

## CURRICULUM VITAE DR. ARUN KUMAR

<b>Name</b>	<b>ARUN KUMAR</b>
<b>Designation</b>	Professor, MNRE Chair Professor (Renewable Energy)
<b>Specialization</b>	SHP Development, Environmental Management of Water Bodies, Energy Economics and Policy
<b>Education</b>	B.E.(Civil) University of Roorkee, Roorkee (Now IIT/R) <i>I Division</i> M.E.(Civil) Indian Institute of Sciences, Bangalore <i>I Division with honours</i> Dip. in Hydro Power Development, Trondheim (Norway) Ph.D., IIT Roorkee
<b>Membership of Professional Societies</b>	Member- ASCE, ASME, IAHR and AWWA, Life Fellow IE (India), Life Fellow IWRS, Life Fellow IWWA, LM –IHA, Life Fellow - IHS, LM-SESI,
<b>Awards/Recognitions</b>	Chair Professor (Renewable Energy), AHEC IIT Roorkee 2013 and 2015 Govt. of India appointed Director in NHPC Ltd. Nov 2015 Coordinating lead author for Hydropower for IPCC Special Report on Renewable Energy during 2009-11. CBIP "Cash your ideas Award - 1991" for innovative and indigenous solution for Weirs in hills, and Surya Award (III) by Indian Institute of Rural Development and Social Services, Delhi (2001) and NORAD fellowship (1988-89). Membership of International/national committees and collaborations – 45
<b>Outreach</b>	Contributed significantly in the establishment and national and international recognition of Alternate Hydro Energy Centre, conceptualised and established national facilities for hydropower simulator, performance evaluation of hydro projects, hydraulic turbines, standards for SHP and environmental management of lakes and rivers, comprehensive use of solar energy at IIT Roorkee campus (1.81 MW SPV, 3.4 lacs lpd SWH and 61 dishes ST), water for welfare-Uttarakhand initiative
<b>Teaching</b>	Teaching various PG/UG courses in AHEC and students of other departments of the institute regularly Designed two M.Tech. Programmes at AHEC “Alternate Hydro Energy Systems” and “Environmental Management of Rivers and Lakes” Designed 3 optional courses for UG students Short Term Course: Designed /Organised 51 International and 155 National Conferences/Seminars/workshops: Designed /Organised 24
<b>Research</b>	Papers in Journals (International/National) – 30 Books/special publication –19 Papers in Conferences (International/National) – 102 International Collaboration in Research – 21 Other Publication (Resource Papers/Reports) – 22 Ph. D. Thesis guidance: 2 (awarded), 2- under final stage and 5 (ongoing) = Total 9 M. Tech Thesis Guidance: 74 (completed) & 7 (ongoing), M Tech projects: 33
<b>Sponsored Research</b>	Developed/completed 15 Projects on master plans, zonal plans, resource assessment, technology development, hydropower real time simulator, performance evaluation, hydraulic turbine laboratory with outlay over Rs 60 crores
<b>Industrial Advisory</b>	Principal Investigator/Investigator in over 700 Projects with total outlay of over Rs. 100 crores
<b>Professional Travel</b>	Travelled extensively both internationally/nationally for various professional projects/ attending conferences/seminars/workshops/meetings.
<b>Co-Curricular and other activities</b>	Coordinator, Green Campus Committee, IITR (From Jan2014) Hon. Treasurer, <i>Anushruti</i> (IIT Roorkee social initiative- School for hearing challenged children) Head AHEC IITR from May 1998-Dec 2011 Chairman APC (1997-2011) and BOS (1998-2011) CFB (2002-2011), SRIC board – (2005-12), Senate (1998-2011) and IAC-(1998-2011), Deputy Director - STEP (1990-1998), Residential Warden (Ganga Bhawan (1982-85), Convenor - Photography section at IISc Bangalore (1979 – 81) and IISc (1979-81), Represented University Volley Ball team (1975-79), B' certificate NCC (1977–78)
<b>Personal Details</b>	DOB June 13, 1959 at Meerut, UP: Married, 2 Sons
<b>Contact Details</b>	Arun Kumar, Alternate Hydro Energy Centre, IIT Roorkee, Roorkee-247 667 (Uttarakhand), INDIA, 91-1332-285821 (Off.), 273270 and 285051 (Res.), 273517 and 273560 (Fax), e-mail: akumafah@iitr.ac.in or <a href="mailto:aheciitr.ak@gmail.com">aheciitr.ak@gmail.com</a>

## **Membership/Awards/On committees/ International Collaboration**

### **A. Awards/ Honours:**

Chair Professor (Renewable Energy), Alternate Hydro Energy Centre IIT Roorkee in July 2013 and April 2015.

Govt of India appointed Director in NHPC Ltd. Board in Nov 2015.

#### **International:**

1. Coordinating lead author (CLA) for Hydropower for IPCC Special Report on Renewable Energy during 2009-11.
2. NORAD fellowship (1988-89).

#### **National:**

1. CBIP "Cash your ideas Award - 1991" for innovative and indigenous solution for Weirs in hills,
2. Surya Award (III) by Indian Institute of Rural Development and Social Services, Delhi(2001),
3. National Scholarship (1973-79),
4. UGC fellowship (1979-81)

### **B. Membership of Professional Bodies/Societies:**

#### **International:**

1. Member - American Society of Civil Engineers(M-1023418)
2. Member - American Water Works Association(M-01081163)
3. Member - American Society of Mechanical Engineers (M-100173557)
4. Member- International Association for Hydro – Environment Engineering and Research (M- 43744)

#### **National:**

1. Life Fellow Institution of Engineers (India)( F-015964-2)
2. Life Fellow Indian Water Resources Society (F-1103)
3. Life Fellow Indian Water Works Association
4. Life Fellow Indian Hydraulic Society (F-758)
5. Member International Association of Hydraulic Research (CN-9943)
6. Life member Indian Association of Hydrologists (LM-170)
7. Life member- Solar Energy Society of India (LM-1136/2005)
8. Life member – Indian National Hydropower Association (INHA/LIFE/013)

### **C. Institutional Collaboration:** Worked for designing and executing the institutional MoUs

#### **International:**

Instrumental in Arranging MOU with International Organisations: Voith Hydro Germany, University of Itijuba (Brazil), University of Peradeniya (Sri Lanka), The Water Resources University - Hanoi (Vietnam), ICIMOD, WEC-HMG (Nepal), IN-SHP (China), REMC-AIT (Thailand), SCP Gestion Conceil (Canada), IH (UK), ITECO (Nepal) Kathmandu, HTA Switzerland

#### **National:**

Ministry of New and Renewable Energy (MNRE), Uttarakhand Govt., Bihar State Hydro Corporation, HimUrja (HP Govt.), J&K PDC.

### **D. Member on International Committees/Assignments:**

1. Resource expert for small hydropower in developing countries for IRENA meeting in Jan 2013 and workshop in Zambia (2013).
2. Expert for preparing report on Establishing SHP technology centre in Tanzania, UNIDO (2012)
3. Coordinating lead author on intergovernmental panel for climate change report on renewable energy – Hydro chapter (2009-2011)
4. Member of Science Planning Group (SPG) in the area of Sustainable Energy by International Council for Science Regional Office for Asia and the Pacific Kuala Lumpur (Malaysia) 2008
5. Development report on Capacity Building on small hydropower development in Cambodia (UNIDO), Implementing Small Hydro Power in particular in rural off grid areas of Sudan (UNIDO),
6. UNDP-GEF Hilly Hydro project,

7. REFRESHA with IH of UK,
8. WB: New Small Hydro Options,
9. R&M DPR with Canada,
10. WIDP-WECS-HMG of Nepal for GIS database in SHP,
11. Centre for Ecology & Hydrology : Training and Drainage Study for lean flow,
12. CIDA – SHP Technology Transfer.
13. Prepared a document for a SHP development for Nias island in Indonesia (UNIDO),
14. Prepared a document for privatisation of SHP in IRAN for Iran water and power co, Ministry of Energy,
15. Prepared sector report on hydropower development in India for Norwegian embassy

