

**Report on the workshop conducted by the  
Centre of Excellence in Water Resources Management (CEWRM)  
Department of Civil Engineering  
BITS, Pilani – Hyderabad Campus**

The Centre of Excellence in Water Resources Management, Department of Civil Engineering, BITS, Pilani – Hyderabad Campus conducted a one day workshop on 19<sup>th</sup> November, 2011, on “ **Recent Advances in Climate Modeling for Water Resources Planning and Management**”.

The workshop was co-sponsored by National Bank for Agriculture and Rural Development (NABARD). 18 research papers (invited) were presented in different sessions. Participants included eminent academicians, engineers, administrators, researchers and students.

Prof.K.Srinivasa Raju, Co-ordinator, introduced the context of the workshop.

### **Context of the Workshop**

Increased concentration of greenhouse gases is expected to alter the radiative balance of atmosphere, causing increase in temperature and changes in rainfall patterns and other climatic variables. One of the most important impacts of climatic changes on society in future will be changes in regional water availability for various purposes such as drinking water supply and irrigation and likely occurrence of extreme events such as floods and droughts. Such hydrologic changes will affect nearly every aspect of human well-being. Intensive water requirement for domestic and industrial applications demands the necessity of understanding the effect of global climate change on regional water supplies and other relevant aspects. Numerous models have been developed to simulate the present climate and are gaining importance due to their ability to predict future climatic changes and consequently their impact on hydrologic systems. Recently developed advanced mathematical modeling techniques also have the potential to apply in the domain of climatic modeling. One of the aims of the workshop is to assess the present status and to identify further lines of research. It also aims to reduce the gap between research and implementation and mobilize the scientific community in a coordinated and effective way to address this major challenge. The outcome of the workshop can be used as the platform for developing strategies for climatic modeling initiatives.

### **Inaugural Session**

The workshop started with a welcome address by Prof K.Srinivasa Raju, Co-ordinator of the workshop. He briefly introduced the theme of the workshop, mission, vision and activities of

CEWRM. Prof V.S.Rao, Director, BITS-Pilani-Hyderabad Campus, emphasized the role of mathematical modeling approaches and stressed on the focused research in this direction and also urged the researchers to find the solutions at the grass root level. Prof D.N.Reddy, Former Vice-Chancellor, JNTU, Hyderabad and Chief Guest for the Workshop, appreciated the efforts of CEWRM and their appropriateness of the workshop theme. He discussed various issues connected with water, environment and climate and stressed upon simple and cost effective solutions for possible implementation. Dr A.Vasan, Head of the Department, Civil Engineering presented the vote of thanks.

### **Focus of the Workshop**

Prof. K.Srinivasa Raju presented the theme of the workshop and discussed the importance of General Circulation Models (GCMs), down scaling approaches, emission scenarios that are required for effective, sustainable and replicable water resources planning and management. Prof. Raju explained the importance of choosing suitable GCM/ downscaling approach/emission scenarios and uncertainty that can be expected at each level. He stressed the role of soft computing and Multicriterion Decision Making (MCDM) approaches and concluded his presentation with some of the thrust areas related to climate modeling that can be part of brain storming session and discussion during the presentations.

### **Session 1: Surface Water Resources**

Prof I.V.Murali Krishna, formerly Director (R & D), JNTU, Hyderabad & Adjunct Professor, Asian Institute of Technology, Bangkok, discussed water resources and climate models in detail. He suggested that sustainable planning was necessary to adapt to climate changes. Dr S.V.N.Rao, Chief Project Manager, WAPCOS, Hyderabad discussed the impact of climate change on hydrologic cycle. He analyzed basic issues that will affect water cycle and consequently climatic modeling.

### **Session 2: Surface and Ground water Modeling**

Session Chairpersons : Mr M.K.Srinivas, Director, Central Water Commission,  
Hyderabad, Ministry of Water Resources, Government of India

Mr V.V.S.Gurunadha Rao, Project Advisor, Chief Scientist & Nodal  
Officer (Rtd), CSIR Network Project on Groundwater, National  
Geophysical Research Institute, Hyderabad.

Mr M.K.Srinivas, Director, Central Water Commission, Hyderabad in his presentation stressed the effect of climate change both on surface and ground water resources and discussed in detail the possible solutions. Prof. N.V.Umamahesh, Department of Civil Engineering, National Institute of Technology, Warangal discussed the impact of climate change not only on planning aspects but even

on management aspects. He also touched upon various technical issues on the GCMs. Prof. P.Ananda Raj, Department of Civil Engineering, National Institute of Technology, Warangal discussed in brief about technical indicators related to water resources and climate change with examples.

