAMIL NADU

Estimated Cost	:	Rs. 72 crore (2000-01 P.L.)
CCA	:	4,229 ha.
Annual Irrigation	:	4,229 ha.

The Chief Engineer, PAO, CWC briefly explained the Project and indicated that the project proposal was put up to the Advisory Committee in its 79th meeting held on 24.5.02 wherein Committee decided that the project may be deferred and resubmitted by the State Govt. after review of irrigation efficiency and cropping pattern with a view to provide extensive irrigation. He further explained that since there is no more area available within gross command which could be brought under irrigation so as to achieve extensive irrigation, the project could be considered by the Advisory Committee. Advisor, (WR), Planning Commission emphasized that the Project Authorities may ensure the high irrigation efficiency as indicated in the project proposal. The Special Secretary, PWD , Tamil Nadu mentioned that the project authorities are approaching NABARD for financing the project and by some modifications such as in river training , the cost of the project may come down to the tune of Rs. 62 crore.

The Advisory Committee accepted the project proposal subject to:

i) Concurrence of the State Finance Department; and

ii) Preference to be given to drinking water requirement particularly in the deficit years before providing water for irrigation.

File No.I-12011/41/2019-WPP Coord.

भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन नदी विकास एवं गंगा संरक्षण विभाग
केंद्रीय जल आयोग
जल आयोजन एवं परियोजनासमन्वय निदेशालय

सत्यमेव जयते

Government of India
Ministry of Jal Shakti
Deptt. of Water Resources, RD&GR
Central Water Commission
WP&P COORDINATON DIRECTORATE

RTI MATTER
SPEED/REG POST

विषय: विषय: सूचना का अधिकार, 2005 के अंतर्गत श्री धीरज मिश्रा, F-44-45, शहीद भगत सिंह मार्ग, लेन जैन भवन के सामने, गोल मार्केट, नई दिल्ली--110001 के दिनांक 08-11-2019 का आवेदन (CWCND/R/2019/50175) द्वारा मांगी गई सूचना के संबंध मे।

सूचना के अधिकार अधिनियम**, 2005** के अंतर्गत अवर सचिव एवं नोडल अधिकारी**,** सूचना का अधिकार**,** केन्द्रीय जल आयोग**,** नई दिल्ली से स्थानांतरित होकर इस कार्यालय में दिनांक **11-11-**2019 को प्राप्त उपरोक्त आवेदन **के संदर्भ में सूचित किया जाता है वृहद एवं मध्यम परियोजनाओ के विवरण केंद्रीय जल आयोग की वेब साइट cwc.gov.in/waterinfo/ नेशनल रजिस्टर ऑफ लार्ज डैम के तहत उपलब्ध है। उपरोक्त आवेदन के बिन्दु क्रमांक** 1 **से** 4 **से चाही गई अन्य सूचना केन्द्रीय जल आयोग के जल आयोजन एवं परियोजना स्कन्ध में उपलब्ध नहीं /शून्य है ।**

Digitally signed by PADMA DORJE
Date:Tue Dec 03 14:11:41 IST 2019
Reason:Approved

निदेशक
ज 0 आ 0 एवंप 0 स 0 नि0
तथा मुख्य जनसूचना अधिकारी

प्रति श्री धीरज मिश्रा, F-44-45, शहीद भगत सिंह मार्ग, लेन जैन भवन के सामने, गोल मार्केट, नई दिल्ली--110001

प्रतिलिपि अवर सचिव एवं सूचना के अधिकार के नोडल अधिकारी, केंद्रीय जल आयोग, सेवा भवन, रामकृष्ण पुरम, नई दिल्ली-110066 को उनके पत्र सं0 A-49012/8/2019/RTI/462 दिनांक 08-11-2019 के संदर्भ में सूचना एवं आवश्यक कार्यवाही हेतु ।

In case you are not satisfied with the information/ reply provided by this office, you may directly prefer an appeal within 30 days from the receipt of this letter to the first appellate authority whose address is given as under. Name, designation & address of Appellate Authority for WP&P wing of CWC is Chief Engineer (PAO), Central Water Commission, 7th Floor (S), SewaBhawan, R. K. Puram, New Delhi – 110066. Phone No. 26103561 Fax No.26103561. email-ceprjap@nic.in

तृतीय तल (द 0), सेवा भवन, रामकृष्ण पुरम
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ई मेल: wppcdte@nic.in
♦जल संरक्षण - सुरक्षित भविष्यΣ

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Tel.: 01129583225
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♦Conserve Water- Save Life♦

File No.I-12011/41/2019-WPP Coord.

भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन नदी विकास एवं गंगा संरक्षण विभाग
केंद्रीय जल आयोग
जल आयोजन एवं परियोजनासमन्वय निदेशालय

सत्यमेव जयते

Government of India
Ministry of Jal Shakti
Deptt. of Water Resources, RD&GR
Central Water Commission
WP&P COORDINATON DIRECTORATE

विषय: सूचना का अधिकार, 2005 के अंतर्गत श्री Shri Sanjay Singh, Vill-Baghrachaka, Post-Gandghora, Distt- Jharsuguda, Odisa, Pin 768216 sksinghcbt@gmail.com के दिनांक 09-11-2019 का आवेदन (CWCND/R/2019/50176 & CWCND/R/2019/50179) द्वारा मांगी गई सूचना के संबंध मे।

With reference to above RTI Application, which is received in this office on 15-11-2019 on transfer from Under Secretary & Nodal Officer for RTI, CWC, New Delhi, (No A-49012/8/2019/RTI/463 &464 dt 14 -11-2019), the information available in WP&P Wing of CWC, is as under:

SNo	Information sought	reply
1	I live in village Baghrachaka which has a Government owned pond	Water being a State subject, steps for augmentation, conservation and efficient management to ensure sustainability of water resources are undertaken by the respective State Government. In order to supplement the efforts of the State Governments, Government of India provides technical and financial assistance to State Governments to encourage sustainable development and efficient management of water resources through various schemes and program, Ministry of Jal Shakti (erstwhile Ministry of Water Resources, RD & GR), Government of India is implementing the scheme "Repair, Renovation & Restoration (RRR) of water bodies" under Har Khet ko Pani component of Pradhan Mantri Krishi Sinchayee Yojana (PMKSY). The Scheme RRR of Water Bodies is a conhnuing scheme since X Plan, Urban water bodies having water spread area from 2 hectares to 10 hectares are eligible to be included under the scheme. Rural water bodies having minimum water spread area of 5 hectares will be included under the scheme. For more information about the scheme, step by step guidelines & criteria, kindly visit the website link: http://pmksymowr.nic,in /documents/RRR_P MKSY,G u idelines_2077 .pdf
2	That some people are using the above said pond as their personal fish pond and preventing other people to use water for irrigation purpose	
3	I want to know whether it is illegal or not and if illegal then what step can be taken	

- The applicant is advised to contact local administrative department /department of water resources of the State Government.

Digitally signed by PADMA DORJE
Date:Mon Nov 25 11:40:35 IST 2019
Reason:Approved

निदेशक Director
ज.आ.एवं प. स.नि. तथा मुख्य जनसूचना अधिकारी WP&P (C) & CPIO

Shri Sanjay Singh, Vill-Baghrachaka, Post- Gandghora, Distt- Jharsuguda, Odisa, Pin 768216

प्रति अवर सचिव एवं सूचना के अधिकार के नोडल अधिकारी, केंद्रीय जल आयोग, सेवा भवन, रामकृष्ण पुरम, नई दिल्ली-110066 को उनके पत्र सं. A-49012/8/2019/RTI/463 & 464 दिनांक 14-11-2019 के संदर्भ में सूचना एवं आवश्यक कार्यवाही हेतु ।

In case you are not satisfied with the information/ reply provided by this office, you may directly prefer an appeal within 30 days from the receipt of this letter to the first appellate authority whose address is given as under. **Name, designation & address of Appellate Authority for WP&P wing of CWC is Chief Engineer (PAO), Central Water Commission, 7th Floor (S), Sewa Bhawan, R. K. Puram, New Delhi – 110066. Phone No. 26103561 Fax No.26103561. email-ceprjap@nic.in**

तृतीय तल (द 0), सेवा भवन, रामकृष्ण पुरम
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दूरभाष : 011 29583225 , फैक्स : 011 29583209
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Email :- wppcdte@nic.in

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File No.I-12011/41/2019-WPP Coord.

भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन नदी विकास एवं गंगा संरक्षण विभाग
केंद्रीय जल आयोग
जल आयोजन एवं परियोजनासमन्वय निदेशालय

सत्यमेव जयते

Government of India
Ministry of Jal Shakti
Deptt. of Water Resources, RD&GR
Central Water Commission
WP&P COORDINATON DIRECTORATE

RTI MATTER
SPEED/REG POST

विषय: सूचना का अधिकार, 2005 के अंतर्गत श्री जितेंद्र सुराना , 41, हुड़को कॉलोनी, नीमच, मध्यप्रदेश , Pin 458441 email: surana_jitendra@yahoo.com. के दिनांक 10-11-2019 के आवेदन (CWCND/R/2019/50177) द्वारा मांगी गई सूचना के संबंध मे।

