

I/84660/2022

भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन नदी विकास एवं गंगा संरक्षण
विभाग
केंद्रीय जल आयोग
सॉफ्टवेयर प्रबंधन निदेशालय



Government of India
Ministry of Jal Shakti
Dept. of Water Resources, RD&GR
Central Water Commission
Software Management Directorate

To,

All Directors/SEs, CWC

Sub: Integrated Water and Crop Information and Management System (IWCIMS) Advisory and Monitoring Committee - Compilation of project details documents for IT systems.

Ref: i) OM No. X-72012/2/2019-O/o DIR(NWIC)/2846-2865 Dated 22.11.2021 from DoWR, RD & GR regarding Constitution of IWCIMS Advisory & Monitoring Committee.

ii) Brief Introduction of “Integrated Water and Crop Information and Management System (IWCIMS)”

iii) “Project Details Document” template from NWIC vide email dated 10.01.2022 addressed to the Chairman, CWC.

Sir,

The department of water resources RD and GR has constituted above mentioned high level committee wherein the Member (D&R), CWC, is a member of the committee. Copy of the OM stating composition of the Committee and the Terms of Reference is attached herewith (Annex-I). To understand the background of this initiative, a document titled “Integrated Water and Crop Information and Management System (IWCIMS) is also attached (Annex-II).

In order to achieve convergence of all IT initiatives, remove duplication and ensure development of an integrated water and crop information and management system a “Project Details Document” is attached herewith (Annex-III) which has to be filled by all the concerned Organizations/ Directorates of CWC for all the projects with existing Information Technology (IT) systems and also for other projects not having the IT systems.

Following projects with existing IT systems/ portals are already being compiled by SMD with information from the concerned project nodal officers/Directorates:

1. Flood Forecast Advisory 5 Days (FCA-II Dte.)
2. Flood Forecasting (FFM Dte.)
3. Dharma (DSM Dte.)
4. ePAMS (PA(C) Dte.)

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●जल संरक्षण-सुरक्षित भविष्य●



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●Conserve Water- Save Life●

All organisations/Directorates are hereby requested to provide details of their projects & data (with or without IT systems) which can be associated with IWCIMS. The details to be provided in the attached format of "Project Details Document".

The details may kindly be sent to this office by 15th February, 2022. For any clarification or discussion in the matter, this office may please be contacted.

This issue with the approval of CE(DSO), CWC.

Encl: A/a

Yours Sincerely,

(S D Sharma)
Director

Copy for kind information to:

1. CEs, CWC
2. PPS to the Chairman, CWC
3. PPSs to the members, CWC

IWCIMS
F.No. X-72012/2/2019-O/o DIR (NWIC)/2846-2865
Government of India
Ministry of Jal Shakti
Department of Water Resources RD & GR

New Delhi
Dated: 22.11.2021

OFFICE MEMORANDUM

Subject: Constitution of Integrated Water and Crop Information and Management System (IWCIMS) Advisory & Monitoring Committee.

In supersession of the OM of even number dated 10.11.2021, approval of the competent authority has been obtained to constitute an IWCIMS Advisory & Monitoring Committee with the following composition and terms of reference:

Composition

S. No.	Name	Designation
1.	Shri Sriram Vedire, Adviser to MoJS	Chairperson
2.	Mission Director, NWM	Member
3.	Member (D&R), CWC	Member
4.	Chairman, CGWB	Member
5.	Joint Secretary (Admin, IC & GW), DoWR, RD & GR	Member
6.	ED (Technical), NMCG	Member
7.	CMD, WAPCOS	Member
8.	Shri Sultan Singh, CGO, (GMDA) & PS (HARSAC, Haryana)	Member
9.	Shri PV Raju, Sc. G & Head, WR Division, NRSC	Member
10.	Dr. Sanjay Kumar, Scientist-E, NIH	Member
11.	Shri Rakesh Kashyap, SJC, NHP	Member
12.	Shri Naveen Kumar Patle, Additional Commissioner (Horticulture), D/o A&FW	Member
13.	Shri Shambhu Azad, CED, WAPCOS	Member
14.	Director, NIC, DoWR, RD & GR	Member
15.	Director, NWIC	Member Secretary

CE IAO
20/11

Terms of Reference:

