



# CAPACITY BUILDING OF ENGINEERS ON INTEGRATED WATER RESOURCES MANAGEMENT (IWRM)



*Increasing Water Use Efficiency – The Need of the Hour  
Improving Water Productivity – The Goal to be Achieved*

Advanced Centre for Integrated Water Resources Management (ACIWRM)  
Water Resources Department (WRD)

## Need for IWRM

The case for Integrated Water Resources Management (IWRM) is getting stronger, year after year, and is a challenge as it has to address sectoral interests and requires that the water resource is managed holistically for the benefits of all stakeholders.

IWRM offers a guiding conceptual framework with a goal of sustainable management and development of water resources. Understanding cross sectoral water demands and the integration processes to address the water scarcity can be achieved only through Integrated Water Resources Management.

IWRM promotes the coordinated development and management of water, land and related resources to maximise economic and social benefits in an equitable manner without compromising the sustainability of vital ecosystems.

Capacity building of the section officers (Junior/ Assistant Engineers) and sub-

divisional heads (Assistant Executive Engineers) by training them more intensively and sensitizing the senior level Engineers (Executive Engineers, Superintending Engineers and Chief Engineers) is essential to manage the available water resources in the best possible way, in order to enhance the water-use efficiency and improve the water productivity.

There is a need to introduce the concepts and principles of Integrated Water Resources Management and other practically relevant thematic trainings for achieving the desired results of improved water resources management and increased availability of water to larger population and meeting the present needs of the society at large.

Government of Karnataka, Government of India and Asian Development Bank agreed to train 600 Engineers (200 women) on IWRM by 2021 and 200 Engineers (75 women) by end of 2018 as part of Karnataka Integrated and Sustainable Water Resources Management Investment Programme (KISRWMIP).



## Curriculum Development

Training Needs Assessment (TNA) facilitated by an international expert from UNESCO-IHE, The Netherlands and Principal Secretary, WRD along with functionaries of WRD and Administrative Training Institute (ATI), resulted in identifying major themes to be included for training the WRD engineers first and later other line department staff related to water resources. It emerged that the emphasis be more on sustainability, distribution and management of water resources for efficient water use with improved water productivity across sectors with due priority to policy, gender, people's participation and data management. Training of farmers and other end-users also was emphasized.

Recognising the importance of IWRM, "Advanced Centre for Integrated Water Resources Management (ACIWRM)" under the aegis of WRD, GoK planned to build the capacity of engineers of different agencies of WRD, viz., KNNL, KBJNL, VJNL, CNNL, CADA, ACIWRM, KERS, WALMI, WRDO, etc.

ACIWRM held discussions with premier academic and research institutions, namely, Indian Institute of Science (IISc); University Visveswaraya College of Engineering (UVCE); BMS College of Engineering; BLDE College of Engineering; Visveswaraya Technological University; Bhoomaraddi College of Engineering and Technology to develop the IWRM training programme. The focus of these institutions was more on technical aspects of water resources engineering and holistic view on water resources management on socio-economic, legal, governance and people's

participation was limited. Hence it was decided that ACIWRM will develop the curriculum on IWRM and identify suitable agencies to deliver the training.

ACIWRM developed the IWRM curriculum keeping in view the TNA outputs, appropriate to local situations by referring to various international and national training materials. The pedagogy of IWRM training included lecture sessions, tutorials, case study analysis, games, role plays and short videos followed by group discussions on the water sector themes besides field visits in a two-week residential course.

### Major themes

1. Introduction to Integrated Water Resource Management
2. Water Users and Beneficiaries
3. Water and Sustainability
4. Agricultural Water Management
5. Water Delivery Systems
6. Water Policy and Legislation
7. Water Organizations
8. Water Resources Planning
9. River Basin and Sub-Basin Planning
10. Integrated River basin management
11. Water Resources Information and Data
12. Water Accounting+
13. Source modelling - Tungabhadra basin
14. Water Resources and Regulation
15. Water Quality and Pollution Control
16. Participation in Water Management
17. Role of negotiation in IWRM
18. Gender and water resources management
19. Leading change
20. Water Resources and Financing
21. Modern Tools for IWRM like remote sensing and GIS
22. Awareness and Information on IWRM

The 1st IWRM training course was conducted for 30 WRD engineers with the curriculum. The course was well received and appreciated by the engineers. Based on the feedback from 1st training, 18 case studies were developed on various aspects such as sectoral water use, water demand & water scarcity, sustainability & management of water, gender & water resources, role of negotiation in IWRM, participation in water management, etc.