Mr V.V.S.Gurunadha Rao, National Geophysical Research Institute, Hyderabad presented ground water modeling applications for protection of ground water resources in general and for Greater Hyderabad region in particular. He mentioned that modeling is always useful for planning the activities in a systematic way. Dr K. Venu Gopal, Ground Water Department, Government of Andhra Pradesh, Hyderabad discussed the impact of climate change on future water availability for irrigation. He discussed the role of ground water and surface water in detail including recharging aspects. Dr K.H.V. Durga Rao, Water Resources Division, National Remote Sensing Centre, Hyderabad, Indian Space Research Organization, Department of Space, Government of India discussed in detail about the importance of water resources assessment due to climate change and demonstrated with a case study.

### **Session 3: Surface, Ground water Modeling and Geographical Information Systems**

Session Chairpersons : Dr. K. Venu Gopal, Joint Director, Ground Water Department,  
Government of Andhra Pradesh, Hyderabad

Prof N.V.Umamahesh, Professor, Department of Civil Engineering,  
National Institute of Technology, Warangal

Mr S.V.Vijaya Kumar, National Institute of Hydrology, Kakinda, Ministry of Water Resources, Government of India discussed the importance of short duration rainfall measurement and its analysis. In his presentation, he demonstrated the same with a case study and concluded that present study will be helpful to mitigate hydrological effects on climate change. Dr K.B.V.N.Phanindra, Department of Civil Engineering, Indian Institute of Technology, Hyderabad, discussed in detail about applications of Universal Kriging for optimal contouring of ground water levels.

Dr M.V.S.S. Giridhar, Centre for Water Resources, JNTU Hyderabad discussed the role of geomatics in rainfall-runoff modeling and demonstrated with a case study. Prof Md.Hussain, Department of Civil Engineering, Gokaraju and Rangaraju Institute of Engineering and Technology (GRIET), Hyderabad stressed the necessity of engineering management practices for the sustainability of both quality and quantity of water resources under climate change regime. Dr V.Hari Prasad, Training and Education Area, National Remote Sensing Centre, Hyderabad, Indian Space Research Organization,

Department of Space, Government of India, discussed earth observation systems and its relation to climate change. He discussed the same with real world examples.

Dr M. Gopal Naik, Department of Civil Engineering, Osmania University, Hyderabad presented Rainfall-Runoff and Sediment yield Modelling of Watershed Using GIS and Remotely Sensed Data for a case study. Dr M. Anjaneya Prasad, Department of Civil Engineering, Osmania University, Hyderabad presented Fuzzy logic models for multi reservoir systems which have the potential that can be related to climate change. Dr K.Rajitha, Department of Civil Engineering, Birla Institute of Technology and Science, Pilani- Hyderabad campus presented the applications of remote sensing and GIS in climate change studies. It is concluded that vast potential of GIS exists for climate change studies. Dr A. Jagadeesh, Department of Civil Engineering, Birla Institute of Technology and Science, Pilani- Hyderabad campus presented Fourier analysis and development of two-dimensional finite element schemes for Shallow water equations (SWE) and Transport related systems. It is concluded that good number of thrust areas are emerging which may be related to climate change studies. Dr Murari R R Varma, Department of Civil Engineering, Birla Institute of Technology and Science, Pilani- Hyderabad campus discussed hydrological modeling studies in forested catchments which may equally be applicable in climate changing environment.

### **Brain Storming Session**

A brain storming session was also organized on the theme to synthesize the entire proceedings.

Prof. I.V.Murali Krishna Co-ordinated the panel discussion. The other members were Dr S.V.N.Rao, Mr S.V.Vijaya Kumar, Prof N.V. Umamahesh, Mr V.V.S.Gurunadha Rao, Mr M.K.Srinivas, Dr Valli Manickam of Administrative Staff College of India, Hyderabad.

### **Concluding remarks**

Prof K.Srinivasa Raju, Co-Ordinator of the workshop and Centre of Excellence in Water Resources Management (CEWRM) has encapsulated the outcome of the workshop and concluded the workshop with a vote of thanks.

### **Recommendations**

The presentation of various papers and the subsequent extensive discussions held including the brain storming session had culminated in the following recommendations:

- Research and practice should be conducted simultaneously for effective utilization of the knowledge in the field of climate change studies. It is suggested that Government departments should also be involved in this regard.

- Preparation of a status report on the availability of data is suggested.
- Documentation of information on climatic studies is to be done and for this purpose appropriate working groups for various themes are to be formed.
- Physical modeling along with advanced mathematical modeling approaches is necessary to analyze the various characteristics of the objectives effectively.
- There is a need to evolve area-specific and location specific water management plans, keeping the climatic data availability perspective in view.

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