#### **E. Membership on National Committees:**

1. Ministry of New and Renewable Energy, constituted committee Chairman on Cost estimation for Village hydro project
2. Member (Alternate) of Bureau of Indian Standard (BIS) RVD Committee 15.4 on Small Hydro (1984-92).
3. Member (convener) of Civil Engg. Aspects - New Technology Committee of Ministry of Non-Conventional Energy Sources, Govt. of India (1997 -1998).
4. Member of 'Project Executive Committee' for UNDP-GEF Hilly Hydro Project, MNES, Govt. of India (1995-1999)
5. Member of High level "Project Implementation Committee" for UNDP GEF Hilly Hydro Project of Ministry of Non-conventional Energy Sources, Government of India (1998 -2000).
6. Member of "Purchase Committee" for UNDP GEF Hilly Hydro Project of Ministry of Non-conventional Energy Sources, Government of India (1998 -2000).
7. Member of "Renewable Energy Cell" of UP State Government since Aug. 2000
8. Nominee Director of IREDA for its funded project (July, 2000- 2003).
9. Member of "Rural Electrification Committee" of Uttaranchal – since Aug. 2001.
10. Member of Project Evaluation Committee of Uttaranchal Jal Vidyut Nigam, since July 2002.
11. Member CII – GBC Godrej Renewable Energy Committee,( 2003 till date).
12. Chairman of the committee constituted by MNES for village hydro cost estimation, 2004.
13. Member of Uttaranchal state committee for CDM projects 2005
14. Member, Advisory Committee, Uttarakhand Electricity Regulatory Commission (2006 – 2011).
15. Chairman, Hydropower seminar, ASSOCHAM and Royal Norwegian Embassy, 2006
16. Member of Planning Commission Sub-Committee on rivers, lakes and aquifer for 11<sup>th</sup> plan , 2006
17. Member of Planning Commission Sub-Committee on R&D Research, Design and Development in renewable energy, 2006
18. Member of International Scientific Committee constituted by MoEF for World Lake Congress, 2007
19. Member, Expert member of committee for State S+T Intervention Projects, DST, Govt. of India, 2007
20. Member, Expert member of committee for selection of site for IIT Patna from hydrology aspects.
21. Member of Standing Committee for Border area Illumination, Govt. of India, MNRE 2008.
22. Member of FICCI Renewable Energy Committee 2009
23. Member of examination of small hydropower site offers constituted by Uttarakhand government 2008 till date
24. Member of Uttarakhand state environment impact of hydropower project committee constituted by Uttarakhand government 2008 till date
25. Member of Consultative committee for mid-term evaluation of MoEF constituted by Planning Commission 2009.
26. Member of expert committee for examining the special issues related to Varanasi sewage on river Ganga constituted by MoEF 2010.
27. Member of expert committee for examining the issues of Loharinag Pala hydro project constituted by MoEF 2010 and again in 2011.
28. Member of governing body as faculty member for Technology Incubation and Entrepreneurship Activity (TIEDA) of IIT Roorkee since Dec 2010,
29. Member- 12th Plan proposals preparation for small hydro sub group of Ministry of New and Renewable Energy (2011)
30. Chairman Expert Committee of MoEF for Srinagar Project – April – May, 2013.

## Details of Papers/books Published/Research Work—Dr Arun Kumar

### I. Journal Peer reviewed Publication

1. Shahid ul Islam and **Arun Kumar**; Inflatable Dams For SHP Projects, International Journal Renewable & Sustainable Energy Reviews (In press)
2. A.K. Rai and **A. Kumar**, Analyzing hydro abrasive erosion in Kaplan turbine: A case study from India, International Journal of Hydrodynamics (In press).
3. Singh Gurdeep and **Kumar Arun**; Performance Evaluation of Desilting Basins Of Small Hydro Power Projects; ISH Journal of Hydraulic Engineering (In press).
4. Harish VSKV and **Kumar Arun**; Reduced order modeling and parameter identification of a building energy system model through an optimization routine, Applied Energy 162 (2016) 1010–1023
5. Ali Abbas & **Arun Kumar**, Development of draft tube in hydro-turbine: A review , International Journal of Ambient Energy, October 2015 , DOI:10.1080/01430750.2015.1111845
6. A.K. Rai and **A. Kumar**, Continuous Measurement of Suspended Sediment Concentration: Technological Advancement and Future Outlook, Measurement (2015), doi: <http://dx.doi.org/10.1016/j.measurement.2015.08.013>
7. Singhal M. K., **Arun Kumar**, Optimum Design of Penstock for Hydro Projects, International Journal of Energy and Power Engineering, Vol. 4, No. 4, 2015, pp. 216-226. DOI: 10.11648
8. Tomar N. and **Kumar Arun**, “Performance Analysis of Fish Passes at Hydraulic Structures Constructed on River Sutlej”, Water & Energy International Journal, Vol. 58, No. 2, May 2015, pp 51 - 61.
9. Pandey MK. and **Kumar Arun**, “Pumped Storage Hydropower in India for Integration of Intermittent Renewable Energy”, Water & Energy International Journal, Vol. 58, No. 3, June 2015, pp 49 - 57.
10. Harish VSKV and **Kumar Arun**, “Demand side management in India: Action plan, policies and regulations: Renewable and Sustainable Energy Reviews, 33(2014), pp 613–624
11. Javed Dhillon, Kumar Arun and Singal SK; “Stochastic approach for providing the operation of Wind and pumped storage under Deregulated Environment”, International Journal of Green Energy: Volume 13, Issue 1, 2016 (DOI: 10.1080/15435075.2014.909358)
12. Dhillon J, **Kumar Arun** and Singal SK; “Optimization methods applied for Wind–PSP operation and scheduling under deregulated market: A review, Renewable and Sustainable Energy Reviews 30 (2014) 682–700
13. Dhillon J, **Kumar Arun** and Singal SK; “Operation of Wind and Pumped Storage Plant under Deregulated Environment, W & E International (Renewable Energy Section), Water & Energy International, November 2012, pp 30 - 34.
14. Swarnkar N K, **Kumar A.**, Estimation of crane capacity and crane span for small hydro power house, IASH Journal, International Association For Small Hydro, ISSN: 2250 – 0103/2250-0111, Vol. 2, No. 1, January 2013.
15. Kawade S, **Kumar A**, Sharma M P. (2013), GHG emissions from hydropower reservoirs: Review on CO<sub>2</sub> and CH<sub>4</sub> emission measurements, International Journal of Applied engineering research, Vol 8, No 9, PP 84-90
16. Singh Gurdeep and **Kumar Arun**; “A Review of Desilting Basins Used in Small Hydropower Plants”, International Journal of Emerging Technology and Advanced Engineering, May 2013, Vol 3, Issue 5, pp 440 – 444.

17. Dhillon J, **Kumar Arun** and Singal SK; “Operation of Wind and Pumped Storage Plant under Deregulated Environment”, International Journal Water and Energy International, Nov 2012, Vol 69, Issue no. 11, pp 30 – 34.
18. REN21. 2012. Renewables 2012-Global Status Report: (Paris: REN21 Secretariat). Arun Kumar: lead Topical Contributor for Hydropower pp 171 May 2012
19. **Kumar, A.**, T. Schei, A. Ahenkorah, R. Caceres Rodriguez, J.-M. Devernay, M. Freitas, D. Hall, Å. Killingtveit, Z. Liu, 2011: Hydropower. In IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation [O. Edenhofer, R. Pichs-Madruga, Y. Sokona, K. Seyboth, P. Matschoss, S. Kadner, T. Zwickel, P. Eickemeier, G. Hansen, S. Schlömer, C. von Stechow (eds)], Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. (Invited)
20. Arvizu, D.,, **A. Kumar**, et al 2011: Technical Summary. In IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. (Invited)
21. IPCC, 2011: Summary for Policymakers. In: IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. **team of authors –Kumar A.** (Invited)
22. Stubauer, I., **Kumar, A.**, ... and Moog, O. (2010) The Development of an Assessment System to Evaluate the Ecological Status of Rivers in the Hindu Kush-Himalayan Region: introduction to the special feature, Hydrobiologia, Volume 651, Number 1, September 2010 , pp 1-15.
23. Sharma M.P., **Kumar Arun** and Rajvanshi Shalini, “Assessment of Trophic State of Lakes: A Case of Mansi Ganga Lake in India”, J. of Hydro Nepal –Journal of Water, Energy and Environment, Issue No. 6, January 2010, 65-72
24. Saxena, Praveen, and **Arun Kumar**. "Small hydro power development in India."Ministry of New and Renewable Energy, Government of India, New Delhi (2007).
25. S.K. Singal, **Kumar Arun**, D. K. Agarwal, O. D. Thapar, and Manoj Arya, “Implementation Of Dam Based Small Hydro Power Plant - A Case Study”, IEEMA Journal, XXVII (9), 58- 63 (Sept 2007) (**invited**)
26. M.P. Sharma, Shailendra Sharma, Vivek Goel, Praveen Sharma & **Kumar Arun**, “ Water Quality Assessment of Behta River using Benthic Macroinvertebrates” Life Science Journal, 3 (4), 2006, pp 67-74.
27. Arun Kumar, “SHP-Potential, Technology and Environment”, SHP Development and Programme Worldwide, SHP NEWS, Autumn, 2003
28. Rees, G.H., Croker, M., Singhal, M.K., Saraf, A.K., **Kumar Arun** & Others, “Flow Regime Estimation of Small Hydropower Development in Himachal Pradesh”, J. Applied Hydrology, Vol. XV(2), 2002, pp 77-90.
29. **Kumar Arun**, “New technology for small hydropower projects”, J. of Power and River Valley Develop Vol. XLVIX 1999 pp 134-141. (**Invited**)
30. **Kumar Arun**, "Cost Effective Civil works as Applicable to Small Hydro Power" RN-SHP, Hangzhou Newsletter for Small Hydropower (Published in issue No. 1,1991).