### UNESCO-IHE support

The course material was reviewed by UNESCO-IHE, The Netherlands and the excerpts are given below:

- *The review of the manual does not include suggestions for any major structural changes, as the overall course content is generally “fit for purpose”.*
- *The emphasis of many sections reflects the input and experience of the course providers, which for such a broad topic is reasonable; especially as the course is designed as an introduction to IWRM designed to raise awareness, increase knowledge and enhance competencies of Junior Engineers, Assistant Engineers and Assistant Executive Engineers.*
- *Further development of knowledge, skills and competencies in IWRM and how that relates to individual job activities can be covered in more advanced trainings, and as developed to reflect the levels of competencies.*
- *The field visit to the Kabini dam provides a good opportunity for participants to individually and in small groups to outline and discuss these types of connections and the challenges these provide for both water management and wider issues of IWRM.*
- *How the course supports the specific professional development and current work of the*

*participants was discussed extensively, including how the learning outcomes and delivery of the course can be more explicitly focused on the participants needs and ambitions. To that end considerations of building a network or “community of practice” among the participants can greatly support continued development and benefits of participants sharing experience into the future.*

### Goal and Objectives

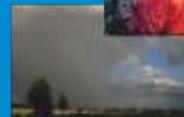
The major goal of IWRM training is to:

*“Enhance and value add the capacities of all individual participant engineers to understand, assess and address water management in an integrated way.”*

The objectives of the IWRM training program include:

- To improve state capacity in water resources management by familiarizing the WRD staff at Basin and Sub Basin levels with the concepts and methods for IWRM and the related sustainable development and management of water resources;
- To increase knowledge of water resources management challenges in India with special emphasis on Karnataka and improve capacity to comprehend and analyze the problems and potential solutions.

### WATER AND LIFE



- Liquid water is needed for many of the chemical reactions that support life
- It also provides a habitat for many living things
- The water cycle is vital to provide fresh water for living things

## Course delivery

After discussing with several institutions to deliver the training course with the specified curriculum, ACIWRM identified Vivekananda Institute for Leadership Development (V-LEAD), Mysuru, involved in training of various stakeholders including senior level government officers. V-LEAD also runs a Post Graduate programme '**Master in Development Management (MDM)**', affiliated to University of Mysuru.

Later, Indian Institute of Science (IISc), one of the premier academic and research institutes in the country organised IWRM training. The training is of two-weeks duration and residential in nature, so that the participants can have enough time for mutual discussions and sharing of experiences.

ACIWRM has identified Ashoka Trust for Research in Ecology & Environment (ATREE), Bengaluru and Visvesvaraya Technological University (VTU), Belagavi who are engaged in research on water resources management and training multi-stakeholders to be the potential trainers.



Group activity on river basin planning

It is now planned to train the staff of Departments of Minor Irrigation, Agriculture, Rural Water Supply, Urban Water Supply, Watershed and the other water user agencies on IWRM.

## Participants in IWRM training

ACIWRM has completed five batches of IWRM training by March-2018 covering 150 Engineers; 113 Assistant Engineers, 29 Junior Engineers and eight Assistant Executive Engineers participated in the training. 111 male and 39 female engineers were trained in due course of time.

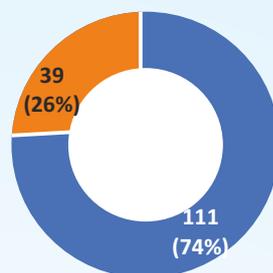


Group work - post field visit

IWRM training – an overview						
Training No.	AEE	AE	JE	M	F	Total
IWRM-1	1	22	7	21	9	30
IWRM-2	1	16	6	20	3	23
IWRM-3	1	27	4	23	9	32
IWRM-4	5	30	4	25	14	39
IWRM-5	0	18	8	22	4	26
<b>Total</b>	<b>8</b>	<b>113</b>	<b>29</b>	<b>111</b>	<b>39</b>	<b>150</b>

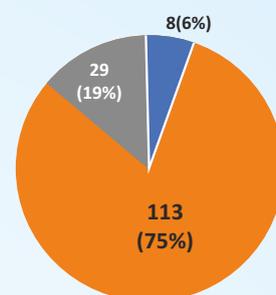
47 IWRM trained Engineers are from KNNL (Karnataka Neervari Nigama Limited), followed by 31 Engineers from VJNL (Visveswaraya Jala Nigama Limited), and 25 Engineers from CNNL (Cauvery Neeravari Nigama Limited) while KBJNL (Krishna Bhagya Jala Nigama Limited) accounted for 15 Engineers. 20 WRDO (Water Resources Development Organisation) Engineers participated, and others accounted for 12 Engineers.

Gender data - IWRM Training



■ Male ■ Female

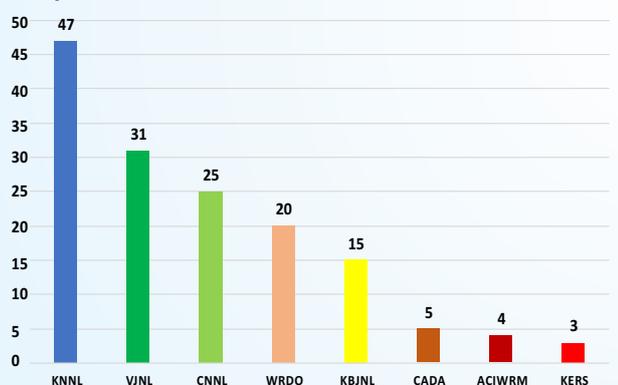
Engineers Trained in IWRM



■ AEE ■ AE ■ JE

Training number	KNNL	VJNL	CNNL	WRDO	KBJNL	CADA	ACIWRM	KERS	Total
IWRM-1	11		4	9	6				30
IWRM-2	9	5	2		7				23
IWRM-3	15	7	5	4	1				32
IWRM-4	5	15	4	7	1	3	4		39
IWRM-5	7	4	10			2		3	26
<b>Total</b>	<b>47</b>	<b>31</b>	<b>25</b>	<b>20</b>	<b>15</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>150</b>

