

NATIONAL REPORT OF THE REPUBLIC OF INDIA

April 2004 – March 2006

(IHP NATIONAL COMMITTEE OF INDIA)

FOR THE 17th SESSION OF INTER GOVERNMENTAL COUNCIL OF
IHP-UNESCO, 3-7 JULY 2006, PARIS

PREAMBLE

The hydrology of Indian sub-continent, comprising an area of 329 million ha, varies from season to season and region to region due to unpredictable changes in climatic conditions. Variability of rainfall every year is a major constraint for utilizing the available water in the rivers. The quantum of water available per capita in India is low compared to the many developed countries. Thus, increasing demand of water for domestic, agricultural, industrial and other purposes along with natural climatic changes is a major concern for the hydrologists and water resources planners in the country.

Ministry of Water Resources (MoWR), Government of India is responsible for the development and regulations of country's water resources. Besides, every State also has a separate Ministry to develop and regulate the water resources. The central organisations under MoWR responsible for different activities are Central Water Commission (CWC), Central Ground Water Board (CGWB), National Institute of Hydrology (NIH), Central Soil and Material Research Station (CSMRS) and Central Water and Power Research Station (CWPRS).

The National Institute of Hydrology is the nodal organisation for coordinating the water related science and technology activities in India and provides Secretariat to the IHP National Committee of India, which is known as Indian National Committee on Hydrology (INCOH). In order to carry out specific activities in various fields of hydrology and water resources development, the IHP National Committee consists of a main body and three sub-committees. The Committee and its members drawn from central and state government agencies as well as experts from academic and research organizations (as given in Appendix I). The Ministry of Water Resources (MoWR) provides financial support to IHP National Committee to carry out the following activities:

- To advice central and state governments and agencies on matters related to hydrology.
- To appoint special task force/expert panels to consider special problems to advice the IHP National Committee.
- To prepare and periodically update the state of art in the country on different branches of hydrology by collating relevant information from the national and international organizations and disseminating the same.

- To undertake studies on historical appreciation of development of hydrology and to introduce perspective planning for research in the field.
- To disseminate information related to hydrology through publication of journals, research news/digests, etc.
- To recommend recognition of centers of excellence on different branches of hydrology and to recommend central funding thereof.
- To recommend funding for the infrastructure development of hydrological research institutions.
- To maintain effective co-ordination so as to avoid overlaps in the research programs of different institutions.
- To promote programs for human resources development leading to the specialization of research staff and recommend encouragement for the outstanding research personnel.
- To identify areas in the field of hydrology which need immediate attention or in which new methods are to be introduced for bringing the level of research activities in the country to the international standards.
- To prepare, co-ordinate and recommend funding of research programmes to be taken up by the institutions in the country on basic and applied research, action strategic research, and other areas related to research in hydrology.
- To encourage the national institutions to take research studies and development activities in the fields, which have been identified by the Committee, as thrust/priority areas; where necessary, the Committee may itself nominate the institution for undertaking research/development in a specified subject.
- To encourage voluntary professional bodies, non-commercial Non Governmental Organizations (NGOs) to take up R & D activities, dissemination of knowledge, participation in mass awareness programme, etc. in hydrology.
- To maintain effective cooperation with other National Committees/Boards, related GOI/state ministries, CSIR laboratories, IIT's engineering colleges and polytechnics, universities and other academic institutions.
- To encourage indigenous industry through loans to take up technological developments in hydrology.
- To monitor the progress made by executing institutions on research schemes in the field of hydrology.
- To promote and coordinate effective participation of India in the international programmes related to hydrology and to act as national committee for such international bodies, where required.
- To promote education, training and manpower development programmes in the field of hydrology.
- To arrange and conduct seminars/conferences/workshops, to support mass awareness programs, and to arrange R & D review sessions on hydrology.

IMPORTANT MEETINGS HELD DURING APRIL 2004-MARCH 2006

(I) Meetings of IHP National Committee

The members of IHP National Committee meet twice in a Calendar Year to review the following activities:

- (i) Funding for research projects on IHP related activities to various agencies under R&D programme of Ministry of Water Resources. At present there are 32 ongoing research projects of about Rs. 5,00,00,000 (US \$ 10,00,000) being funded by the IHP National Committee of India.
- (ii) Sponsoring Seminar/Symposium/short-term courses by various agencies including National Symposium on Hydrology organized by IHP National Committee. During the period April 2004- March 2006, Twenty such events involving an expenditure of about Rs. 7,00,000 (US \$ 15,000) were sponsored by IHP National Committee.
- (iii) Publication of Hydrology Review Journal- "JVS" every year.
- (iv) Publication of "State-of-art" report on various Themes of Hydrology.
- (v) Organization of IHP-UNESCO sponsored activities in India (GWADI, International Workshops, etc.).

