

NITI Aayog
Government of India

Composite Water Management Index

March, 2017

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Abbreviations

AIBP – Accelerated Irrigation Benefits Programme

BCM – Billion Cubic Metres

CAD & WM – Command Area Development and Water Management

cm – Centimetre

IPC – Irrigation Potential Created

IPU – Irrigation Potential Utilised

ISF – Irrigation Service Fee

IWMP – Integrated Watershed Management Programme

KPIs – Key Performance Indicators

mha – Million Hectare

Max - Maximum

MGNREGS - Mahatma Gandhi Rural Employment Guarantee Scheme

MMI – Major and Medium Irrigation

MoWR, RD&GR – Ministry of Water Resources, River Development and Ganga Rejuvenation

NITI – National Institution for Transforming India

NRCP - National River Conservation Programme

O&M – Operation and Maintenance

PIM – Participatory Irrigation Management

PMKSY – Pradhan Mantri Krishi Sinchayee Yojana

RKVY – Rashtriya Krishi Vikas Yojana

UTs – Union Territories

WUAs – Water Users Associations

Background and Rationale

The annual precipitation including snowfall, which is the main source of water in India, is about 4000 billion cubic meters (BCM). However, the average annual rainfall varies considerably from one region of the country to another. The North East region receives about 1000 cm and Western Rajasthan gets less than 10 cm of annual precipitation. Further, most of the rainfall occurs during the season of south-west monsoon in four months i.e. from June to September.

About 53.3 percent of total precipitation is lost due to evapotranspiration which leaves a balance of 1869 BCM water in the country. Further, about 40 per cent of the potential available can't be put to beneficial use due to topographical constraints and uneven distribution of water resources over space and time. Thus utilizable water potential of the country is estimated to be 1123 BCM consisting of 690 BCM of surface water and 433 BCM of ground water (Box 1.1).

Box 1.1	
Status on Average Annual Water Availability	
• Precipitation received	4000 BCM (100%)
• Water Resources Potential	1869 BCM (46.7%)
• Utilizable Water Resources	1123 BCM (28.1%)
Ground Water	433 BCM (10.8%)
Surface Water	690 BCM (17.2%)
(Figures in parentheses are per cent of total precipitation)	

Availability of both surface and ground water varies from one region to another. In view of limitations on availability of water resources and rising demand for water, sustainable management of water resources has acquired critical importance. NITI Aayog has developed a Composite Water Management Index as a useful tool to assess and further improve the performance in efficient management of water resources. The index would provide useful information for the States and also for the concerned Central Ministries/Departments enabling them to formulate and implement

suitable strategies for better management of water resources. It has been finalized after an elaborate exercise including seeking feedback from the States and consultation with reputed experts.

The Index has a set of 28 Key Performance Indicators (KPIs) covering irrigation status, drinking water and other water-related sectors. Critical areas such as source augmentation; major and medium irrigation; watershed development; participatory irrigation practices; sustainable on-farm water use practices; rural drinking water; urban water supply and sanitation; and policy & governance have been accorded high priority. The index would serve as a useful tool to track performance in the water sector and take corrective measures timely for achieving better outcomes thereby meeting the citizens' expectations satisfactorily.

Sectors Prioritized for Water Management Index

- 1) Source Augmentation (Restoration of Water Bodies)
- 2) Source Augmentation (Groundwater)
- 3) Major and Medium Irrigation - Supply Side Management
- 4) Watershed Development - Supply Side Management
- 5) Demand Side Management – Participatory Irrigation Practices
- 6) Demand Side Management – Sustainable on-farm Water Use Practices
- 7) Rural Drinking Water
- 8) Urban Water Supply and Sanitation
- 9) Policy and Governance