## II. Book/special publication

1. **Kumar, A.**, “Benchmark cost for small and large hydropower projects” sponsored by Ministry of New and Renewable Energy, AHEC IIT Roorkee, August 2015.
2. Proceeding of International Conference on Hydropower for Sustainable Development, Dehradun, Feb 05-07, 2015, pp 568.
3. Proceedings on National Workshop on Developing an Strategy for Education and Vocational Training for the Renewable Energy Sector in India at New Delhi, Aug 22, 2014, pp 44.

#### 4. National Standards/Manuals/Guidelines for SHP Projects 2013

1. General 1.1- Small hydropower definitions and glossary of terms, list and scope of different Indian and international standards/guidelines/manuals
  2. General 1.2 and 2.1 - Planning and Layouts
  3. General 1.3 - Project hydrology and installed capacity
  4. General 1.4 - Reports preparation: reconnaissance, pre-feasibility, feasibility/ detailed project report and as built report
  5. General 1.5 - Project cost estimation
  6. General 1.6 - Economic and financial analysis and tariff determination
  7. General 1.7 - Model contracts for execution and supplies of civil and E&M works
  8. General 1.8 - Project Management of Small Hydroelectric Projects
  9. General 1.9 - Environment Impact Assessment
  10. General 1.10 - Performance evaluation of small hydro power plants
  11. General 1.11 – Renovation, Modernization and Upgrading
  12. General 1.12 - Site Investigations
  13. Civil Works 2.2 & 2.3 - Hydraulic and Structure design
  14. Civil Works 2.4 - Maintenance of civil works (including hydro-mechanical)
  15. Civil Works 2.5 - Technical specifications for Hydro Mechanical Works
  16. Electro Mechanical works 3.1 - Selection of Turbine and Governing System
  17. Electro Mechanical works 3.2 - Selection of Generator and Excitation systems
  18. Electro Mechanical works 3.3 – Design of switchyard and selection of equipment, main SLD and layout
  19. Electro Mechanical works 3.4 – Selection of Control, Automation, Protection and Monitoring system
  20. Electro Mechanical works 3.5 – Design of Auxiliary systems and selection of equipments
  21. Electro Mechanical works 3.6 - Technical Specifications for procurement of generating equipments
  22. Electro Mechanical works 3.7 - Technical Specifications for procurement of auxiliaries
  23. Electro Mechanical works 3.8 - Technical Specifications for procurement and installation of switchyard equipment
  24. Electro Mechanical works 3.9 - Technical Specifications for procurement of control, automation, protection and monitoring systems
  25. Electro Mechanical works 3.10 - Power Evacuation and Interconnections with Grid
  26. Electro Mechanical works 3.11 - Operation and maintenance
  27. Electro Mechanical works 3.12 Erection, Testing and Commissioning
5. Sustainable Energy in Asia and the Pacific – Emerging Technologies and Research Priorities, Academy of Science Malaysia, ICSU Regional Office for Asia and the Pacific, Kuala Lumpur, 2010. Chapt 6 Hydropower
  6. Small Hydropower – Initiative and Private Sector Participation (Edition 1 in 1997, Edition 2 in 2001, Edition 3 in 2003).
  7. Guidelines For Preparation Of Project Reports Under National River Conservation Plan And National Ganga River Basin Authority, Ministry Of Environment & Forests, National River Conservation Directorate, New Delhi, Dec 2010.
  8. HK Verma & **Arun Kumar**; “Performance Testing of SHP Stations: A Guide for Developers, Manufacturers and Consultants”, Dec 2009.
  9. **Kumar Arun** presented as Anon ((2009): Status Paper on Ganga, National River Conservation Directorate, Ministry of Environment and Forest, Govt of India 31 p. Aug 2009
  10. **Arun Kumar** ,”Renewable energy for Industrial application- A case study of India”, A chapter on small hydro, UNIDO, Vienna May 2007
  11. Compendium Of The Expertise And Facilities Of Member Organisations; Water For Welfare – An Uttarakhand Initiative” Virtual Centre Of Excellence In The Form Of Federation Of Existing Institution For Leveraging Hydro/ Power/ Water Resources In Uttarakhand; April 2009
  12. Special publication on Water Policy and Water Conservation, Water For Welfare – An Uttarakhand Initiative” Virtual Centre Of Excellence In The Form Of Federation Of Existing Institution For Leveraging Hydro/ Power/ Water Resources In Uttarakhand, March 2008

13. Special publication on Hydro Power Policies and Guidelines, Water For Welfare – An Uttarakhand Initiative” Virtual Centre Of Excellence In The Form Of Federation Of Existing Institution For Leveraging Hydro/ Power/ Water Resources In Uttarakhand, March 2008.
14. Special publication on Impact of Tehri Dam – Lessons Learnt, Water For Welfare – An Uttarakhand Initiative” Virtual Centre Of Excellence In The Form Of Federation Of Existing Institution For Leveraging Hydro/ Power/ Water Resources In Uttarakhand, March 2008.
15. Syllabi of Additional Courses for Leveraging Rich Potential of Water and Hydro Resources in Uttaranchal”, Oct. 2006.
16. “Micro hydro Quality standard”, AHEC IIT Roorkee, Sept 2005
17. Report of Zonal Plan Activities, Vol I\_ main report, Vol II Thematic Maps and Vol III Regional Flow duration models, AHEC IIT Roorkee April 2002
18. Prepared the draft and final version of the guidelines for Bureau of Indian Standard on the "Preliminary dimensions of small, mini & micro hydro power station and selection of turbines"(draft) as an alternate member of committee on hydropower stations. (Published IS 12800 (part 3):1991).
19. Special Issue on Small Hydro- Urja Bharati, Journal of Ministry of Non-Conventional Energy Sources as Convener of Publication Advisory Committee (Aug. 1992).

### III Congress/Conference publications

1. **Kumar Arun**; Agarwal Abhishek, Bagga Aarushi and Sarda Manoj, “Solar Installation Initiatives in BEG & C Campus”, National Seminar of Defense Personnel, Bengal Engineer Group & Centre, Roorkee, April 2015
2. Rai Anant Kr., **Kumar Arun** and Staubli Thomas, “Developing A Test Rig to Measure Hydro-Abrasive Erosion in Pelton Turbine”, International Conference on Hydropower for Sustainable Development, Dehradun, pp 535 - 547, Feb 05-07, 2015
3. SK Singal, **Arun Kumar**, Vinit Kumar Singh, MS Verma and Abhilasha Jain, “Hydro Power Development in Arunachal Pradesh - Issues”, International Conference on Hydropower for Sustainable Development, Dehradun, pp 454-462, Feb 05-07, 2015.
4. Rai Anant Kr., **Kumar Arun** and Staubli Thomas, “An innovative approach to measure hydro-abrasive erosion in Pelton turbine”, International Conference on Environment and Energy (ICEE-2014) - December 15-17, 2014 at Hyderabad, India.
5. B.K. Gandhi\*, A. Kumar and HK Verma, “Discharge And Efficiency Measurements In Bassi Hydro Power Station In India”, , International Conference on Hydraulic Efficiency Measurement (IGHM-2014), University of Itzjuba, Brazil, Sept 16-19, 2014
6. Harish, V S K V and **Kumar, A**, "A simplified mathematical approach to develop a thermal model of building in MATLAB/Simulink," National conference on emerging trends in engineering science & technology (NCETEST), vol., no., pp.173, 29-30 March. 2014
7. Harish, V S K V and **Kumar, A**, "Planning and implementation strategy of Demand Side Management in India," Automation, Control, Energy and Systems (ACES), 2014 First International Conference, vol., no., pp.1,6, 1-2 Feb. 2014.
8. **Kumar A** and Sinvhal H., “Hydropower, Disaster and E-flows”, National symposium on “Eco-disasters in the Himalayas: Causes, Challenges and Management” organized by H.N.B. Garhwal University, Srinagar during Feb 15 – 16, 2014, Srinagar.
9. **Kumar A.**, “Water Quality Monitoring in India” in the workshop “Integrated Water Management for Ganga Basin: A Workshop on Collaboration Avenues” organized by NMCG, MOEF, New Delhi, Feb 10 – 11, 2014, New Delhi