सूचना के अधिकार अधिनियम, **2005** के अंतर्गत अवर सचिव एवं नोडल अधिकारी, सूचना का अधिकार, केन्द्रीय जल आयोग, नई दिल्ली से स्थानांतरित होकर इस कार्यालय में दिनांक **15-11**-2019 को प्राप्त उपरोक्त आवेदन के संदर्भ में सूचित किया जाता है कि सूचना का विषय केन्द्रीय जल आयोग के जल आयोजन एवं परियोजना स्कन्ध से संबन्धित नहीं होने के कारण सूचना उपलब्ध नहीं है ।

Digitally signed by PADMA DORJE
Date:Mon Nov 18 17:54:51 IST 2019
Reason:Approved

निदेशक
ज 0 आ 0 एवंप 0 स 0 नि0
तथा मुख्य जनसूचना अधिकारी

श्री जितेंद्र सुराना , 41, हुड़को कॉलोनी, नीमच, मध्यप्रदेश , Pin 458441

प्रति अवर सचिव एवं सूचना के अधिकार के नोडल अधिकारी, केंद्रीय जल आयोग, सेवा भवन, रामकृष्ण पुरम, नई दिल्ली-110066 को उनके पत्र सं0 A-49012/8/2019/RTI/465 दिनांक 14-11-2019 के संदर्भ में सूचना एवं आवश्यक कार्यवाही हेतु ।

In case you are not satisfied with the information/ reply provided by this office, you may directly prefer an appeal within 30 days from the receipt of this letter to the first appellate authority whose address is given as under. **Name, designation & address of Appellate Authority for WP&P wing of CWC is Chief Engineer (PAO), Central Water Commission, 7th Floor (S), SewaBhawan, R. K. Puram, New Delhi – 110066. Phone No. 26103561 Fax No.26103561. email-ceprjap@nic.in**

तृतीय तल (द 0), सेवा भवन, रामकृष्ण पुरम
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दूरभाष : 011 29583225 , फैक्स : 011 29583209
ई मेल: wppcdte@nic.in
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File No.I-12011/41/2019-WPP Coord.

भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन नदी विकास एवं गंगा संरक्षण विभाग
केंद्रीय जल आयोग
जल आयोजन एवं परियोजनासमन्वय निदेशालय

सत्यमेव जयते

Government of India
Ministry of Jal Shakti
Deptt. of Water Resources, RD&GR
Central Water Commission
WP&P COORDINATON DIRECTORATE

RTI MATTER
SPEED/REG POST

विषय: सूचना का अधिकार, 2005 के अंतर्गत श्री जितेंद्र सुराना , 41, हुड़को कॉलोनी, नीमच, मध्यप्रदेश , Pin 458441 email: surana_jitendra@yahoo.com. के दिनांक 10-11-2019 के आवेदन (CWCND/R/2019/50177) द्वारा मांगी गई सूचना के संबंध मे।

सूचना के अधिकार अधिनियम, **2005** के अंतर्गत अवर सचिव एवं नोडल अधिकारी, सूचना का अधिकार, केन्द्रीय जल आयोग, नई दिल्ली से स्थानांतरित होकर इस कार्यालय में दिनांक **15-11**-2019 को प्राप्त उपरोक्त आवेदन के संदर्भ में सूचित किया जाता है कि सूचना का विषय केन्द्रीय जल आयोग के जल आयोजन एवं परियोजना स्कन्ध से संबन्धित नहीं होने के कारण सूचना उपलब्ध नहीं है ।

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Reason:Approved

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तथा मुख्य जनसूचना अधिकारी

श्री जितेंद्र सुराना , 41, हुड़को कॉलोनी, नीमच, मध्यप्रदेश , Pin 458441

प्रति अवर सचिव एवं सूचना के अधिकार के नोडल अधिकारी, केंद्रीय जल आयोग, सेवा भवन, रामकृष्ण पुरम, नई दिल्ली-110066 को उनके पत्र सं0 A-49012/8/2019/RTI/465 दिनांक 14-11-2019 के संदर्भ में सूचना एवं आवश्यक कार्यवाही हेतु ।

In case you are not satisfied with the information/ reply provided by this office, you may directly prefer an appeal within 30 days from the receipt of this letter to the first appellate authority whose address is given as under. **Name, designation & address of Appellate Authority for WP&P wing of CWC is Chief Engineer (PAO), Central Water Commission, 7th Floor (S), SewaBhawan, R. K. Puram, New Delhi – 110066. Phone No. 26103561 Fax No.26103561. email-ceprjap@nic.in**

तृतीय तल (द 0), सेवा भवन, रामकृष्ण पुरम
नई दिल्ली-110066
दूरभाष : 011 29583225 , फैक्स : 011 29583209
ई मेल: wppcdte@nic.in
♦जल संरक्षण - सुरक्षित भविष्यΣ

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♦Conserve Water- Save Life♦

भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन नदी विकास एवं गंगा संरक्षण विभाग
केंद्रीय जल आयोग
जल आयोजन एवं परियोजनासमन्वय निदेशालय