Key Performance Indicators

Tracking Water Management Initiatives in States/UTs (Composite Water Management Index)				
State:			Year : 2016-17	
Sr. No.	Key Performance Indicator (KPI)	Unit	Value of KPI	Remarks
1	2	3	4	5
A. Source Augmentation (Restoration of Water Bodies)				
1 (a)	Number of water bodies restored during the Financial Year 2015-16 as compared to total number of water bodies identified for restoration.	%		
1 (b)	Number of water bodies restored during the Financial Year 2016-17 as compared to total number of water bodies identified for restoration.	%		
B. Source Augmentation (Groundwater)				
2 (a)	Percentage of over-exploited and critical blocks to total blocks as on 31.03.2016	%		
2 (b)	Percentage of over-exploited and critical blocks to total blocks as on 31.03.2017	%		
3 (a)	Percentage of areas of major groundwater re-charging identified and mapped for the State as on 31.3.2016?	%		
3 (b)	Percentage of areas of major groundwater re-charging identified and mapped for the State as on 31.3.2017	%		
4 (a)	Percentage of mapped area covered with infrastructure for re-charging groundwater to the total mapped	%		

Tracking Water Management Initiatives in States/UTs (Composite Water Management Index)				
State:			Year : 2016-17	
Sr. No.	Key Performance Indicator (KPI)	Unit	Value of KPI	Remarks
1	2	3	4	5
	area as on 31.03.2016.			
4 (b)	Percentage of mapped area covered with infrastructure for re-charging groundwater to the total mapped area as on 31.03.2017	%		
5	Has the State notified any Act or a regulatory framework for regulation of Groundwater use/ management?	Yes/ No		
C. Major and Medium Irrigation - Supply Side Management				
6 (a)	% of Irrigation Potential Utilized (IPU) to Irrigation Potential Created (IPC) as on 31.03.2016	%		
6 (b)	% of Irrigation Potential Utilized (IPU) to Irrigation Potential Created (IPC) as on 31.03.2017	%		
7 (a)	Total number of major and medium irrigation projects in the State	No.		
7 (b)	Number of projects assessed and identified for the IPC-IPU gap in the State?	No.		
8	Expenditure incurred on works (excluding establishment expenditure) for maintenance of irrigation assets per hectare of command area during the Financial Year 2016-17?	Rs./ ha		
9 (a)	Total length of canal and distribution network in the state vis-à-vis the length of the canal and distribution network lined as on 31.03.2016	%		

Tracking Water Management Initiatives in States/UTs (Composite Water Management Index)				
State:			Year : 2016-17	
Sr. No.	Key Performance Indicator (KPI)	Unit	Value of KPI	Remarks
1	2	3	4	5
9 (b)	Total length of canal and distribution network in the state vis-à-vis the length of the canal and distribution network lined as on 31.03.2017	%		
D. Watershed Development - Supply Side Management				
10	Area under rain-fed agriculture as a percentage of the net cultivated area as on 31.3.2016 or previous year	%		
11	Number of water harvesting structures constructed or rejuvenated as compared to the target (sanctioned projects under IWMP, RKVY, MGNREGS and other schemes) during the Financial Year 2016-17.	%		
12 (a)	Assets created under IWMP	No.		
12 (b)	Percentage of assets created under IWMP geo-tagged as on 31.03.2016	%		
12 (c)	Percentage of assets created under IWMP geo-tagged as on 31.3.2017.	%		
E. Demand Side Management - Participatory Irrigation Practices				
13	Has the State notified any law/ legal framework to facilitate Participatory Irrigation Management (PIM) through Water User Associations (WUAs)?	Yes/ No		
14 (a)	Irrigated Command Area in the State as on 31.03.2016	ha		

Tracking Water Management Initiatives in States/UTs (Composite Water Management Index)				
State:			Year : 2016-17	
Sr. No.	Key Performance Indicator (KPI)	Unit	Value of KPI	Remarks
1	2	3	4	5
14 (b)	Percentage of irrigated command areas having WUAs involved in the O&M of irrigation facilities (minor distributaries and CAD&WM) as on 31.3.2016	%		
14 (c)	Irrigated Command Area in the State as on 31.03.2017	ha		
14 (d)	Percentage of irrigated command areas having WUAs involved in the O&M of irrigation facilities (minor distributaries and CAD&WM) as on 31.3.2017	%		
15 (a)	Total irrigation service fee collected during the financial year 2015-16			
15 (b)	Percentage of Irrigation Service Fee (ISF) retained by WUAs as compared to the fee collected by WUAs during the Financial Year 2015-16.	%		
15 (c)	Total irrigation service fee collected during the financial year 2016-17			
15 (d)	Percentage of Irrigation Service Fee (ISF) retained by WUAs as compared to fee collected by WUAs during the Financial Year 2016-17.	%		
F. Demand Side Management – Sustainable on-farm Water Use Practices				
16 (a)	Area cultivated by adopting standard cropping pattern as per agro-climatic zoning, to total area under cultivation as on 31.03.2016	%		
16 (b)	Area cultivated by adopting standard cropping pattern as per	%		