10. Harish VSKV and **Kumar A.**, Techniques used to construct an energy model for attaining energy efficiency in buildings A Review, International Conference on Control, Instrumentation, Energy and communication, University of Calcutta, Kolkata, Jan 31 – Feb 02, 2014
11. Harish, V S K V and **Kumar, A.**, "A nonlinear time invariant constrained optimization technique for parameter identification of a building energy model," Conference on Electronics Engineering and Computer Science (IEMCON), International Conference on, vol., no., pp.339-343, 2014.
12. Harish, V S K V and **Kumar, A.**, "Development of an energy model of a building's conditioned space equipped with a heating, ventilation and air conditioning system," Energy in Buildings (EinB), 2014 3rd International Conference on, pp.242-254, Nov. 2014, ISSN: 2241-9748.
13. **Kumar A.**, International Best Practices” in the Conference on “Small Hydro in India - Issues and Opportunities”, Oct 25, 2013, Power Line at New Delhi
14. **Kumar A.**, “E-flows: A Beginning is required”, workshop on Assessment of Environmental Flows, NIH Roorkee, Oct 02 – 03, 2013
15. **Kumar A.**, “Geo-meteorological Analysis of the Event and Technological Needs” State level workshop on “Responsibility Sharing and Work Distribution on Uttarakhand Disaster – Lesson for Future planning in the Indian Himalayan Region” in FRI Campus, Dehradun on Sept 19, 2013.
16. Harish, V S K V and **Kumar, A.**, "Managing electrical energy in buildings for energy conservation," National congress on science and technology, DAV Institute of Engineering & Technology Jalandhar Punjab, India, 30-31 May. 2013.
17. **Kumar A.**, The role of small hydro in the Indian energy system, Indo-Norwegian seminar: Renewable Energy Respecting Nature 7-8 May 2013, Mumbai
18. Swati Kawade, **Kumar A** and Sharma MP (2013). Contribution of CO<sub>2</sub> and CH<sub>4</sub> emissions through different Greenhouse gases emission pathways in total GHG emission from a tropical hydropower reservoir. Renewable energy respecting nature, Indo-Norwegian seminar, Mumbai, India 7-8 May 2013
19. Swati Kawade, **Kumar A** and Sharma MP (2013). Annual estimate of Green-House gases emissions (GHG) from a tropical reservoir in India. India water week, New Delhi, India 8-12 April 2013, Efficient water management: challenges and opportunities, pp 294
20. Dhillon J., **Kumar A.** and Singal S. K., Optimal Operation of Wind-PSP under Grid Connected Day ahead Market, IEEE International Conference on Research and Development prospects on Engineering and Technology, E.G.S Pillay Engineering college, Nagapattinam, Tamil Nadu, India, March, 2013.
21. Bhatt, Utsav, Verma, H.K.; **Kumar, A.**, Automation and remote control of volumetric calibrator using RS-485/MODBUS protocol, 2nd International Conference on Power, Control and Embedded Systems (ICPCES) Allahabad, 17-19 Dec. 2012, 10.1109/ICPCES.2012.6508038
22. Dhillon J, **Kumar Arun** and Singal SK; “Scheduling of Wind and Pumped storage plant under Day Ahead Market”, 17th International Seminar on Hydropower Plants – Pumped Storage in the Context of Renewable Energy Supply, Nov 2012, Vienna, pp 53 – 62.
23. Dhillon J, **Kumar Arun** and Singal SK; “Short term Wind-PSP Scheduling using MINLP approach”, 6th International Multi Conference on Intelligent System, Sustainable, New and Renewable Energy Technology and Nanotechnology (IISN-2012), Klawad, pp. 71-75, March 16-18 , 2012.
24. **Kumar A.**, “Hydropower in Rural Development - Overview of solutions in India” at International symposium on “The Place of Water Power in the Renewable Energy Panel held during November 20 – 21, 2012, in Grenoble, France”. (Invited)



25. **Kumar A**, “Small Hydro Resource Assessment” ASEAN-India Workshop on Cooperation in New and Renewable Energy by Ministry of New and Renewable Energy on Nov 06, 2012 at New Delhi. (Invited)
26. **Kumar A**, “Small Hydro In India”, Indo Swiss Symposium on Renewable Energies and Rational Energy End-use held at EPFL, Lausanne, Switzerland from October 22 – 25, 2012. (Invited)
27. **Kumar A**, “Environmental and Social Impact of SHP Projects” in the Conference on “Small Hydro in India - Issues and Opportunities” during Oct 15 –16, 2012 at New Delhi (Invited)
28. Swati Kawade, **Kumar A** and Sharma MP (2012), “Methodologies use for GHG emissions from Tehri Hydropower reservoir”, International workshop for inter-comparison of reservoir GHG flux measurement technologies, Beijing, China, hosted by Institute of remote sensing applications Chinese academy of science during 18-24 June 2012
29. **Kumar, A**, “Establishing The Role Small Hydro Can Play In Developing Countries Through Case Study Analysis”, 4th annual Small Hydro 2012 conference , 25th – 26th April 2012 in Toronto, Canada (Invited)
30. **Kumar, A**, Challenges in carrying out CIA of hydropower projects: absence of data, Cumulative Impact Assessment of Hydropower Development in Nepal, March 12-13, 2012 , Kathmandu, Nepal (Invited)
31. **Kumar, A**, “Shp Development In India”, National Seminar “Implementation of Hydro Projects through Private Participation” Jan 10, 2012, Pune, India (Invited)
32. **Kumar A**, “Indian Experience in Micro/small hydro development”, Regional Workshop on Micro Hydropower Development: Prospects & Challenges in South Asia September 12 - 14, 2011 in Kathmandu, Nepal( Invited)
33. **Kumar Arun**, Small Hydropower: Social and Environment service , presented at Second World Renewable Energy Technology Congress-2011, New Delhi Apr 21-23, 2011 (Invited)
34. **Kumar Arun**, “Challenges in Implementing Hydropower in India and Relevant Technology Development”, International Symposium on Energy Materials: Opportunities and Challenges, Kolkata, March 1-2, 2011(Invited)
35. Swati KM, Sharma MP and **Kumar A**, “Green-House Gas From Hydropower Reservoirs”, In proceedings of International Conference on Sustainable Water Resources Management and Climate Change Adaptation, organized by National Institute of Technology Durgapur, Durgapur (West Bengal), pp 405-420, Feb.17-19, 2011.
36. Saxena P, and **Kumar A**, “Government of India Policy on Hydro Power Development”, International Conference on Hydraulic Efficiency Measurement (IGHM-2010), Alternate Hydro Energy Centre, IIT Roorkee, Roorkee (India), pp.1-6, Oct. (21-23) 2010
37. Patil SS, Verma HK and **Kumar A**, Efficiency Measurement of Hydro Machine by Thermodynamic Method, International Conference on Hydraulic Efficiency Measurement (IGHM-2010), Alternate Hydro Energy Centre, IIT Roorkee, Roorkee (India), pp.181-189, Oct. (21-23) 2010.
38. Jain Sanjay, Saini R.P. and **Kumar Arun**, “CFD approach for prediction of efficiency of Francis Turbine”, International Conference on Hydraulic Efficiency Measurement (IGHM-2010), Alternate Hydro Energy Centre, IIT Roorkee, Roorkee (India), pp.257-263, Oct. (21-23) 2010.
39. Shekhawat Kuldeep Singh, Saini R.P. and **Kumar Arun**, “Finite Element Method (FEM) Analysis of Silt Erosion in Small Hydro Turbine” National Seminar on Advancement of Renewable Energy, presented at Arya College of Engineering, Jaipur
40. **Kumar Arun**, “Hydropower : Sustainable Energy Hydropower”, World Renewable Energy Technology Congress-2010, 18– 20 March 2010, New Delhi (Invited)

41. **Kumar Arun**, “Introduction to Low Head Hydropower Technology and its' Potential”, Workshop on Low-Head Hydropower Development, Colombo Feb 18-20, 2010, (Invited)
42. HK Verma & **Kumar Arun**; “Performance Testing of SHP Stations: A Guide for Developers, Manufacturers and Consultants”, Dec 2009.
43. **Kumar Arun**, “Status of SHP Development In India”, National Seminar Hydro Power Stations-Advancement In Harnessing & Up-Keeping July 2 – 3, 2009, Dehradun (Invited)
44. **Kumar Arun** and Vinay Shankar, “SHP Development In India”, 5th Hydro Power for Today Forum, May 11-12 2009, Hangzhou, China
45. **Kumar Arun**, “Small Hydropower Development: Recent Indian Initiatives”, International Conference Water India-V, New Delhi (India) on 3-4 November, 2008, (Invited)
46. **Kumar Arun** and Vinay Shankar, “Preparation Of A Plan Of Interventions For Conservation Of Vembanad Lake, Kerala, India”, International workshop on Sustainability of Lake Remediation and Interventions Hyderabad, India
47. **Kumar Arun** and Vinay Shankar, “Human Resource Development For Sustainable Remediation and Interventions”, International workshop on Sustainability of Lake Remediation and Interventions Hyderabad, India
48. Maity D, Sinvhal H and **Kumar Arun**, “Comprehensive Management Plan of Rabindra Sarovar, Kolkata” presented in International workshop on "Sustainability of Lake Remediation and Interventions", July 22-25, 2008, Hyderabad.
49. Gardiner D.J., **Kumar A.**, et. al., 2008; Science Plan on Sustainable Energy, International Council for Science Regional Office for Asia and the Pacific Kuala Lumpur (Malaysia).
50. M.P.Sharma, Vivek Goel and **Kumar Arun**, “Water quality mapping of Kosi River using benthic macroinvertebrate” presented at “International conference on “Rivers in Hindu Kush-Himalaya: Ecology and Environmental assessment” held at Kathmandu, Nepal on March 03-07, 2008. (Invited)
51. M.P. Sharma & **Kumar Arun**, “Water Resources Management Strategies in India”, presented at “International conference on “Rivers in Hindu Kush-Himalaya: Ecology and Environmental assessment” held at Kathmandu, Nepal on March 03-07, 2008
52. Saxena P and **Kumar Arun**, “Small Hydro Development In India”, Ministry of New and Renewable Energy, Special Publication on 25 years of Renewable Energy in India, Nov. 2007. (Invited)
53. **Kumar Arun**, “Hypolimnic Withdrawal For Lake Conservation”, World Lake Conference (Taal 2007) at Jaipur Oct 28-30, 2007 ( Key Note Address- Invited)
54. **Kumar Arun**, H. K. Verma, Indian initiative to develop standards, guidelines and manuals for small Hydropower, International Conference on Small Hydropower Kandy, Sri Lanka, 22-24 October 2007
55. J. D. Sharma, **Kumar Arun**, M. K. Singhal, Real time digital simulator for small hydropower plants, International Conference on Small Hydropower Kandy, Sri Lanka, 22-24 October 2007
56. H. K. Verma, **Kumar Arun**, Performance testing and evaluation of small hydropower plants International Conference on Small Hydropower Kandy, Sri Lanka, 22-24 October 2007
57. R. P. Saini, **Kumar Arun**, Water mills for multipurpose applications, International Conference on Small Hydropower Kandy, Sri Lanka, 22-24 October 2007
58. **Kumar Arun**, SMALL HYDROPOWER DEVELOPMENT: Non-Fossil Energy for Sustainable development, 7th renewable energy, summit, Sept 12, 2007, New Delhi (invited)