The 27th meeting was held on 30th April, 2004.

The 28th meeting was held on 1st December, 2004.

The 29th meeting was held on 15th June 2005.

The 30th meeting of INCOH was held on 14th December 2005.



(II) Steering Committee Meetings

The 21st, 22nd and 23rd Steering Committee (a sub-committee of IHP National Committee) meetings were held on 24 August 2004, 3rd June 2005 and 3rd August 2005 respectively to consider financial support from IHP National Committee for organizing Conferences/seminars/symposia/short-term courses etc.

(III) Research Committee Meetings

The 6th and 7th meeting of Research Committee, Ground Water (a sub-committee of IHP National Committee) were held on 7th December 2004 and 21st February, 2005, respectively, in which new research projects related to ground water hydrology submitted for funding were discussed.

The 12th and 13th meeting of Research Committee, Surface Water (a sub-committee of IHP National Committee) were held on 5th January 2005 and 9th September 2005, respectively, in which new research projects related to surface water hydrology submitted for funding were discussed.

IMPORTANT EVENTS HELD DURING THE YEAR 2005-06

(I) Organization of International G-WADI Modeling Workshop and Asian G-WADI Regional Meeting

The first International G- WADI modelling workshop was held during 28th February to 4th March at NIH, Roorkee India. The meeting was attended by 45 scientists from eighteen countries including representatives from the Asian region, South America, North Africa, Southern Africa, the Middle East, Europe, North America and Australia. Presentations on various aspects of modeling and data resources and technological advances in observations and data systems were made and a series of hands-on computer workshops were held. Modeling software and tools were provided to the participants.

The workshop included detailed discussion of priority needs in the areas of data, models and calibration and uncertainty methods. The workshop demonstrated that there was a lack of awareness of the capability of current methods for automatic optimization and the analysis of uncertainty, but great interest in the applicability of such methods, particularly in the context of model application to the un-gauged catchments.





The key recommendations of the workshop are as follows:

- G- WADI, through its website, should provide access to models and supporting global data sets together with links to useful websites
- There is a need for guidance on model suitability and assessment of the worth of models
- There is a need for guidance and tutorials on methods of model calibration and uncertainty analysis.
- A number of arid/semi-arid catchments should be nominated and data made available for model testing and inter-comparison.
- On modeling methods, links should be established with relevant international Problems of ungauged catchments and the need for guidance from programmes such as PUBS, GEWEX.
- It would be useful to post information on model use and experience in different countries on the web site and to provide chat room facilities for arid zone modelers.
- The development of tutorial material and supporting software, including examples from developing countries be made available via the G- WADI web-site.
- The development of a web-site guidance note for model users on appropriate methods of optimization and uncertainty analysis for the different categories of model, including GIS-based semi-distributed and distributed models be made available. The guidance note should include advice on strategies for model regionalization.

(II) Brain Storming Session for IHP activities in India

To look up for the possibility of India's role in thrust areas of IHP-VII (2008-2013) activities of UNESCO, one day brain storming session was organized by INCOH on Friday 20th May, 2005. The Department of Civil Engineering, Indian Institute of Science, Bangalore hosted the brain storming session and provided all logistic support. Four technical sessions were held on each proposed Theme.

Further, the concerns and reservations of the Indian National Committee, MoWR, Government of India for IHP VI-Theme IV- Focal area 4.3: Water Conflicts- Prevention and Resolution and for IHP VII- Theme II- Governance and Socio-economics were duly shared with the Members.



(III) UNESCO sponsored International Workshop

An International Workshop on "Impacts of Reforestation of Degraded Land on Landscape Hydrology in the Asian Region" was organised at the National Institute of Hydrology, Roorkee during 06 – 10 March 2006. The Workshop was primarily intended to review the on-going research work in the Asian region concerning the hydrological impacts of forestation of degraded land with particular reference to high and low stream flows and groundwater recharge. The other objectives include setting up of a regional

network of research basins to investigate the impacts of reforestation. The workshop primarily addressed the following three areas:

1. Land cover changes and associated soil and eco-system degradation
2. Changes in water flows linked with land cover change
3. Water quality, erosion and sedimentation vs. land cover change

The workshop was sponsored and supported by the UNESCO-IHP Programme. The five days event was co-sponsored by ICAR, NIH, INCOH, CSIR and DST. Dr K D Sharma, Director NIH, Dr Mike Bonell from UNESCO Paris and Dr Bhanu Neupane from UNESCO Office, New Delhi coordinated the workshop.

28 invited delegates from Sri Lanka, Malaysia, Pakistan, Nepal, China, Iran, Indonesia, Australia, New Zealand, Bangladesh, UK, France, Thailand and India participated in the workshop.