Tracking Water Management Initiatives in States/UTs (Composite Water Management Index)				
State:			Year : 2016-17	
Sr. No.	Key Performance Indicator (KPI)	Unit	Value of KPI	Remarks
1	2	3	4	5
	agro-climatic zoning, to total area under cultivation as on 31.03.2017			
17 (a)	Has the State segregated agriculture power feeder?	Yes/ No		
17 (b)	Area in the State covered with segregated agriculture power feeder as compared to the total area under cultivation with power supply.	%		
18 (a)	Is electricity to tube wells/ water pumps charged in the State?	Yes/ No		
18 (b)	If yes, then whether it is charged as per fixed charges?	Yes/ No		
18 (c)	If yes, then whether it is charged on the basis of metering?	Yes/ No		
19 (a)	Total Irrigated Area in the State as on 31.03.2016	ha		
19 (b)	Area covered with micro-irrigation systems as compared to total irrigated area as on 31.03.2016.	%		
19 (c)	Total Irrigated Area in the State as on 31.03.2017	ha		
19 (d)	Area covered with micro-irrigation systems as compared to total irrigated area as on 31.03.2017	%		
G. Rural Drinking Water				
20 (a)	Proportion of total rural habitations fully covered with drinking water supply as on 31.03.2016.	%		
20 (b)	Proportion of total rural habitations fully covered with drinking water supply as on 31.03.2017.	%		

Tracking Water Management Initiatives in States/UTs (Composite Water Management Index)				
State:			Year : 2016-17	
Sr. No.	Key Performance Indicator (KPI)	Unit	Value of KPI	Remarks
1	2	3	4	5
21 (a)	% reduction in rural habitations affected by Water Quality problems during the Financial Year 2015-16	%		
21 (b)	% reduction in rural habitations affected by Water Quality problems during the Financial Year 2016-17	%		
H. Urban Water Supply and Sanitation				
22 (a)	% of urban population being provided drinking water supply as on 31.03.2016	%		
22 (b)	% of urban population being provided drinking water supply as on 31.03.2017	%		
23 (a)	Total estimated generation of waste water in the urban areas as on 31.03.2016	Vol./ cum		
23 (b)	Capacity installed in the state to treat the urban waste-water as a proportion of the total estimated waste water generated in the urban areas of the state as on 31.03.2016	%		
24 (a)	% waste-water treated during 2015-16	%		
24 (b)	% waste-water treated during 2016-17	%		
I. Policy and Governance				
25	Whether the State has enacted any legislation for protection of waterbodies and water-supply channels and prevention of encroachment into/on them?	Yes/ No		

**Tracking Water Management Initiatives in States/UTs
(Composite Water Management Index)**

State:		Year : 2016-17		
Sr. No.	Key Performance Indicator (KPI)	Unit	Value of KPI	Remarks
1	2	3	4	5
26	Whether the State has any framework for rain water harvesting in public and private buildings?	Yes/no		
27 (a)	Percentage of households being provided water supply and charged for water in the urban areas as on 31.3.2016?	%		
27 (b)	Percentage of households being provided water supply and charged for water in the urban areas as on 31.3.2017?	%		
28 (a)	Does the State have a separate integrated Data Centre for water resources?	Yes/No		
28 (b)	Whether the data is being updated on the integrated data centre on a regular basis?	Yes/No		