59. **Kumar Arun** & Mk Singhal, Small Hydropower Development National Seminar On Recent Advances In Wind And Hydro Energy Generation September 20, 2007 Jammu (invited)
60. **Kumar Arun**, “Small Hydro Power: Growth, Prospects, Barriers And Mitigations”, Capacity Building Initiative Workshop For Financial Institutions In India To Address Risks And Barriers Associated With Re Projects, May 18-19, 2007, Mumbai (Invited)
61. **Kumar Arun**, “Training and Education in Small Hydropower and other Renewable Energy”, Strategy for Quality focused training in Renewable Energy and Distributed Generation in India, Feb 21, 2007, New Delhi. (Invited)
62. **Kumar Arun**, “Small Hydropower: Potential And Developmnet”, National Seminar On Hydropower: Harnessing The Untapped Potential, January 04, 2007, New Delhi (Invited)
63. **Kumar Arun**, “Small Hydro Power – Resource Assessment & Technology Development”, Workshop On India-Asean Cooperation In Renewable Energy 18-19 December 2006, New Delhi (Invited)
64. **Kumar Arun** & Verma HK, “Standards And Guidelines For Small Hydropower Development: The Indian Initiative”, International Himalayan Small Hydropower Summit, October 12-13, 2006, Dehradun
65. Saraf AK & **Kumar Arun**, “Spatial Technologies In Himalayan Small Hydropower Development”, International Himalayan Small Hydropower Summit, October 12-13, 2006, Dehradun
66. **Kumar Arun**, “Some Specific Aspects Of Small Hydropower Projects For Consideration By Regulators”, International Himalayan Small Hydropower Summit, October 12-13, 2006, Dehradun
67. Saini RP & **Kumar Arun**, “Development Of Standard Water Mills In Uttaranchal”, International Himalayan Small Hydropower Summit, October 12-13, 2006, Dehradun
68. **Kumar Arun**, “Standards and Performance Testing of Small Hydropower” Workshop on “Development of Small, Mini & Micro Hydropower Plants – Challenges & Related Issues” 16th June, 2006, CBIP, New Delhi, (Invited)
43. **Kumar Arun**, “Sustainable Conservation of Lakes” National Consultation on Water Management in Fisheries and Aquaculture, June 23-24, 2006, Pussa, New Delhi. (Invited)
44. **Kumar Arun**, M.K. Singhal, Sejal Kunchwar Small Hydro Power Projects – Issues, Constraints and Suggested Measures during Aug. 23-25, 2005, Shimla, Himachal Pradesh. (Invited), (Invited)
45. **Kumar Arun**, “DDG Technologies – Potential, Constraints, Application and Relevance to Uttaranchal” Workshop on Renewable Based DDG From Commissioning to Viability, March 18, 2006, Dehradun. (Invited)
46. **Kumar Arun**, Small Hydropower - Untapped Potential, 5th ASSOCHAM Renewable Energy Summit on Commercialization of Renewable Energy Technologies, Aug. 25-26, 2005. (Invited)
47. **Kumar Arun**, Saini, R.P., Gandhi B.K., and Verma, H.K., “Performance Testing of Hydropower Stations: Need, Scope and Recommendations”, Conference on Development of Hydropower Projects – A Prospective Challenge, April 20-22, 2005, Shimla. (Invited)
48. **Kumar Arun**, “Small Hydropower: Option for Electricity Generation”, International Seminar on Non-conventional Energy, Renewables Energy Efficiency and Conservation”, Feb. 20-21, 2005, Thiruvananthapuram. (Invited)
49. **Kumar Arun** and Verma H.K., “Standards and Testing of Small Hydropower Stations”, International Congress on Renewable Energy, Jan. 20-22, 2005, Pune. (Invited)

50. **Kumar Arun**, “Existing Micro Hydro Standards and Quality Programmes in India”, South Asia Regional Workshop on Developing Standards for Micro-Hydro Sector, Colombo, Sri Lanka, Sept. 5-7, 2004. (Invited)
51. Verma, H.K. and **Kumar Arun**, “Instrument Networking for Efficiency Measurement in Small Hydro Power Stations”, international conference on Advances in Hydraulic Efficiency Measurements at Lucern, Switzerland, July 14-16, 2004. (Invited)
52. **Kumar Arun**, “Technical issues and design of structure for low head projects”, International seminar on Renewable Energy, June 10-12, 2004 at Colombo, Sri Lanka. (Invited)
53. **Kumar Arun**, “Small Hydropower in Hilly Regions” Presented at International Congress on “Renewable Energy for Sustainable Development”, Jan. 21-23, 2004 at Bangalore. (Invited)
55. **Kumar Arun**, “Small Hydropower Development - Potential and Rural Electrification”, Presented at Regional Seminar on “Small Hydropower”, Nov. 11-15, 2003 at Thiruvananthapuram, Kerala. (Invited) – also included in IREDA news (Jan. 2004).
56. **Kumar Arun**, “Rural Electrification: Small Hydro”, Presented at Round Table Meet on “US India Initiative for Hydropower Development”, April 14, 2003, New Delhi. (Invited)
57. **Kumar Arun**, “Distributed Generation : Technologies for Power Supply in Rural Areas” Presented at National Workshop on “Rural Electrification: Small Mini/Micro Hydel – Technology Overview” held on Jan. 24-25, 2003 at New Delhi (Invited)
58. **Kumar Arun**, “Small Hydropower Development Potential, Technology & Environment”, Presented at National Conclave on “Small Hydropower” held on July 18-19, 2002 at New Delhi. (Invited) – also included in IREDA news and SHP News (China)
59. Rees, G.H., **Kumar Arun**, Saraf, A.K., Singhal, M.K., “Application of Regional Flow Estimation method in the Himalayas”, 4th International Conference on FRIEND in Cape Town, South Africa, Mar. 18-22, 2002.
60. **Kumar Arun**, “Small Hydro Potential and Prospects in India”, International Conference “Green Power 2002”, CII, Feb. 15-16, 2002, Chennai. (Invited)
61. **Kumar Arun**, Rees, G., Raghuvanshi, T.K., “Small Hydropower assessment through HP Software”, Annual International Conference Map India 2002, New Delhi, Feb. 6-8, 2002. (Invited).
62. Kumar Arun, “Selection of sites and low head turbines for Small hydro power development”, business meet on Small Hydro Power Projects 2000-2001, Hyderabad Dec. 14, 2000. (Invited)
63. Raghuvanshi AK and Kumar Arun, “GIS Based Assessment of Small Hydro Power Potential in Himachal Pradesh” National Seminar on small Hydro, Shimla, Dec. 09, 2000 (Invited).
64. Kumar Arun, “Small Hydro Power Potential in Uttarakhand Region” Seminar on Harnessing of Uttarakhand Resources for Development of the Himalayas, Dehradun, September 10, 2000. (Invited)
65. Kumar Arun, Testing and certification of Small Hydro Equipment national Conference on renewable energy, Indore Dec. 20-22, 2000. (Invited)
66. Kumar Arun and Singal SK, Low Head small hydro power development', national workshop, Chandigarh Jan. 17, 2000. (Invited)
67. Kumar Arun, "Assessment of Small Hydro Scheme in India", IEA Workshop on Review of Assessment Methodologies and Possible Improvements, Nice, France, Oct. 13-14, 1998. (Invited)
68. Kumar Arun, "Small Hydro Power - Technology R&D Areas", IEA Workshop at Nice, France, Oct. 13-14, 1998 .(invited)