The following recommendations were emerged from the Symposium:

- ✓ Establishment a network of experimental basins in the South-East Asia for undertaking forest hydrology studies.
- ✓ Urge governmental and civil societies to initiate and prioritize forest management research programmes.
- ✓ Request UNESCO – Inter-Governmental Council to consider Roorkee declaration as a resolution and provide sufficient funds for promoting forest hydrologic research



(IV) Organization of Research and Development (R&D) Sessions

The 2nd R&D Session of IHP National Committee was held at Mahatma Gandhi State Institute of Public Administration, Water Resources & Environment Directorate, Government of Punjab, Chandigarh during 30th Sept. to 1st Oct. 2004. It was inaugurated by Sri K.R. Lakhanpal, Principal Secretary, Irrigation & Finance, Govt. of Punjab. Sri R. Jeyaseelan, Chairman, IHP National Committee & Chairman, Central Water Commission, New Delhi presided over the inaugural session.

The 3rd R&D Session of IHP National Committee was held at National Geophysical Research Institute (NGRI), Hyderabad during 26-27 September 2005 to review the progress of on-going research projects funded by the Ministry of Water Resources, Government of India. It was inaugurated by Dr. S.K.Sikka, Principal Scientific Advisor, Government of India. Dr. V.P.Dimri, Director, NGRI, Hyderabad was the Guest of Honour for the inaugural session.

In the R&D sessions all ongoing research projects were presented by the Principal Investigators for which funds have been provided by the Ministry of Water Resources and a critical review of each project was done by the experts.

(V) Organisation of 11th National Symposium on Hydrology

The 11th National Symposium on Hydrology with a focal theme on “Water Quality” was organised during November 22-23, 2004 at National Institute of Hydrology, Roorkee. Shri R. Jeyaseelan, Chairman INCOH and Chairman Central Water Commission, New Delhi inaugurated the Symposium and Prof. Prem Vrat, Director, Indian Institute of Technology, Roorkee was the Chief guest for the Valedictory function.



The following recommendations were emerged from the Symposium:

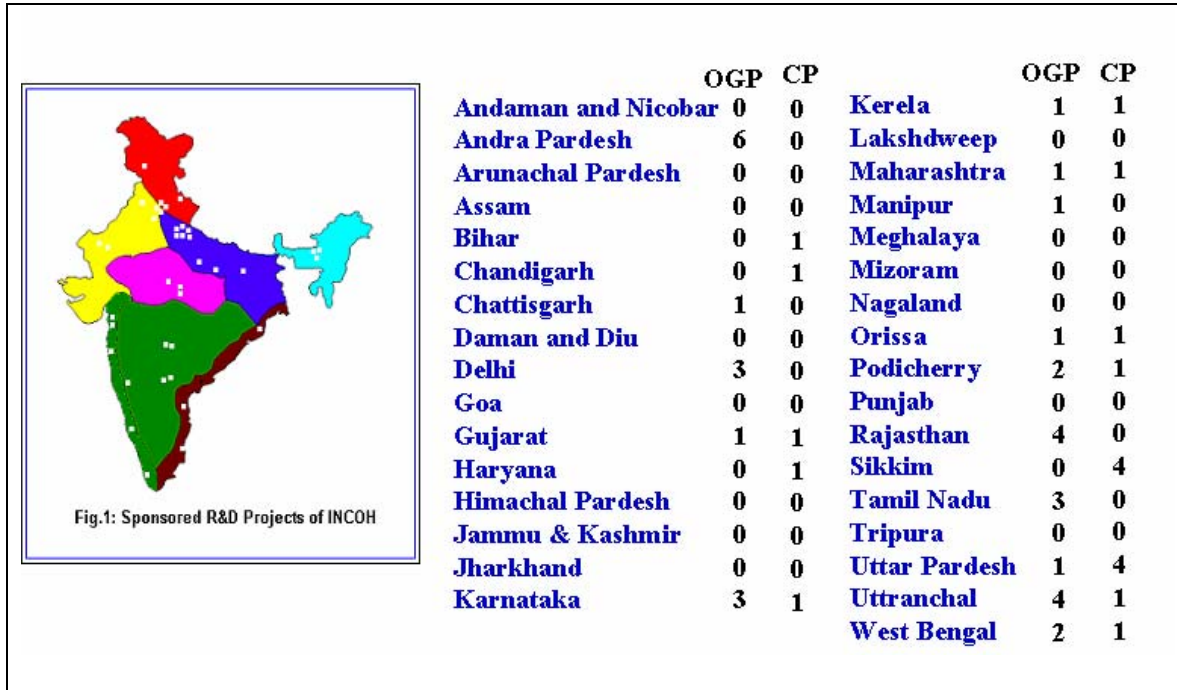
1. Increasing pollution threat to the rivers/streams, exceeding permissible limits prescribed by Bureau of Indian Standard for different uses of water, requires special attention towards adoption of cleaner technology for safeguarding the health of the rivers including ecosystem maintaining by the rivers.
2. For assessment of minimum flow in a stream or a river, which could be either determination of flow for the given pollution load or the permissible pollution load for the given flow, suitability of alternatives should be examined before accepting or rejecting any scheme.
3. Methodology may be developed for prediction of sediment yield considering the various land uses and developmental activities in the river basins.
4. Use of the advanced optimization techniques such as Differential Evolution and Simulated Annealing should be encouraged for multi-objective planning and operation of the water resources systems for optimum utilization of water resources.
5. Judicious artificial groundwater recharge measures should be taken up for groundwater management in over-exploited areas.