Water Management Index
Explanatory Notes for various Key Performance Indicators

Sr. No.	Key Performance Indicator	Explanatory Notes
A. Source Augmentation (Restoration of Water Bodies)		
1 (a)	Number of water bodies restored during the FY 2015-16 as compared to total number of water bodies identified for restoration.	Achievement on restoration of water bodies under various schemes such as PMKSY, IWMP, MGNREGS and other Centrally Sponsored Schemes; and also under State Plans/ programmes need to be reported. Progress Report of the State may be referred for the data.
1 (b)	Number of water bodies restored during the FY 2016-17 as compared to total number of water bodies identified for restoration.	
B. Source Augmentation (Groundwater)		
2 (a)	Percentage of over exploited and critical blocks to total blocks as on 31.03.2016	Central Ground Water Board, Dynamic Groundwater Resources of India, 2011; and other reports of the States and the MoWR, RD&GR may be referred to. Improvement in performance (reduction of over-exploited and critical blocks) would be considered for scoring.
2 (b)	Percentage of over exploited and critical blocks to total blocks as on 31.03.2017	-do-
3 (a)	Percentage of areas of major groundwater re-charging identified and mapped for the State as on 31.3.2016?	Geo-coordinates need to be indicated on the mapped areas.
3 (b)	Percentage of areas of major groundwater re-charging identified and mapped for the State as on 31.3.2017	
4 (a)	Percentage of mapped area covered with infrastructure for re-charging groundwater to the	

Sr. No.	Key Performance Indicator	Explanatory Notes
	total mapped area as on 31.3.2016?	
4 (b)	Percentage of mapped area covered with infrastructure for re-charging groundwater to the total mapped area as on 31.3.2017?	
5	Has the State notified any Act or a regulatory framework for regulation of Groundwater use/management?	Data source: Notification of the State Government
C. Major and Medium Irrigation - Supply Side Management		
6 (a)	% of Irrigation Potential Utilized (IPU) to Irrigation Potential Created (IPC) as on 31.03.2016	Data source - Reports of the Ministry of Agriculture and Farmers Welfare; the Ministry of Water Resources, River Development and Ganga Rejuvenation and the concerned State Government.
6 (b)	% of Irrigation Potential Utilized (IPU) to Irrigation Potential Created (IPC) as on 31.03.2017	
7 (a)	Total number of major and medium irrigation projects in the State	A total of 143 projects completed under AIBP and other non-AIBP projects across the country need to be examined for the IPC-IPU gap. The gap of 12.40 million ha in the sector of MMI and 3.29 million ha in the sector of Minor Irrigation (Surface) has been reported in the country. There may be certain other projects implemented by the State Government, which may also be included in the information.
7 (b)	Number of projects assessed and identified for the IPC-IPU gap in the State?	
8	Expenditure incurred on works (excluding establishment expenditure) for maintenance of irrigation assets per hectare of command area during the Financial Year 2016-17?	(a) Establishment expenditure such as salary, office expenses, travelling expenses etc. should be excluded. (b) Command area as per irrigation potential created. (c) Deviation from the maintenance norm

Sr. No.	Key Performance Indicator	Explanatory Notes
		indicated by the 13 th Finance Commission (adjusted for inflation) would be the criteria for awarding the score.
9 (a)	Total length of canal and distribution network in the state vis-à-vis the length of the canal and distribution network lined as on 31.03.2016	(a) Conveyance efficiency is enhanced substantially by converting the unlined sections of the canal network into lined sections.
9 (b)	Total length of canal and distribution network in the state vis-à-vis the length of the canal and distribution network lined as on 31.03.2017	(b) The data on lined canal network may be obtained from the Reports of the concerned State Government.
D. Watershed Development - Supply Side Management		
10	Area under rain-fed agriculture as a percentage of the net cultivated area as on 31.3.2016 or previous year	(a) The objective is to bring more and more area under assured irrigation. (b) Agriculture Statistics at a Glance and other reports of the Ministry of Agriculture and Farmers Welfare may be referred to for the data.
11	Number of water harvesting structures constructed or rejuvenated as compared to the target (sanctioned projects under IWMP, RKVY, MGNREGS and other schemes) during the Financial Year 2016-17.	Achievement of target set for construction/rejuvenation of water harvesting structures under IWMP, RKVY, MGNREGS and other schemes for the year needs to be reported by the State.
12 (a)	Assets created under IWMP	Total number of assets created under IWMP is to be reported.
12 (b)	Percentage of assets created under IWMP geo-tagged as on 31.03.2016	Inventory of assets with their geo-coordinates needs to be put in place.
12 (c)	Percentage of assets created under IWMP geo-tagged as on 31.3.2017.	