69. Kumar Arun, "Small Hydro - A National Perspective", ANERT National Conference, Thiruananthapuram, Feb. 10-11, 1999. (Invited)
70. Kumar Arun, "Private Sector Participation in SHP Development in India - An Introspection", ANERT National Conference, Thiruananthapuram, Feb. 10-11, 1999.
71. Kumar Arun, "Reviving the Small Hydro Potential in Uttar Pradesh", National Seminar on Development Needs of Uttarakhand Region", Dehradun, Feb. 20-22, 1999. (Invited)
72. Kumar Arun, "Small Hydro Schemes in Hilly Areas with Limited Hydrological Data", International Symposium on "Hydrology of ungauged streams in Hilly Region for SHP Development, March 9-10, 1998, New Delhi.
73. Singh RD, Chaudhary H and Kumar Arun, "Regional Flow Duration for Himalayan Region of the Indian State of Uttar Pradesh", 5th International Conference "Hydroenergia 97", Dublin, Ireland, Sept. 29-Oct.1, 1997.
74. Kumar Arun, "Regional Flow Duration Model for Planning Small Hydro Power Projects in Himalayan Catchments of a North India State", 3rd International Conference of Hydro Power, 1997, Trondheim, Norway, June 30-July 2, 1997.
75. Kumar Arun, "GIS in Small Hydro Planning and Resource Management", Issue Sept - Oct.' 1997, GIS Development, New Delhi PP 30-37.
76. Kumar Arun, "Small Hydro Status" CII organised International Conference on Investment Opportunities in Renewable Energy, Mumbai, Sept. 11-12, 1997. (Invited)
77. Kumar Arun, "Small Hydro Power Scenario in Uttar Pradesh", All India Seminar on Development of Hydro Power Potential in India, April 22, 1997, Lucknow. (Invited)
78. Kumar Arun, "Survey and Assessment of Small Hydro Potential" International Conference on Small Hydro Power System, Mar 13-14, 1997, New Delhi. (Invited)
79. Kumar Arun, "Technology Selection Challenges for Small Hydro Power" International Conference on Small Hydro Power System, Mar 13-14, 1997, New Delhi.
80. Kumar Arun, "Remote Sensing and GIS Application in Small Hydro Projects Planning & Development. International Conference on Small Hydro Power System, Mar 13-14, 1997, New Delhi.
81. Kumar Arun, "Small Hydro Power Technology", All India Peoples' Technology Congress, Calcutta, Feb. 21-23' 97. (Invited)
82. Kumar Arun, "Selection of member and size of unit of Small Hydro Plant"; First International Conference on Renewable Energy and Small Hydro, Feb. 3-7 1997, Hyderabad.
83. Kumar Arun, "Resource Assessment-Resource assessment", International workshop for NAM and developing countries on Renewable Energy Application, Photovoltaic, Wind & Small Hydro, New Delhi, Dec. 3-7, 1996. (Invited)
84. Kumar Arun, "Small Hydro Power Status, Technology and R&D Areas, Seminar on S&T Inputs to Renewable Energy, Proceeding and Legislation, IIT, New Delhi, Nov. 22, 1995. (Invited)
85. Kumar Arun, "Small Hydro Potential of India', National Symposium on Renewable Energy, Bangalore Mar 6-7, 1995. (Invited)
86. Kumar Arun, "Small Hydro Power -Issues and Constraints" National Seminar on Small Scale Hydro Power, New Delhi, Jan 20-21, 1995. (Invited)
87. Kumar Arun, "Small Hydro Power and Role of consultant", National Seminar, Triputhi, Sept. 02, 1994.

88. Kumar Arun, and Singal SK "Sadani Small Hydro Electric Project - a case Study", National Seminar, Ranchi, Mar 1994. (Invited)
89. Panesar PS and Kumar Arun, "Ganga - Small Hydro Development", Seminar on Ganga in the Service of Nation", Roorkee, Sept, 1993.
90. Kumar Arun, "Economic & Financial Analysis of Small Hydro Power Projects", Urja bharati, Journal of Ministry of Non-Conventional Energy Sources, Vol. 3, No.2, Aug. 1992.
91. Kumar Arun and Jain MP "Potential of Entrepreneurship in Small Hydro Generation", International Conference on "Science Park Movement, Tiruchirapalli, Dec. 1990.
92. Kumar Arun, and Sinvhal H "Entrepreneur, Science Parks and Communication Through Video Media", International Conference on Science Park Movement, Tiruchirapalli, Dec. 1990.
93. Kumar Arun, "Civil Engineer as Manger of Hydraulic Project" 5th National Convention of Civil Engineers, Institution of Engineers, Calcutta Jan. 1990.
94. Kumar Arun, and Saxena NK "Design Aid on Desilting Tanks for Micro Hydro Stations", Seminar on Potential & Development of Small/Micro Hydel Energy Systems in the Himalayan regions at Roorkee, Dec. 1987. (Invited)
95. Kumar Arun and Saxena NK, "Steel Fibre Reinforced Concrete Penstock for Small Hydro Projects", Seminar on Potential & Development of Small/Micro Hydel Energy Systems in the Himalayan Regions at Roorkee, Dec. 1987.
96. Chauhan G, Kumar Arun and Singhal MK, "Design and Construction of Gates for Small Scale Hydropower III International Symposium on Wave, Tidal, Otec & Small Scale Hydro Energy by British Hydraulic Research Association at Brighton, England, May 1986.
97. Kumar Arun and Das D, "Environmental Impacts on Small Scale Hydropower Stations" International Seminar on Environmental Impacts Assessments of Water Resources Projects of WRDTC at Roorkee, Dec. 1985.
98. Kumar Arun and Thapar OD, "Inexpensive Renewable Energy System for Rural Areas" International Water Resource Association V World Congress on Water for Development at Brussels, Belgium, June 1985.
99. Kumar Arun and Thapar OD, "Integrated Small Hydro Energy Development" Speciality Conference on Water for Resource development by American society of civil Engineers at Idaho, USA, Aug. 1984.
100. Thapar OD, Das D and **Kumar Arun**, "Small Hydro Power System Technology and Rural Development", Seminar on Small Hydro Power by Central Board of Irrigation & Power", at Delhi, India, Jan. 1983. (**Invited**)
101. **Kumar Arun** and Thapar OD, "Manali Mini Hydro Power Project : A Case Study, World Conference on Water Power-1985, by American Society of Civil Engineers and US Army Corps of Engineers at Las Vegas, USA, Sept. 1985.
102. Thapar OD, Das D and **Kumar Arun**, "Kakroi Fall Ultra Low Head Hybrid Hydro Energy Development" an international conference Energex-82, by Ministry of Energy, Canada, Aug. 1982. (**Invited**)

#### **IV. Software**

1. Hydra-HP – Flow regimes Estimation for Small Hydropower Estimation alongwith Centre for Ecology and Hydrology, UK (sold 42copies).

#### **B. OTHERS (NATIONAL PUBLICATIONS/RESOURCE PAPERS/REPORTS)**

- 1 Team member of National team on MMHP for writing the country report for ICIMOD Nepal's Regional Training Programme on Mini and Micro hydropower.
- 2 Presented Resource paper on Small Hydro-Technology, Potential and Economics in business Meet on Renewable Energy use in Plantation Industry, Guwahati March 1994. **(Invited)**
- 3 Presented Resource Paper on Small Hydro-Technology, Potential and Economics in Business meet on Renewable Energy Use in Darjeeling Hills, Darjeeling June 6-7, 1994. **(Invited)**
- 4 Team Member "SHP - Private Sector Participation" Nov., 1996 and Nov., 1999 and April 2003.
- 5 Presented Resource Paper on Small Hydro-Technology, Potential and Economics in Ladhakh Region in workshop at Leh Aug. 06, 1994. **(Invited)**
- 6 Presented Resource Paper on "Potential for Hydro Energy" Seminar on International Prospectives in Water Resources Planning for students of University of Iowa (USA), Jan. 13, 1998, Roorkee. **(Invited)**
- 7 GIS based Identification of sites for Small Hydro Power Development, Workshop for Hilly states, Jan. 30-31, 1998 at Roorkee and Feb. 20-21, 1998 at Guwahati. **(Invited)**
- 8 Prepared Country resources paper on Small Hydro Power and presented at "Experts' Consultation on Private MMHP Development in the Hindu Kush Himalayan Region - A Review of Inputs and Methodologies", Kathmandu, Nepal, Feb. 9-13, 1998. **(Invited)**
- 9 Prepared as Team Coordinator Pre - Investment Report for New Options in Small Hydro Power, for IREDA, Jan, 198 for their submission to World Bank for 2nd line of credit.
- 10 Prepared as Team leader the Report "Identification of sources for irrigation, drinking water and Small Hydro Power in Tea Estates of Darjeeling Hills", for Darjeeling Planters' Association, March, 1998.
- 11 Presented Resource Paper on "Civil Engg. consideration for Design of Diversion and Desilting works" at "Workshop on SHP - State of Art", IIT Delhi, Dec. 10-12, 1998. **(Invited)**
- 12 Prepared as Team Leader the Report "GIS based data base of Small Hydro Power sites in Himachal Pradesh" April 2002.
- 13 Prepared as Team Leader the Report "GIS based district inventory of SHP sites in Nepal", Dec. 2001.
- 14 Prepared as Team Leader the Report "Zonal Plan covering 13 Hilly states of India for SHP Development" UNDP-GEF Hilly Hydro Project April 2002.
- 15 Presented Resource Paper for distributed generation through SHP in Ministry of Power National Workshop in Jan 2003. **(Invited)**
- 16 Presented Resource Papers for remote village electrification through SHP for State Nodal Agency Officers at Guwahati & Delhi in National Training Programme during June & Aug. 2004. **(Invited)**
- 17 Presented resource paper on Feasibility, planning, designs and procurement lowest cost with high quality in Workshop at Colombo, Sri Lanka in June 2004. **(Invited)**.
- 18 Prepared as Team Leader the Report on "Conservation of River Kshipra at Ujjain" Municipal Corporation, Ujjain, Govt of Madhya Pradesh, April 2009.
- 19 Prepared as Team Leader the Report on "Review of Water Quality Monitoring", Ministry of Environment & Forests, National River Conservation Directorate, Govt of India, Feb 2010.
- 20 Master plan on "State Level Identification Plan of Small Hydropower Potential Sites in Punjab", Punjab Energy Development Agency, Chandigarh, April 2006
- 21 Master plan on "Assessment of Cumulative Impact of Hydropower Projects in Alaknanda and Bhagirathi Basins up to Devprayag", Ministry of Environment & Forests, National River Conservation Directorate, Govt. of India, March 2011
- 22 Master Plan on "Small Hydropower for Ladakh Region of Jammu Kashmir", Ministry of New and Renewable Energy, Govt. of India, Dec 2009