6. Using hydrological software packages, optimal pumping strategies should be derived in order to contain the contaminants in aquifer system.
7. Numerical models should be used to study the mechanisms of contaminant transport in groundwater system.
8. Preventive measures should be taken up to control the intrusion of saltwater in coastal aquifer systems.
9. Combination of surface and bore well geophysical data should be encouraged to delineate the saline and fresh water aquifers.
10. Mass awareness program must be conducted by different central and states govt. agencies, teaching institutes and other organisations in a big way to solve water quality problems of rivers in India.
11. Biological parameters must be given due importance for assessing the fresh water quality of Rivers in India.
12. Studies on Lakes and wetland should be strengthened and outcome information should be shared among stake holders for its implementation.
13. Pesticides monitoring in water bodies is an important area of research.
14. Pollutants shall be studied along with the direction of flow. Further, the studies should come up with remediation measures.
15. In keeping with area specific severe groundwater pollution and apprehension of sub-terrainian discharge of highly polluted effluent, investigations to establish such practices is needed so that appropriate measures to control such practices could be evolved.
16. In the field of water quality modeling, there is a need of advanced techniques such as ANN, Expert System, and DSS.
17. Various water quality models need to be validated on micro to macro scale and these models shall be coupled with ground water model for management of water resources.
18. Development of suitable innovative technologies in water treatment is the most important agenda for water engineers.
19. Physical, chemical treatment technology is to be replaced by physico-chemical and bioremediation technology system.
20. Research carried out in lab.scale/pilot scale should be extended on field scale for commercial exploitation of the research in the field of water quality management. Techno-economics of the new technology should also be compared while presenting them.

SUPPORT TO RESEARCH PROJECTS

The ministry of Water Resources has research grants for studies to be conducted in the area of hydrology. In order to rationalize the process of funding of various research projects in hydrology, the IHP National Committee has been identified as the nodal agency. After thorough scrutiny of the projects and based on the recommendations of the Research Committee (surface water and ground water), ten projects were approved by the MoWR during the year 2004-05 and 2005-06. A list of research projects funded by IHP National Committee is given in Appendix I.

The funds for research projects are given to academic institutes, research and development organisations, central and state government agencies and non-governmental organizations distributed all over the country. Following diagram shows the distribution of ongoing (ONG) and completed (CP) projects.



INDIA'S PARTICIPATION IN IHP-UNESCO

IHP National Committee of India is participating in the activities of International Hydrological Programme (IHP) of the UNESCO by organizing regional courses and workshops. The Committee has been actively contributing to the VIth phase (2002-2007) of IHP of UNESCO through its National Committee. India decided to take initiatives on specific focal areas under various themes on priority basis. The focal areas of each theme in which activities were taken up by the INCOH are given in Appendix II.

The themes / focal areas and the activities to be taken up by the Indian National Committee on Hydrology (INCOH) during the VII Phase of the International Hydrological Programme (IHP) (2008-20013) of UNESCO have been approved by the Ministry of Water Resources, Government of India and are given in Appendix III.

SUPPORTS TO SEMINARS/SYMPOSIA/TRAINING COURSES/WORKSHOPS

As a part of its objectives, IHP National Committee provides sponsorship to various organisations in the country for organising national and international events in hydrology

and water resources. The Committee has been actively providing support to various organisations in the country for holding different activities. The details of various activities held during the year 2004, 2005 and 2006, for which technical assistance and funds were provided by the IHP National Committee, are given in Appendix IV.

PUBLICATIONS

(I) Hydrology Review Journal

The Indian National Committee has been bringing out an annual Hydrology Review Journal entitled "Jal Vigyan Sameeksha" whose each issue is devoted to a specific theme. This activity has been taken up to disseminate information and thereby promoting improvement in the standards of hydrological research in the country. The papers specific themes are invited from the experts in India. These publications are widely circulated to all organisations and agencies dealing in water sector. The focal themes of various issues so far brought out by the Secretariat and the topics of future issues are given in Appendix V.