सत्यमेव जयते

Government of India
Ministry of Jal Shakti
Deptt. of Water Resources, RD&GR
Central Water Commission
WP&P COORDINATON DIRECTORATE

RTI MATTER
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विषय: सूचना का अधिकार, 2005 के अंतर्गत श्री धीरज मिश्रा, F-44-45, शहीद भगत सिंह मार्ग, लेन जैन भवन के सामने, गोल मार्केट, नई दिल्ली--110001 के दिनांक 11-11-2019 का आवेदन (CWCND/R/2019/80203) द्वारा मांगी गई सूचना के संबंध मे।

सूचना के अधिकार अधिनियम**, 2005** के अंतर्गत अवर सचिव एवं नोडल अधिकारी**,** सूचना का अधिकार**,** केन्द्रीय जल आयोग**,** नई दिल्ली से स्थानांतरित होकर इस कार्यालय में दिनांक **15-11-**2019 को प्राप्त उपरोक्त आवेदन **के संदर्भ में सूचित किया जाता है वृहद एवं मध्यम परियोजनाओ के विवरण केंद्रीय जल आयोग की वेब साइट cwc.gov.in/waterinfo/ नेशनल रजिस्टर ऑफ लार्ज डैम के तहत उपलब्ध है। उपरोक्त आवेदन के बिन्दु क्रमांक** 1 **से** 4 **से चाही गई अन्य सूचना केन्द्रीय जल आयोग के जल आयोजन एवं परियोजना स्कन्ध में उपलब्ध नहीं /शून्य है ।**

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Date:Tue Dec 03 13:15:51 IST 2019
Reason:Approved

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तथा मुख्य जनसूचना अधिकारी

प्रति श्री धीरज मिश्रा, F-44-45, शहीद भगत सिंह मार्ग, लेन जैन भवन के सामने, गोल मार्केट, नई दिल्ली--110001

प्रतिलिपि अवर सचिव एवं सूचना के अधिकार के नोडल अधिकारी, केंद्रीय जल आयोग, सेवा भवन, रामकृष्ण पुरम, नई दिल्ली-110066 को उनके पत्र सं0 A-49012/8/2019/RTI/466 दिनांक 14-11-2019 के संदर्भ में सूचना एवं आवश्यक कार्यवाही हेतु ।

In case you are not satisfied with the information/ reply provided by this office, you may directly prefer an appeal within 30 days from the receipt of this letter to the first appellate authority whose address is given as under. Name, designation & address of Appellate Authority for WP&P wing of CWC is Chief Engineer (PAO), Central Water Commission, 7th Floor (S), SewaBhawan, R. K. Puram, New Delhi – 110066. Phone No. 26103561 Fax No.26103561. email-ceprjap@nic.in

भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन नदी विकास एवं गंगा संरक्षण विभाग
केंद्रीय जल आयोग
जल आयोजन एवं परियोजनासमन्वय निदेशालय

सत्यमेव जयते

Government of India
Ministry of Jal Shakti
Deptt. of Water Resources, RD&GR
Central Water Commission
WP&P COORDINATON DIRECTORATE

RTI MATTER
SPEED/REG POST

विषय: सूचना का अधिकार, 2005 के अंतर्गत श्री धीरज मिश्रा, F-44-45, शहीद भगत सिंह मार्ग, लेन जैन भवन के सामने, गोल मार्केट, नई दिल्ली--110001 के दिनांक 11-11-2019 का आवेदन (CWCND/R/2019/80205) द्वारा मांगी गई सूचना के संबंध मे।

सूचना के अधिकार अधिनियम**, 2005** के अंतर्गत अवर सचिव एवं नोडल अधिकारी**,** सूचना का अधिकार**,** केन्द्रीय जल आयोग**,** नई दिल्ली से स्थानांतरित होकर इस कार्यालय में दिनांक **14-11-**2019 को प्राप्त उपरोक्त आवेदन के संदर्भ में सूचित किया जाता है उपरोक्त आवेदन से चाही गई सूचना केन्द्रीय जल आयोग के जल आयोजन एवं परियोजना स्कन्ध में उपलब्ध नहीं /शून्य है ।

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Reason:Approved

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तथा मुख्य जनसूचना अधिकारी

प्रति श्री धीरज मिश्रा, F-44-45, शहीद भगत सिंह मार्ग, लेन जैन भवन के सामने, गोल मार्केट, नई दिल्ली--110001

प्रतिलिपि अवर सचिव एवं सूचना के अधिकार के नोडल अधिकारी, केंद्रीय जल आयोग, सेवा भवन, रामकृष्ण पुरम, नई दिल्ली-110066 को उनके पत्र सं0 A-49012/8/2019/RTI/467 दिनांक 14-11-2019 के संदर्भ में सूचना एवं आवश्यक कार्यवाही हेतु ।

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