## **I. Software**

2. Hydra-HP – Flow regimes Estimation for Small Hydropower Estimation along with Centre for Ecology and Hydrology, UK (sold 42 copies).

## Supervision and Guidance of the students

### A. Doctoral Students Guidance:

1. Green house gas emissions from reservoirs, (Kawade Swati Manoharrao) – awarded in April 2014
2. Scheduling Of Wind - PSP Generation Under Day-Ahead Market (Javed Dhillon) – awarded in 2015
3. Optimal planning of medium head hydro power projects, (Mukesh Kumar Singhal) since 2009 (likely to submit in Dec 2015)
4. Efficient Distribution system (HKVK Harish) since 2012 - (likely to submit in Feb 2016)
5. Impact of Sediment on hydropower plant (Anat K Rai) since 2012
6. Draft tube design development (Abbas Ali) since 2013
7. Penstock Hydraulic Transient (QIP - Rahul Garg) since 2014
8. Solar generation monitoring (Manish Kumar) since July 2015
9. Renewable energy integrated with pump storage (QIP-Rajesh Kumar) since July 2015

### B. Master degree Dissertations

#### (1) M.E. (AHES) / M. Tech (AHES),

1. Development of SHP on Existing Facilities in Eastern Maharashtra (Surendra Pimparkhedkar 2002)
2. Automated Test System for Efficiency of Turbine and Generator (Abhinay Mohan 2002)
3. Rural Electrification Model Based on Integrated Renewable Energy systems (Braj Bhushan 2002 – 03)
4. Model Testing for SHP Hydro Turbines (Sh. Debasis Mitra 2002 – 03)
5. Field Testing of Hydro Mechanical Equipments of SHP Stations (Sh. Prakash Mishra 2002 – 03)
6. Development of a model for testing of SHP electro mechanical machines (Sh. M. Bala Subrah- manyam 2003-04)
7. Modeling of hydraulic transients in small hydropower plant operation (Sh. Medidi V.M. Kishore 2003-04)
8. Energy modeling for off grid electrification of clusters of villages (Sh. Prasant Kumar Das 2003-04)
9. Performance & Design of Transmission and Distribution System in Rural Areas (Sh. Rakesh Sharma 2003-04)
10. Renewable Energy Development of Andhra Pradesh using GIS software (Shri D. Ravindra Naik 2004-05)
11. Flow Analysis of a SHP station (Shri K. Sridhar Reddy 2004-05)
12. Quality improvements in wind energy generation (Shri Shrinivas U. Jawdekar 2004-05)
13. Performance Evaluation of Hydro Turbine Using CFD Analysis (Shri Anil Kumar 2004-05)
14. Performance Evaluation of Hydro Turbine Using CFD (Anil Kumar 2005-06)
15. GIS Based Asset Management of Transmission & Distribution System (Janmejaya Upadhyay 2005-06)
16. Flow Analysis of Multipurpose Low Capacity Turbines Using CFD (Khalid Razi 2005-06)
17. Optimum design of low head small hydro power plant (P. Satya Naga Harshada 2006-2007)
18. Internet based small hydro plant database (Gaurav Bhatiwada 2006-2007)
19. Transmission pricing under open access (Mohan K.S. Rao Potluri 2006-2007)
20. GIS based master plan of small hydro power for Maharashtra state (Bhale Ganesh Shankarrao 2006-2007)
21. Rural electrification expansion under CDM (Nitesh Kumar Srivastava 2006-2007)
22. CFD based flow analysis of hilly small hydropower station (Sanjay Kumar VK Jain 2006-2007)
23. Evaluation and Sensitivity analysis of small hydro policy of different states (Devesh Goyal 2007-2008)
24. Sensitivity of different clearances in SHP development (Panugothu Ramaswamy 2007-2008)
25. Web based monitoring of electricity distribution system (Santosh Ghosh 2009)
26. Cost effective hydropower generation (Suresh Kumar Vengali 2009)
27. Technical and Financial Evaluation of Automation of Shp Stations (Anubhuti Agarwal 2010)
28. Erosion Analysis of Hydro Turbine Materials (Kuldeep Singh Shekhawat 2010)
29. Economic Analysis of Silt Erosion In Hydro Turbines (Rahul Sinha 2010)
30. Hydro Turbine Efficiency Measurement By Thermodynamic Method (Patil Shantaram Subhash 2008-2009)
31. Scheduling of Wind-Pumped Storage Hydro Power Plants (Kiran Kumar Dondapati 2011)
32. Turbine Efficiency Measurement By Thermodynamic Method (Sasank Sekhar Patnaik 2011)
33. Design of Smart off Grid Energy System (M.D. Farman 2011)
34. Optimal selection of low head hydro turbine. ( Amit Kumar 2012 )
35. Economic analysis of automation of small hydropower plants (Pise Prafulla Krishnant 2012)



36. Performance Evaluation of Desilting Devices For SHP sites (Gurdeep Singh 2012 – 13)
37. Smart Grid Application in Nigerian Electric Power Grid (Temitope Aremu 2012 – 13)
38. Analysis of Sediment Monitoring Techniques (Nitin Swarnkar 2012-13)
39. Hydropower Development in Laos (Sybounheuang Phimmaseh 2012 – 13)
40. Hydropower at drinking water supply scheme (Ritesh Parto 2013 – 14)
41. Investigation on inflated weirs (Shahid ul Islam 2013 – 14)
42. Optimal combination of desilting devices for Small Hydropower (Shiri Dhiman 2013 – 14)
43. Performance Analysis and design of the Fish Passes (Nikunj Tomar 2014 -15 )
44. Pumped Storage Hydropower in India and its Integration with Renewable Energy (Mantosh Kumar Pandey 2014 – 15)
45. Analysis and optimum design of Forebay Tank (Santosh Chaudhary 2014-15)
46. Comparative analysis of Energy and Water use in Irrigation Practices and water availability for other uses (Vineet Kaur 2014-15)
47. SHP Development in West Africa (Eliezer Mawuli Ahorlu 2015-16) – Ongoing
48. Pump Storage and its integration with renewable energy sources (Jyoti Gupta 2015-16) – Ongoing
49. Hydraulic transient analysis for small hydropower (Manoj Kumar 2015-16) – Ongoing
50. Planning access to hydropower projects (Raju Mandal 2015-16) – Ongoing
51. Performance evaluation of SHP development in Nepal (Sagar Shrestha 2015-16) – Ongoing