(II) State of Art Reports

In pursuance of its objectives to prepare and periodically update the state of art in different branches of hydrology and disseminating the same, the Committee had taken up a programme of inviting experts to prepare state of art reports on various facets of hydrology. The topics and experts are identified and recommended by the Committee. These reports are being circulated to state and central government agencies including academic and research organisations. A list of titles with authors of the report is given in Appendix VI.

(III) Special Publications

The following publications of Ministry of Water Resources were printed by the Committee as special publications for wider circulation to all organisations and agencies dealing in water sector.

- Theme Papers by Ministry of Water Resources, Government of India for National Conference on "Water Quality Issues –2004" organised at Kolkota during 14-15 October 2004
- Country Paper for International G-WADI Modelling Workshop and Regional Meeting organized at National Institute of Hydrology, Roorkee during 28th February-4th March 2005 (jointly with UNESCO).

**LIST OF ONGOING RESEARCH PROJECTS UNDER
IHP NATIONAL COMMITTEE**

SNo	Project name	P.I. name & address
1	Study of hydrological Behaviour of Micro watershed and development of integrated watershed management Model	Dr.A.P Mukherjee IGAU, Raipur, Chattisgarh
2	Behaviour of monsoon rainfall in Rajasthan	Director DSO & Hydrology I ID&R Irrigation Unit, J L N Marg Jaipur
3	Hydrological & Ecological Studies on the Oustery Lake ecosystem	Prof.S.A.Abbasi, Pondicherry University Pondicheery
4	Integrated Hydrological Studies in Kondaveeti Vagu Watershed.	Dr. P.Sankara Pitchaiah, ANU, Nagarjuna Nagar, A P
5	Reservoir performance analysis using stochastic stream flow models	Dr.K.Srinivasan, IIT Madras, Chennai, Tamil Nadu
6	Ground water studies using satellite data. Helium and Geophysical techniques-A pilot study project	Dr.S.K.Gupta PRL, Ahmedabad, Gujarat
7	Feasibility of artificial recharge study through mathematical modelling in Kongal river basin, hard rock region, Nalgonda, A.P.	Dr.V.S.Singh NGRI, Hyderabad, A P
8	Ascertaining arsenic mobilisation in soilwater-plant systems and exploring the possible remedial measure, West Bengal	Dr. S. K. Sanyal, BCKV, Mohanpur, WB
9	Geohydrological studies for augmentation of spring discharge in Western Himalaya	Dr.G.C.S.Negi GBPIHED, Almora, Uttranchal
10	Study of fluvial geomorphology and tectonics of Khari-Mashi drainage basin, Rajasthan for data preparation and groundwater recharge capability assessment	Dr. S. Sinha Roy, Birla Inst. of Scientific Research, Jaipur, Rajasthan
11	Groundwater behaviour in connate water areas and hard rocks terrains of Orissa with respect to different schedules of pumping and varied draw down conditions	Er. J. Patnaik, C.Er. & Dir., DGWS&I, Bhubaneswar, Orissa

12	R&D cum action and awareness project on rainwater harvesting, groundwater recharge and waste water reuse	Dr.S.A.Abbassi Pondicherry Univ., Pondicherry
13	Studies on salt water intrusion in coastal D.K.District, Karnataka	Dr. A.Mehesha, NIT, Suratkal, Karnataka
14	To assess the Impact of presence of Water harvesting and Water Conservation in Imphal Manipur	Dr. L. Dinachandra Singh, MSTC, Imphal, Manipur
15	To assess the Impact of presence of septic tanks on ground water and spread of water borne diseases, and to identify means to solve the problems created by the waste water in Balrampur dist. In U.P.	Dr. Gauhar Mahmood Jamia Millia Islamia, New Delhi
16	Ground water flow modeling and aquifer vulnerability assessment studies in Yamuna-Krishni sub-basin, Muzaffarnagar District	Dr. Rashid Umar AMU, Aligarh, U P
17	Study on Ground Water Contamination through Municipal Land Fills in the NCT of Delhi	Dr. A. L. Ramanathan JNU, New Delhi
18	Development of defluoridation Media for contaminated ground water and its Lab to field Application	Dr. Uday Chand Ghosh Presidency College, Kolkata , W B
19	Ground Water Research Studies in Thar Terrain of Rajasthan through surplus water	Sri K.C. Kothari Addl. CE, SWRPD, Jaipur, Rajasthan
20	Institutional Framework for Regulating use of ground water in India	Prof. Kamta Prasad IRMED Karkardooma, Delhi
21	Impact of Urban, Industrial & Agricultural Pollution in Surface and Ground Water in and around Hyderabad & Secunderabad - A.P.	Prof. M. N. Reddy Osmania University, Hyderabad , A P
22	Hydrofluorosis in Halia River, Environs; Nalgonda district, A.P. A case study of Intensity and Source	Dr. M. Muralidhar Osmania University Hyderabad, A P
23	Study of Trace Metal in Surface & Sub-surface water in and around Tirupati	Prof. K.L.Narasimha Rao Sri Venkateswara Univ. Tirupati, A P