Sr. No.	Key Performance Indicator	Explanatory Notes
E. Demand Side Management – Participatory Irrigation Practices		
13	Has the State notified any law/ legal framework to facilitate Participatory Irrigation Management (PIM) through Water User Associations (WUAs)?	The objective is to promote active participation of the farmers in operation and maintenance of the created irrigation infrastructure and also in achieving the best-possible water-use efficiency.
14 (a) and 14 (c)	Irrigated Command Area in the State	Total irrigated command area is required to be reported
14 (b)	Percentage of irrigated command areas having WUAs involved in the O&M of irrigation facilities (minor distributaries and CAD&WM) as on 31.3.2016	% of command areas where WUAs, registered under the relevant Act, are engaged in operation and maintenance of irrigation facilities (minor distributaries & CAD&WM) need to be reported.
14 (d)	Percentage of irrigated command areas having WUAs involved in the O&M of irrigation facilities (minor distributaries and CAD&WM) as on 31.3.2017	
15 (a) and (c)	Total irrigation service fee collected during the financial year 2015-16	WUAs need to be strengthened by allowing them to retain part of the Irrigation Service Fee collected from the farmers, as per the Act/Rule notified by the concerned State Government for promoting Participatory Irrigation Management.
15 (b)	Percentage of Irrigation Service Fee (ISF) retained by WUAs as compared to the fee collected by WUAs during the Financial 2015-16.	
15 (d)	Percentage of Irrigation Service Fee (ISF) retained by WUAs as compared to fee collected by WUAs during the Financial 2016-17.	

Sr. No.	Key Performance Indicator	Explanatory Notes
F. Demand Side Management – Sustainable on-farm Water Use Practices		
16 (a)	Area cultivated by adopting standard cropping pattern as per agro-climatic zoning, to total area under cultivation as on 31.03.2016	Reports of the Ministry of Agriculture and Farmers Welfare; and the Agriculture Department of the State may provide the data on cropping pattern as per agro-climatic zoning.
16 (b)	Area cultivated by adopting standard cropping pattern as per agro-climatic zoning, to total area under cultivation as on 31.03.2017	
17 (a)	Has the State segregated agriculture power feeder?	Separation of agriculture and non-agriculture power feeders facilitates judicious rostering of power supply to agricultural and non-agricultural consumers in the rural areas.
17 (b)	Area in the State covered with segregated agriculture power feeder as compared to the total area under cultivation with power supply	
18 (a)	Is electricity to tube wells/ water pumps charged in the State?	A Score of 1 would be awarded for metered power supply and 0.5 for flat rate charges
18 (b)	If yes, then whether it is charged as per fixed charges?	
18 (c)	If yes, then whether it is charged on the basis of metering?	
19 (a)	Total Irrigated Area in the State as on 31.03.2016	Use of micro-irrigation systems i.e. drip and sprinkler need to be promoted.
19 (b)	Area covered with micro-irrigation systems as compared to total irrigated area as on 31.03.2016.	
19 (c)	Total Irrigated Area in the State as on 31.03.2017	
19 (d)	Area covered with micro-irrigation systems as compared	

Sr. No.	Key Performance Indicator	Explanatory Notes
	to total irrigated area as on 31.03.2017	
G. Rural Drinking Water - Supply		
20 (a)	Proportion of total rural habitations fully covered with drinking water supply as on 31.03.2016.	A habitation is considered fully covered with drinking water supply when all its inhabitants are provided drinking water of good quality at the rate of minimum 40 litres per capita per day.
20 (b)	Proportion of total rural habitations fully covered with drinking water supply as on 31.03.2017	
21 (a)	% reduction in rural habitations affected by Water Quality problems during the Financial Year 2015-16	(a) Data sources: Reports of the States and the Ministry of Drinking Water and Sanitation. (b) % reduction in rural habitations affected by Water Quality problems (Arsenic and Fluoride affected habitations) during the Financial Years 2015-16 and 2016-17 need to be reported.
21 (b)	% reduction in rural habitations affected by Water Quality problems during the Financial Year 2016-17	
H. Urban Water Supply and Sanitation		
22 (a)	% of urban population being provided drinking water supply as on 31.03.2016	Population in urban areas, as defined in the census report, being provided drinking water supply need to be reported.
22 (b)	% of urban population being provided drinking water supply as on 31.03.2017	
23 (a)	Total estimated generation of waste water in the urban areas as on 31.03.2016	(a) Capacity installed under Namami Gange, NRCP and other Centrally Sponsored Schemes; and also under State Plans/programmes needs to be reported. (b) Discharge of untreated sewage from the urban areas is one of the largest sources of pollution in rivers. It is required to bridge the gap between the sewage
23 (b)	Capacity installed in the state to treat the urban waste-water as a proportion of the total estimated waste water generated in the urban areas of the state as on 31.03.2016	