The Committee will make recommendations with regard to:

- i. A single system for all water, crop and weather-related parameters (as envisioned in the planning of the proposed system) covering all the programs/schemes/missions/activities of the Ministry and also serve as a single interface with all the related systems of other Ministries/Organizations of GoI and State Governments.
 - ii. Integration of all the processes and data flows of all the programs/schemes/missions/activities of all the Wings/Departments of the Ministry into the proposed system.
 - iii. Synergize data flows of MoJS with related external systems of other Wings/Departments/Ministries of GoI and State Governments.
 - iv. Model MOUs of MoJS with State Governments and with external entities and agencies to ensure the strength, integrity, authenticity and interoperability etc. of the data and related functionality.
 - v. Efficient planning of all phases of the project and relevance of planned modules with respect to the data relevance and functionality and suggesting modifications, if any.
 - vi. Pilot projects for PoC study and developing a prototype during the design phase of the proposed IWCIMS system.
 - vii. Bringing data flows of all the R&D initiatives, pilot projects based on new technological innovations etc. undertaken by MoJS into the proposed system.
 - viii. Any other aspect that is considered essential to achieve the objective mentioned above.
2. The Committee will submit its report to the Secretary, Ministry of Jal Shakti.
 3. Secretariat Assistance to the Committee will be provided by NWIC.

(K.H. Sivaramakrishnan)

Under Secretary to the Government of India(NHP)

To:

1. Adviser to Hon'ble MoJS
2. All the Members of the Committee

Copy To:

1. PS to Hon'ble Minister (Jal Shakti)/PS to Hon'ble MoS (Jal Shakti)
2. PPS to Secretary DoWR/Additional Secretary
3. PPS to JS(RD&PP)/JS(Admn. IC & GW)

Integrated Water and Crop Information Management System (IWCIMS)

The Cloud-enabled digital platform is envisaged to have an *Integrated Water and Crop Information & Management (Decision Support system)* which would act as a single authoritative system for all the Water, Agriculture and Weather-related parameters. Currently, a vast amount of hydrological and hydro-meteorological data sets has been collected under the WIMS platform by the state and central agencies. These data sets have been disseminated through India WRIS. This phenomenal development has cumulated a huge amount of hydrological and meteorological data sets and made them available to the public in general and researchers in particular. However, decision-makers and planners are facing an issue of analyzed results. How to handle a huge amount of data to bring into meaningful insights from the same for various decision-making processes is still a big issue before the planners. Integrated Water and Crop Information Management System is an answer for this issue.

In the initial stages of the development of previous platforms for the database, hydrologists for solving the issues related to the water resources sector exclusively used it. However, the urge of the Nation to combat the climate changes and their impact as well as to make agriculture more inclusive to become self-sufficient in food production, crop information is also an essential item to deal with. This prompted planners to develop an integrated platform of Integrated Water and Crop Information Management System. It is envisaged to foster the growth of water, agriculture and forestry output through this integrated approach. This integrated platform will analyze a huge amount of water resource and crop data to provide analyzed results to the planner and decision-makers so that information-based decisions can be taken by planners.

This decision support platform will help administrators, planners, decision-makers and scientists through seven (07) thought-out modules.



Integrated Reservoir Management



Integrated water resource management approaches ensure water withdrawals respect basin-level thresholds, including through transboundary cooperation where relevant. This helps to limit water stress levels.

This module will help in earmark all the reservoirs of India and help in its day-to-day operations in an automated way. The platform provides and an analyzing tool for estimating the inflows and outflows, various prioritized allocations. It will operators of the reservoir in coming out of the age-old practice of MS office spreadsheet-based planning to real-time automated planning by using multiple data sets simultaneously. The various dashboards created for the module will allow decisions makers to view

and assess data sets irrespective of the geography they are in. Automated rule curve-based allocations, flood forecasting and alarm generations are some of the key features of this module.