24	Identification of sites for artificial ground water recharge in upper ganga plain, using remote sensing – GIS	Dr. R. P. Gupta IIT, Roorkee Roorkee, Uttranchal	
25	Study on hydrology of small watersheds of highland Kerala	Smt. Celine George CWRDM, Kerala	
26	Flood Estimation in mixed/Urban/Rural catchments of South India	Dr. S. Ramaseshan Anna University, Chennai	
27	Artificial Neural networks for Water resources planning: An innovative approach	Dr. K. Srinivasa Raju, Birla Institute of Technology & Science, Pilani	
28	Fuzzy – Stochastic Modeling for Stream Water Quality Management	Dr. P. P. Mujumdar I.I.Sc. Bangalore Karnataka	
29	Assessment of water resources under climate change	Prof. P. P. Majumdar, IISc, Bangalore	
30	Hydrological investigation of lake Picholla Udaipur (Rajasthan) for its rejuvenation	Dr. C. S. P. Ojha IIT Roorkee, Roorkee	
31	Development of drought vulnerable indices of preparedness and mitigation	Dr. R Nagarajan IIT Bombay Mumbai	Sri R. P. Pandey NIH Roorkee
32	Integration of Fuzzy Logic and GIS for Delineating Groundwater Source Areas in Bazada land of Solani River Basin	Shri O. P. Dubey IRI Roorkee Roorkee	

Appendix-II

ACTIVITIES TAKEN UP UNDER IHP-VI (2002-07) BY THE IHP NATIONAL COMMITTEE OF INDIA

India has implemented a detailed programme according to IHP-VI Themes towards preparation of reports, conducting research studies, organisation of seminars/symposia, etc. at national and regional level and promotion of hydrological education in the country. Under each theme of IHP-VI program, one Focal area was considered on priority basis as shown in the Table below and activities were undertaken.

Theme	Focal area	Activities undertaken/proposed
Theme 1: Global Changes and Water Resources	Focal Area 1.3: Integrated assessment of water resources in the context of global land based activities and climate change	(a) Publication of Hydrology Review Journal on Theme "Water and Environment" 2002 (b) Publication of Hydrology Review Journal on Theme "Snow hydrology" 2003 (c) Research projects entitled "Assessment of water resources under climate change" IISc Bangalore.
Theme 2: Integrated Watershed and Aquifer Dynamics	Focal Area 2.1: Extreme events in land and water resources	(a) UNESCO Regional Training Workshop on "Groundwater Dynamics In Hard Rock Aquifers" -Including Sustainable Management and Optimal Monitoring Network Design June 17-21, 2004, NGRI, Hyderabad, India. (b) 11 th National Symposium on Hydrology with Focus on "Water Quality" November 22-23, 2004 NIH, Roorkee (c) Involvement in UNESCO's JIHP program on isotope hydrology. (d) 2 nd Research and Development Session 30 th September- 1 st October, 2004 at Water Resources Department, Chandigarh, Punjab. (e) Publication of State-of-art report on "Regionalisation of hydrological parameters" -by Prof. N.K.Goel, IIT, Roorkee 2002 (f) Publication of State-of-art report on "Water quality indices" by Dr. S.A. Abbassi, Pondicherry University- 2002 (g) 3 rd Research and Development Session September 26-27, 2005 at NGRI, Hyderabad. (h) 12 th National Symposium on Hydrology

		with Focus on “Hydrological Groundwater Governance Ownership of Groundwater and its Pricing”, 14-15 November, 2006 at Central Ground Water Board, New Delhi
Theme 3: Land Habitat Hydrology	Focal Area 3.1: Dry lands	<ul style="list-style-type: none"> (a) Indian National Committee has been involved with UNESCO in the projects and collaboration on “Forest Hydrology” (b) International G-WADI modelling workshop and Regional meeting. 28th February-4th March, 2005, National Institute of Hydrology, Roorkee, India (c) One day Brain Storming Session for IHP-VII related activities. 20th May 2005
Theme 4: Water and Society	Focal Area 4.5: Public awareness raising on water interactions	<ul style="list-style-type: none"> (a) Freshwater year 2003 – Freshwater conservation campaign, initiation of new programs and organisation of various events by Ministry of Water Resources, Government of India. (b) Organised a three-day international workshop on “Afforestation-reforestation of degraded land and impacts on landscape hydrology in Asia-Australia” during 6-10 March 2006.
Theme 5: Water Education and Training	Focal Area 5.2: Continuing education and training for selected target groups	<ul style="list-style-type: none"> (a) Hydrology Project Phase I- Training was provided by NWA and NIH for hydrological data processing and analysis. (b) Two international Post Graduate Diploma and Master's courses are being organized by India (i) IIT Roorkee and (ii) Anna University, Chennai