Sr. No.	Key Performance Indicator	Explanatory Notes
		generation and the sewage treatment capacity.
24 (a)	% wastewater treated during 2015-16	Proportion of wastewater generated from the urban households that undergoes different (primary, secondary and tertiary) levels of treatment before getting discharged to the aquatic environment.
24 (b)	% wastewater treated during 2016-17	
I. Policy and Governance		
25	Whether the State has enacted any legislation for protection of waterbodies and prevention of encroachment into/on water bodies?	-
26	Whether the State has any regulatory framework for rain water harvesting in public and private buildings?	-
27 (a)	Percentage of households being provided water supply and charged for water in the urban areas as on 31.3.2016?	Households in urban areas, as defined in the census report, being provided water supply and charged for water need to be reported.
27 (b)	Percentage of households being provided water supply and charged for water in the urban areas as on 31.3.2017?	
28 (a)	Does the State have a separate integrated Data Centre for water resources?	Updated data-base is needed annually for planning and implementing appropriate interventions to manage water resources scientifically.
28 (b)	Whether the data is being updated on the integrated data centre on a regular basis?	

Ranking Methodology

(Methodology for ranking of the States based upon performance against KPIs)

1. Score against the Key Performance Indicators (KPIs) - S_i ($i = 1$ to 28)
 - (a) For the unit of measurement 'Yes/No', a State having response 'Yes' would be awarded a score of '1' and the State having 'No' response would be awarded '0'.
 - (b) The scoring assigns importance to improvement on identified KPIs during the year. For improved performance during the 2016-17 over 2015-16, score in terms of percentage increase in improvement would be awarded.
 - (c) For the unit of measurement in absolute numbers, a State will be awarded the score on a range of 1 to 5 where 1 relates to the lowest performance and 5 to the highest. Others would be awarded proportionately.
2. Weightage to the indicators - W_i ($i = 1$ to 28)
 - (a) The weightage to the various sections is under:-

Section	Weightage
Source Augmentation (Restoration of Water Bodies)	5
Source Augmentation (Groundwater)	15
Major and Medium Irrigation (Supply Side Management)	15
Watershed Development (Supply Side Management)	10
Demand Side Management – Participatory Irrigation Practices	10
Demand Side Management – Sustainable on-farm water-use practices	10
Rural Drinking Water – Supply and Demand Side Management	10
Urban Water Supply and Sanitation	10
Policy and Governance	15
Total	100

- (b) Each Indicator in a section would be assigned equal weightage i.e. total weightage for the section/no. of indicators in the section.
3. Composite Score

$$\text{Composite score for a State} = \frac{\sum_{i=1 \text{ to } 28} (S_i \times W_i)}{\text{Max } S_i}$$

Key Steps for Assessment and Timelines

Key activities involved in the process of preparing Composite Water Management Index for the States/UTs and timelines for completion of those activities are given below:-

Sl. No.	Activity Description	Implementing Agency	Completion Date
1	Organization of Workshops to sensitize and support the States in preparing the index. During these workshops, importance of the identified KPIs, data sources for the KPIs and the ranking methodology would be explained.	NITI Aayog, MoWR,RD&GR	30.04.2017
2	Development of an online portal for the States/UTs to provide data, validate data and develop index	NITI Aayog	30.04.2017
3	Uploading of data/value for various KPIs on the web portal	States/UTS	30.07.2017
4	Validation of data by independent agency	NITI Aayog, States/UTs	30.09.2017
5	Finalization of data and preparation of composite water management index for the States/UTs	NITI Aayog, MoWR,RD&GR, State/UTs	30.11.2017
6	Uploading of composite water management index prepared for the States/UTs and other related information on the webportal	NITI Aayog	31.12.2017
7	Overall coordination and management	NITI Aayog	-