Block Level Crop Planning

This module will amaze all the data related to crop. The module will help in crop planning as it is integrating crop water requirements, market forecasting, weather information, etc. to the grass root levels. Managers and planners in the agricultural industry will be able to plan their activities near real-time information on economic aspects as well as crop yield simulations. As the module follows a demand-driven approach of the agriculture planners at block levels can view their areas in terms of crop diversity, water requirement, optimization of water and plan for intercropping. Planners at the grass route level can follow an integrated farming practice of cropping, rearing livestock, develop fisheries all together so that their combined effect will improve the livelihood of the people involved as real-time pricing and other demand information is readily available with them. The dashboard developing for the decisions makers will help them where to interfere in what way and help them to grow more products most profitably.



Village Level Water Balance

This module of IWCIMS will evaluate the water availability and water requirement on a village level. Various forecasts and models will be used to evaluate water availability on a village level. Water requirements for various purposes will also be automated through the data assimilation and estimation automation process.

This will enable the planners and decision-makers to assess the village is water positive or deficient. The deficiency will thus be address by water conservation measures. The module will allow the users to evaluate existing water conservation measures and this GIS-based platform will help planners in selecting sites for additional conservation structures more technically and scientifically in an automated environment. This will be a ready tool for the decision-makers to decide how much water needs to be conserved and to distribute the conserved water more equitably. The module will be a helpful hand in bringing additional water from the water-positive areas nearby. The platform will help in locating such water surplus areas in the nearest location.



Water Security Plan

This is one of the key modules which provide water security to the community. This module will be used mainly by planners and decision-makers and authorities responsible for providing safe drinking and other purposes water to the community. This module will provide a profile of each panchayat from a water auditing point of view. After an initial water availability and demand analysis in an automatic way, GIS-based maps will be created based on water availability into water surplus, water-deficient and water-sufficient area polygons. Here analysis can be done to priorities the deficient areas for water security plans. The possibility of additional conservation as well as importing water from nearby surplus areas can be planned through the dashboard of this module. Also, the module allows rationalization of the demand and equitable distribution of water to the community.

Smart Grid Water Transfer

The smart grid water transfer module will help planners and decision-makers in water distribution tenements. Through the database, minor irrigation structures will be made visible to the planners along with their command areas and water requirement. Early warning systems of the other modules will be employed here to assess the drought susceptibility of these irrigation systems to drought. This will enable planners to plan to fetch the nearest reliable source visible to them through a dashboard. GIS enables distribution system and drain will help in planners to route out an optimal route to bring water to minor irrigation tanks their save the crops and economy. This technology-driven approach will help them to plan water transfer from the surplus basin through the inter-basin transfer process.



Drought Management

This module uses its automated early warning systems and analysis of historical maps leads to drought susceptibility mapping will help planners in identifying drought-prone areas well in advance and prepare for the mitigation measures. The platform will allow scientists to estimate various meteorological, hydrological and groundwater drought indices and also a possibility of the analysis of a compound indexing. Satellite image-driven technologies of the module will help in early signs of drought through NVDI and NDWI indices on a pan-India basis. Drought can be monitor, characterized and impact can be assessed and all the results will be available to the decisions makers and administrators for the planning activities.



An underwater photograph showing a clear blue sea. A translucent plastic bag is floating near the surface, partially visible at the top of the frame. The water is slightly rippled, and the lighting is natural, suggesting daylight.

Pollution and Quality Management

This is an important module of the IW-CIMS. The huge amount of water quality data lying in various platforms will be analysed here on a standardization process so that planners will get an idea of the water quality exceedance locations with respect to BIS and other standards assigned for the same. The mode will treat surface water and ground water separately as the dynamicity of these two resources is different as far as the water quality is concerned.

Real-time monitoring of the water quality is made available to the planners through various dashboards of the module. An automated water quality index proposed in this module will give an overall idea of the water quality scenarios to the planners. Groundwater quality data will also undergo a similar process and areas with hazardous quality will be flagged to the decision-makers to bring water from nearby safe locations. Groundwater pollution will be indexed through a vulnerability index which will help decision-makers to safeguard against further deterioration of the groundwater quality.

Apart from the design, development and creation of DSS modules, the enhancement of the existing WRIS is also an important mandate. The Ground Water Information System (GWIS) would be a major highlight of the system.

Groundwater Information System

In the current scenario, the Ground water data related to the Ground water exploration, Geophysical Investigation and Pumping Test is captured. There is a strong need of predictive analysis on the data captured.