Appendix-III

**PROPOSED ACTIVITIES FOR IHP-VII (2008-13) TO BE TAKEN UP BY THE
IHP NATIONAL COMMITTEE OF INDIA**

THEME	PRIMARY FOCAL AREAS	ACTIVITIES TO BE TAKEN UP BY INCOH
Theme I: Global Change, Watersheds and Aquifers	Focal area I-1: Large-scale groundwater dependencies related to global change.	Artificial recharge of water and groundwater assessment
	Focal area I-2: Hydrological extremes in sensitive and stressed biomass and hydro climatic zones e.g. small island developing states.	Water resources management under drought situation
	Focal area I-3: Global change and feedback mechanism of hydrological processes in stressed environments.	Assessment of water resources under climate change
	Focal area I-4: Changing global dynamics in aquatic environments: degrading ecosystems, especially those susceptible to sea level change, coastal sediment balance and pollutant accumulation.	
Theme II: Governance and Socio-Economics	FOCAL AREA II-1: Culture, ethics and legislation for wise stewardship of water	
	FOCAL AREA II-2: Good Governance, capacity development and stakeholder participation, Empowerment of human resources.	
	FOCAL AREA II-3: Affordability, poverty alleviation and assured financing, for effective IWRM; 'water' in national Poverty Reduction Strategy Papers (PRSPs).	
	FOCAL AREA II-4: Shared Water resources and conflict resolution/co-operative solutions, true valuation of common pool water resources.	
	FOCAL AREA II-5: Resolving the water and energy nexus through sound governance.	
Theme III: Ecohydrology and	FOCAL AREA III-1: Water as a landscape agent: erosive capacity, mobile solvent, habitat for aquatic biota – interdependencies and regulation in biogeochemical cycling.	

Environmental Sustainability	FOCAL AREA III-2: Complementing engineering solutions with ecological measures resulting in sustainable carrying capacity of ecosystems.	
	FOCAL AREA III-3: Urbanization pressures, sustainable cities, towns and villages; water and sanitation for mega cities	
	FOCAL AREA III-4: Risk based environmental management (under uncertainty), especially climate change threats to ecosystem functions.	1. Real time flood forecasting 2. Flood inundation zoning for different return periods
Theme IV: Water Quality, Human Health and Food Security	FOCAL AREA IV-1: Methodologies for safeguards against water borne biotic and abiotic pollutants	
	FOCAL AREA IV-2: Access to safe water, human health and integrated water resource management.	International conference on water, environment, energy and society (WEES)
	FOCAL AREA IV-3: Non-conventional water resources: brackish water use and waste water re-use.	
	FOCAL AREA IV-4: Access to water for food security in environmentally stressed zones.	
	FOCAL AREA IV-5: Consumptive and in-stream requirements of water (terrestrial and aquatic ecosystem), food and people.	
	FOCAL AREA IV-6: The role of water consumption versus virtual water trade in assuring food security and environmental sustainability	
Theme V: Water Education and Training	Transfer of Technology through various training programmes and capacity building	

Appendix-IV

**SEMINAR/SYMPOSIA/TRAINING COURSES/ WORKSHOPS SPONSORED
DURING YEAR 2004 -2006**

S. No	Name of Activity and organisation	Date when held	Venue	Amount of funding provided by INCOH
1.	One day Brain storming Seminar on Ground Water Rising Problem of Jodhpur City"	8 th April, 2004	JNVU, Jodhpur	25,000
2.	Interactive Workshop on Water Conservation	13-14 th April, 2004	NIH Roorkee	25,000
3.	19 th Water Resources Day	27 th May, 2004	Inst. Of Engeers, Guwahati	10,000
4.	Seminar on "Assessment and Management of Water Resources (AMWR-2004)	26 th July, 2004	IISC, Bangalore	25,000
5.	Seminar on "Forest Water & People (FORWAP - 2004)	29-30 th July, 2004	Belgaum	25,000
6.	National Workshop on "Role of R&D in Water Sector"	9-10 th Sept. 2004	NWA, Pune	25,000
7.	International Conference on Hydraulic Engg. Research & Practice ICON-HERP-2004	26-28 th Oct. 2004	IIT, Roorkee	25,000
8.	Symposium on "Prediction in Un-gauged Basins for Sustainable Water Resources Planning & Management (PUBSWRPM-2004)	30 th Oct. 2004	BITS, Pilani	25,000
9.	National Symposium on Water Quality	22-23 rd Nov., 2004.	NIH, Roorkee	3.00 lakhs
10	National Conference on "Resource Conserving Technologies for Social Up-liftment"	7-9 th Dec. 2004	New Delhi	50,000
11.	National Symposium on "Water Resource Management in Mine Areas (WRMMA-2004)	16-17 Dec. 2004)	Bhubneswar	10,000
12	International Conference on Hydrological Perspectives for Sustainable Development	23-25 th Feb. 2005	IIT, Roorkee	1.5 lacs (by MoWR)