Representation from different WRD Institutions



- Leadership and leading change sessions opened the minds in water management
- Source modelling and water accounting+ sessions must be elaborately covered
- Importance of data and information management for decision support system need to be intensified
- Practicing yoga kept us afresh throughout the training programme
- Field visit to understand consumptive and non-consumptive water use and interaction with Water Users Cooperative Societies (WUCS) must continue

## Participants' feedback

- Integrating different uses of water with irrigation is revealing & need of the hour
- Gender involvement and the people's participation are the key elements in IWRM
- Maintaining river health and ecological flow for sustainable water management should be ensured
- Topics on Policy, Law and Financial implications coverage under water governance is welcome



A participant sharing his experience

During all the training programmes, participants were very enthusiastic and shared their experiences. During the field visits the participants were very inquisitive and collected relevant information of different sectors of water use and made good presentations after analysis in groups. The training providers also facilitated the training sessions in a participative manner and innumerable discussions were facilitated.

The participants feedback in terms of coverage of subject, time management, clarity in

communication, relevance of exercises, clarifications provided and relevance of sessions to the course objectives has been very encouraging. Example of IWRM-3 training suggests that the feedback from participants was ranging between very good and excellent for six different criteria set-out. The 'relevance of sessions to the objectives of the course' and 'time management' were scored at par and stood first with 89% (Excellent = 37.5% and Very good = 51.5%) and the lowest one being the relevance of videos and examples that stood at 77% (Excellent = 27% and Very good = 50%).

Participants' Feedback	Poor	Fair	Good	Very Good	Excellent
Subject coverage	0	1	12	51	36
Time Management	0	2	9	51	38
Clarity in Communication	1	4	10	47	38
Relevance of exercise/video/examples	1	3	19	50	27
Clarifications Provided	0	1	13	50	36
Relevance of sessions to the course Objectives	0	1	10	52	37

### Outreach of IWRM training

World Bank supported National Hydrology Project (NHP) review mission requested ACIWRM to organise the IWRM training to the NHP participating states. ACIWRM is positive of the request and will organise the IWRM training on payment basis.

A team from Government of Himachal Pradesh, lead by Engineer-in-Chief visited ACIWRM with a vision to establish such centre in their state and after the discussions, they also

expressed interest to sponsor some of their staff for IWRM training before they proceed with establishment of such centre.



Valedictory of IWRM training and certificate distribution



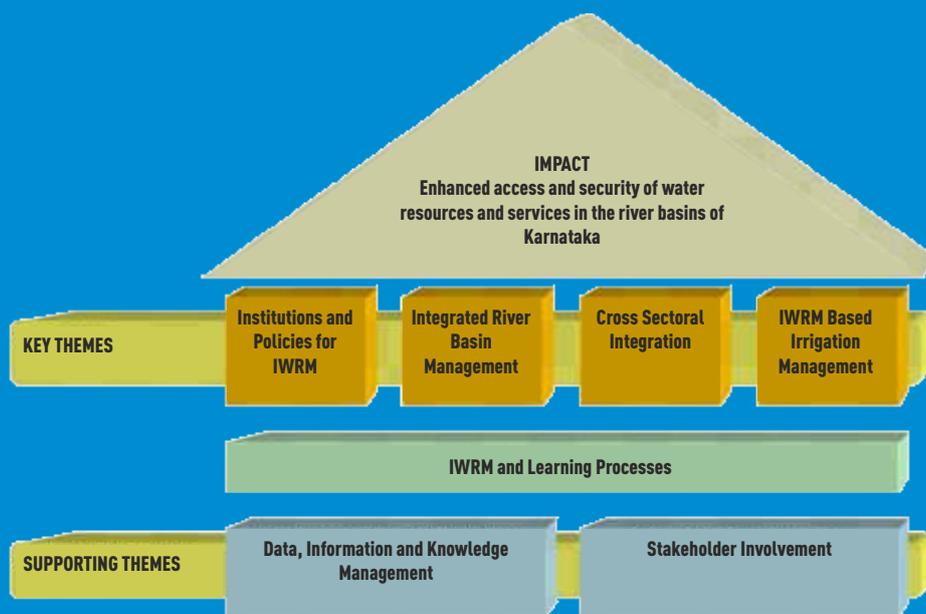
IWRM training participants

# ACIWRM

The ACIWRM was established to become a Global Centre of Excellence by Government of Karnataka in February 2012. ACIWRM acts as a think tank to the government's Water Resources Department (WRD). It is engaged in policy analysis, research, planning, capacity building and develop the knowledge base for gearing up the department up to its future vision 2030. The ACIWRM works with the various departments, civil society, the private sector, farmers and water user associations, and other organizations to produce integrated advice to the WRD for managing the state's water resources.



## The IWRM Roadmap



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