IWCIMS's analytical capabilities will ensure an intelligent insight into the captured data. It is one of the key features of the IWCIMS. In this module all ground water related data captured using WIMS platform will be analyzed. This module act as a data-analyzing platform for scientist and technocrats who works on ground water domain for their day-to-day operations and the worked-out results will be published on a dashboard for the decision makers and planners.

The present and historic ground water levels collected through the field programs will be analyzed in this platform for water logging, groundwater level trends, and seasonal as well as long term fluctuations of the ground water levels. The published results this one analysis alone will help in planners who work on augmentation of groundwater through artificial recharge to select sites, methods and identifying source for the same. Another important feature of this module is preparation of a composite log. Drill time data such as drill time, lithology, drill time discharge, geophysical logs, well assembly within a single chart to facilitate scientist for their day-to-day report general as well as those involved in ground water exploration work.

GWIS	Aquifer Mapping
	Aquifer Management
	Fence and Cross Sectional Diagram
	Geophysical Investigation
	GIS Functionality
	Ground Water Vulnerability Maps
	Hydrological Map
	Pumping Test Analysis
	Statistical Functions

Figure 3: GWIS Indicative Modules

Another fascinating feature of this module is to analyzing all the pumping test data for the generation aquifer factors such as transmissivity, store capacity, specific yield, well functions, hydraulic conductivity etc. which is done manually till this date. This module has a wide variety of features to process various geophysical, hydrogeological data set to create user controlled hydrogeological cross sections, fence diagrams, creation of various indices like groundwater drought index, vulnerability index etc. This module will provide planners and decision makers a wide variety of data tools and dashboards, which enable them to protect and sage guard this precious resource as well as ensuring that development works are not hampering.



Project Details Document

Instructions to fill the document:

- 1) This document needs to be separately filled for each and every project (scheme/mission/program/project) by each and every agency (wing/division/mission/department/organization) in the Ministry of Jal Shakti.
- 2) The responsibility of filling this document(separately for each and every project as mentioned above) is as follows.
 - a. If the organization (ex: CWC, NMCG, CGWB etc.) is handling the project (ex: NAQUIM of CGWB), they will have to fill this.
 - b. If any wing of the Ministry is handling the project (ex: SBA, JJM by DDWS; NHP by DoWR etc.), project details shall be filled by the respective wing.
 - c. The Project details document shall be approved by the head of the organisation and in case of any wing of the ministry, it shall be approved by the head of the wing not below the rank of an officer of JS / CE.
- 3) The filled in project details documents are **considered to be officially certified** by your wing/division/mission/department/organization. Ministry will be requested by this committee to convey this message to all the concerned senior officers.
- 4) This document is only for all the wings/divisions/missions/departments/organizations) **under the Ministry of Jal Shakti (MoJS)**. A separate document will be provided to the outside agencies/departments of GOI and State Governments.
- 5) The details requested under all the sections needs to be **subjective, descriptive, elaborative and exhaustive**. Please do not answer objectively like 'yes/no/alright'.
- 6) Wherever possible, please **use tabular format** in presenting the details.
- 7) Please ensure that all **your IT and technical teams are well consulted** while filling all the project details documents.
- 8) Please submit all the project details documents in about 15 days, that is by 10th January 2022.

Project Details Document

1. Agency (wing/division/ mission/department/organization) Profile:

Name of the agency	
Name of the in-charge officer (director level) with designation, contact no. and e-mail	
Name of project nodal officer with designation, contact no. and e-mail	
Office Address	
Type of Organization (Department/PSU/Society/Organization/Mission/Any Other (please mention))	
Other Telephone Number(s); E-mails	
Web-Site (if any)	

2. List out all the projects (schemes/missions/programs/projects) of your agency (wing/division/mission/department/organization). Present all this information subjectively in a tabular format.

- a. List the projects into two groups –
 - i. one is the list of the projects having existing IT systems (give the basic details of the IT system) and
 - ii. the second is the list of the projects not having IT systems.
- b. For each of the projects in the above two groups, give the details of the project's purpose/objectives/goals. Also identify if the project falls within the gambit of any (one or more) of the presently planned modules of the IWCIMS system or not.

3. Projects with existing IT systems:

Fill this document separately for each of the projects falling under this category. Present all this information subjectively in a tabular format.