	(HYPESD-2005)			
13.	20th Water Resource Day – 2005 on the theme “Economical Development of Perennially FloodProne Areas”	31st May 2005	I.E.(India), Assam State Centre, Guwahati	10,000
14.	International Conf. On “Crisis Management in Water & Environment – 2005” (ICCMWE2005)	15th – 16th July 2005	Science City, Kolkata	50,000
15.	National Workshop on “Geoinformatics in Water Sector”	22-23rd Sept. 2005	NWA, Pune	25,000
16.	Seminar on “Rejuvenation of Urban Lakes” HARUL – 2005	20-21 Oct.2005	M.P.	15,000
17.	Organisation of One Day Workshop on Rain Water Harvesting	15th Dec. 2005	Institution of Engineers (India) Roorkee	10,000
18.	Organisation of XXIV AHI National Seminar on “Hydrology” with special reference to “Urban Ground water Pollution”	27-28 December 2005	Karnatak University, Dharwad	15,000
19.	International Conference on “Ground Water Resource Management”	1st – 4th Feb, 2006	SES, JNU, New Delhi	30,000
20.	International Conference on Reforestation of Degraded land on landscape hydrology in the Asian Region	6-10 March, 2006	NIH,Roorkee	25,000
21.	Workshop on "Water Conservation with special emphasis on Recycle and Reuse"	March 25,2006	Civil engineering Department, IIT, BHU, Varanasi	20,000

**DETAILS OF VARIOUS PUBLISHED ISSUES OF HYDROLOGY REVIEW
JOURNAL “JAL VIGYAN SAMEEKSHA (JVS)”**

Volume	Year	Area
Published		
VOLUME I NO.1	1986	Drought
VOLUME I NO.2	1986	Hydrological Forecasting
VOLUME II NO.1	1987	Ground Water Management
VOLUME II NO.2	1987	Hydrological Network Design
VOLUME III NO.1	1988	Water Quality
VOLUME III NO.2	1988	Drainage
VOLUME IV NO.1	1989	Remote Sensing
VOLUME IV NO.2	1989	PC Applications in Hydrology
VOLUME V NO.1&2	1990	Soil Moisture
VOLUME VI NO.1&2	1991	Soil Erosion & Sedimentation
VOLUME VII NO.1	1992	Flood Hydrology
VOLUME VII NO.2	1992	Water Conservation
VOLUME VIII NO.1	1993	Reservoir Operation
VOLUME VIII NO.2	1993	Education and Training
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VOLUME X NO.1&2	1995	Watershed Management
VOLUME XI NO.1	1996	National Activities
VOLUME XI NO.2	1996	National Activities
VOLUME XII NO.1	1997	Data Storage and Retrieval System
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VOLUME XIII NO.1 & 2	1998	Advances in Remote Sensing and GIS
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VOLUME XVI NO.1 & 2	2001	Emerging Techniques in Water Resources
VOLUME XVII NO.1 & 2	2002	Water and Environment
VOLUME XVIII NO.1 & 2	2003	Snow Hydrology
VOLUME XIX NO.1 & 2	2004	Hydrological Aspects of Large Scale Water Transfer
VOLUME XX	2005	Fresh and Sea Water Interaction in Coastal Regions
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VOLUME XXII	2007	Impact of climate change on water resources

STATUS OF PUBLISHED STATE OF ART REPORTS

Title of Report	Prepared By	Status
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How To Conduct River Surveys	Dr.V.P.Thergaonkar&Sh. A.M.Deshkar	Printed
Current Status and Prospects of Rain Water Harvesting	Dr. H.N.Verma and Dr. K.N.Tiwari	Printed
Surface Drainage Aspects of Agricultural Areas	Sh.G.P.Malhotra	Printed
Research in Soil and Water Conservation in India with Special Emphasis on Watershed Management	Dr. V.V. Dhruva Narayana	Printed
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