Project Details Document

- a. Brief about existing IT systems(give details of each existing IT system of the given project/scheme/mission/program of the organization)

S.no.	Parameters	Details
1.	Name of program, project, mission or scheme being implemented	
2.	Name of corresponding IT system	
3.	URL of existing IT system	
4.	List of functionalities for water management and related activities being provided	
5.	Existing business requirements and functionalities being provided through the existing IT systems	
6.	Envisaged business requirements and functionalities planned to be provided through the existing IT systems	
7.	Operational Model (In-house/Outsourced/ PPP)? Hosting of the application?	
8.	(i) Existing sources, channels & formats of data. Is data manual or automatic? (ii) Explain how the data is considered authentic? (iii) Challenges faced with respect to quality of data being captured? (iv) If the data is considered to be not authentic, propose solutions on how to make it authentic in order to achieve	

Project Details Document

	<p>the desired outcomes of your IT system?</p> <p>(v) List all the identified stakeholders with whom you have data dependency or data interaction with (ex: MoA, CPCB, SPCB's, IARI, NRSC, IMD, Satellite, Bhuvan, MI census, telemetry, MGNREGS and States etc.)?</p> <p>(vi) Mention the impediments in the data interaction with all of the above and how you can find solutions by taking advantage of integration with the planned IWCIMS system?</p>	
9.	<p>For all the data streams indicated above, explain whether you are performing data migration, portability, conversion, extraction, linking, sharing, loading and/or integration?</p>	
10.	<p>Provide metadata (descriptive metadata, structural metadata, administrative metadata, reference metadata and statistical metadata etc.) for all the datasets being used in your system?</p>	
11.	<p>Data accessibility and integration approach (for each):</p> <ul style="list-style-type: none">(i) Public domain(ii) Limited access(iii) Downloadable(iv) With Integration thorough APIs(v) Any other	

Project Details Document

12.	Expected outcomes, required inputs and identified processes involved for each outcome. Please tabulate starting from highest priority to lesser priority.(<i>see Annexure-I below for an example</i>)	
13A	Future plans for the existing IT system (new system/ enhancement of existing)	
13B	Plans with timelines for upgrade / improvements in data clearly stating parameter wise current state and future plans on data frequency, data density (no of measuring stations in basin, sub basin etc) and data resolution.	
14.	How you wish to leverage the data for decision support?	
15.	Future roadmap with respect to information systems and data management?	
16.	IT System nodal officer details (name, contact no. and e-mail)	

Annexure-I: Format of an example use case with expected outcomes, identified inputs and identified processes:

(Please prioritise the use cases and expected out comes i.e. high priority use cases and out comes shall be stated first followed by rest in order of priority)

Example Use case: Village Level water Budgeting

S. No.	Expected Outcomes	Required Inputs	Identified processes
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Project Details Document

1.	Village wise water availability	Rainfall, geo-spatial details of water bodies and water sources (both surface & ground)	Calculation of water levels, Works management
2.	Village wise water demand	Demographic & livestock data, crop data, Soil data	Calculation of water consumption, Demand forecasting
3.	Water balance	Ground water data, Water quality data	Calculation of water losses, water balance
4.	Managing water deficit	Alternate water sources, Forest data	Rain water harvesting, Afforestation, IEC campaigns, Prioritization
5.	Planning for future needs and adaptation of climate change	Meteorological data, IoT devices, Reports	Data analytics, Predictive modelling, Route optimization

4. Projects without existing IT systems:

- a. Repeat the same format given in section 3 above (minus the existing IT system particulars) to fill in all the relevant details. Since there is no 'existing' IT system, give the details of 'envisaged' or 'expected' for all the parameters listed? Provide details about expected outcomes and associated inputs & processes also as shown in annexure-I above?
- b. What are your expectations from the IWCIMS initiative? Explain in detail, how your expected or envisaged IT systems can be made part of this

Project Details Document

IWCIMS initiative? What are your proposals for adding new modules or updating of the presently planned modules in order to achieve your expected outcomes?

5. **For every expected outcome of each existing or expected module, define your contribution in terms of:**
- i. Inputs (data, other resources)
 - ii. Processes (work flows, business rules, calculations)
 - iii. Output (measurable outcomes, KPIs, targets, plans)