## **(2) M.Tech. ( CRL/EMRL)**

52. Water quality assessment and conservation of Umkhrah river (Bantehsonglang Blahwar 2004-05)
53. Conservation of Thane Creek and Ulhas River Estuary (Vinay Nikam 2004-05)
54. River Conservation Plan For River Cauvery From Mettur Dam to Erode (T. Natarajan 2005-06)
55. Resource Recovery From Sewage Treatment Plants (STPs) (D. Suresh Kumar 2005-06)
56. Conservation plan for lakes in West Bengal (Diganta Maity 2008)
57. Conservation plan for Kshipra river (Yogendra Kumar Giri 2008)
58. Conservation plan of Anshupa Lake (Biranchi Narayan Das 2007-08)
59. Conservation of Noyyal River in Tamil Nadu (Nallathambi Kannammal 2009)
60. Impact of JNNURM on Ganga River at Haridwar (Chandra Bhan 2010)
61. Impact Analysis Of Conservation Works Of Hussainsagar Lake In Hyderabad (G. Deepak Kumar 2010)
62. Impact of hydro projects on water quality (Sravan Kumar Kota 2012)
63. City sanitation plan (Rafik Abdelfatah 2012)
64. Environmental Management Plan of River Brahmani (Prasanta Kar 2012 – 13)
65. Bioremediation for Conservation of lakes (Neeraj Gahlawat 2012 – 13)
66. City sanitation plan for the city of Dhanbad, Jharkhand (Aparna Dutta 2013 – 14)
67. Cumulative Impact Assessment of Development on River Ganga from Haridwar to Garh (Mohit Chaudhary - 2013 – 14)
68. Plan for Conservation of Aquatic Eco System (Prashant Singh 2013 – 14)
69. Integrated Water Resources Management of a River Stretch using GIS & Ground Water Flow Modeling (Pooran Singh Patwal 2014-15)
70. Conservation Plan for Adyar River (Karthik Kumar C 2014-15)
71. Analysis of Disinfection Systems for Waste-water Treatment with Special Reference to THM (Surbhi Tak 2014-15)
72. Impact Analysis of Environmental Flow and Economic and Financial Analysis (Bhargab Das Sharma 2015-16) – Ongoing
73. Urban Wastewater Management (Krishna Kumar Yadav 2015-16) – Ongoing
74. City Sanitation Plan of Khartoum (Walaa Abdalhalim Ahmed 2015-16) – Ongoing

## **C. M.Tech. Projects**

### **M. Tech. AHES**

1. PDD for canal based SHP in Bihar for CDM (Anil Kumar)
2. PDD for SHP stations (Suhashini Gudala) joint with Shri SN Singh
3. Development of data base for SHP plants (Gaurav Bhatiwada)
4. Preparation of project design document (PDD) for watermills in Uttarakhand (Ajit Singh)
5. Status of small hydro power development in Maharashtra (Chetan Bhaskar Meshram)
6. Open access transmission system (Mohan K.S. Rao Potala)
7. Economic Design of penstock (Devesh Goyal)
8. Demonstration unit of pump as turbine (Md. Ashif Saghir)

9. PDD for shp projects in Ladakh (Santanu Kumar Pradhan)
10. PDD for CDM benefits based hydropower in Narmada valley (Venkata Ramasita Balasu)
11. Optimum design for remote SHP project (Anubhuti Agarwal) 2009
12. Planning of a small hydro power project in Ladakh area (Deepak S) 2009
13. Preparation of PDD of Small Hydro Power Plants in Ar P (Ila Dashora)
14. Preparation of PDD for canal based bundled SHP plants (Afroz Alam) 2010
15. Pre-feasibility report for SHP project for IIT Mandi (Kartik Upadhyay) 2010
16. Performance analysis of SHP based livelihood activities (Subhash Yadav)
17. R&M studies of low head canal projects (Ishwar Chandra) 2011
18. Detailed Project Report of Neora Shp Site (Gurdeep Singh 2012-13)
19. DPR of Ero-Omola SHP, Ekiti State Nigeria (Temitope Aremu 2012-13)
20. Analysis of crane capacity and crane span for small hydro powerhouse (Nitin Swarnkar 2012-13)
21. DPR of Kapher Small Hydropower in Laos (sybounheuang Phimmaseh 2012 – 13)

#### **M. Tech. CRL/EMRL**

22. Evaluation of sewerage system in Coimbatore (T. Natarajan)
23. Performance evaluation of existing sewage treatment systems for Nasik city (Chavan Ajay Daulat)
24. Construction of low cost sanitation in slums of Durgapur, West Bengal (Sanjeev Kumar)
25. Comparative studies of different STPs (Arshad Ali)
26. DPR of animal waste based electricity generation (Prashant Bharti)
27. Design of operation strategy for a STP (Saurabh Soni) 2009
28. SHP development from sewage treatment plant (Pise Prafulla Krishnant) 2011
29. Conservation plan of protected area (sanctuary) (Om Prakash Chaudhary) 2011
30. Preparation of pre feasibility report for a sewerage project. (Venkatachalam N) 2011
31. Design of sewage treatment plant for a town in Myanmar (Kyaw Naing Oo) 2011
32. O&M of Bhubaneswar City (District- I) Sewerage System On PPP Mode (Prasanta Kar 2012-13)
33. Review of DPR for Rejuvenation and conservation of Jait Sagar Lake (Neeraj Gahlawat 2012 – 13)

## Details of Professional travel

### ***International:***

Abu Dhabi (2011, 2013 & 2014), Austria (2005, 2011, 2015), Bangladesh (1999, 2003), Belgium (1985), Brazil (2008, 2009 & 2014), Cambodia (2010), Canada (1997 & 2012), China (1986, 1998, 2014, 2015), Czech (2005), Equatorial Guinea (2008), Ethiopia (2012), France (1998, 2006 & 2012), Germany (2009, 2011, 2015), Iran (2005), Japan (2013 & 2014), Korea (2015), Malaysia (2008 & 2014), Mexico (2010 & 2013), Myanmar (2015), Nepal (2013, 2011, 2008, 2007, 2003, 2000, 1999, 1998, 1997, 1996 & 1994), Netherlands (1985), Nigeria (2008), Norway (1988-89, 1995, 2000, 2009), Poland (2012), Rwanda (2007), Sri Lanka (1999, 2004, 2006, 2007 & 2010), Sudan (2004), Switzerland (2000, 2004, 2006, 2012), Tanzania (2012), Thailand (1998), Turkey (2009 & 2014), UK (1985, 2000, 2002 & 2010), USA (1983, 1997 & 2010) and Zambia (2013).

### ***National:***

To the states of Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chandigarh, Chhattisgarh, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir (including Ladakh), Jharkhand, Karnataka, Kerala, Maharashtra, Madhya Pradesh, Meghalaya, Mizoram, Nagaland, Orissa, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal.

### **Details of visits to Foreign Countries for Training/Education tour/Workshops/Seminars**

1. Invited by UNIDO and attended Vienna Energy Forum meeting during June 18 – 20, 2015 at Vienna, Austria.
2. Invited by UP Government and visited with the delegation China, South Korea, Austria and Germany for rubber dams manufacturers and design institutes during June 07 – 17, 2015.
3. Invited and delivered the expert talk in the workshop on off-grid electrification during Jan 28–29, 2015 at Nay Pyi Taw, Myanmar organized by The World Bank
4. Invited by International Center on Small Hydropower (ICSHP) of UNIDO and Hangzhou China and participated in meeting as a member of the Editorial Board on Nov 26, 2014 at Hangzhou, China. Also visited Three Gorges hydropower plant in Yichang and Hydro turbine laboratory of China Institute of Water Resources and Hydropower Research at Beijing.
5. Invited and participated as the member of conference organizing committee and to paper in 10th International Conference for Hydraulic Efficiency Measurement during Sept 16 – 18, 2014 at Itajuba–MG–Brazil
6. Invited and participated in annual conference of University Network for climate and Ecosystems change and Adaptation Research (UN-CECAR) scheduled on May 30, 2014 and Planning Workshop during May 31–June 01, 2014 at Kuala Lumpur, Malaysia.
7. Invited and participated in the hidroenergia 2014, international conference organized by European Small Hydropower Association (ESHA) during May 21 – 24, 2014 at Istanbul, Turkey as member of scientific committee, Chaired the session on New turbine technology and presented the paper.
8. Invited and delivered lectures as resource person for small hydropower under UN-CECAR postgraduate course on Renewable Energy being organized by United Nations University Institute of Sustainability and Peace (UNU-ISP), Tokyo, Japan during April 08 – 09, 2014.
9. Invited and participated in consultative meeting on International Renewable Energy Agency proposed capacity building programmes being held on Jan 19, 2014 at IRENA Headquarters, Abu Dhabi. (Invited)
10. Invited by UNIDO, to organize training workshop in Dec 09 – 19, 2013 on Small hydropower Development in Monrovia, Liberia. (Invited)
11. Invited and participated in workshop on “A Comprehensive Assessment of the Hindu Kush Himalayas: Action to Sustain the Global Asset” during 02-03 Sept, 2013, ICIMOD, Kathmandu, Nepal (Invited)
12. Invited by UNIDO, to organize training workshop in July 03 – 13, 2013 on Small hydropower Development in Freetown, Sierra Leone. (Invited)
13. Invited by Kafue Gorge Regional Training Centre (KGRTC), as resource person in the training workshop for capacity building to develop small hydropower development during May 27 – 31, 2013 at Namalundu, Zambia. (Invited)
14. Invited by International Council for Science (ISCU), to participate in ICSU Regional – Global integration Workshop on Sustainable Energy, Mexico City, April 08-09, 2013. (Invited)
15. Invited as resource person for deliver 2 lectures for the UN-CECAR postgraduate course on Renewable Energy being organized by United Nations University Institute of Sustainability and Peace (UNU-ISP), Tokyo, Japan on March 04 & 05, 2013 and April -7-08, 2014. (Invited)
16. Invited to visit the facilities regarding Japanese technology in the field of small hydropower and to attend few meetings with organization members and METI in Japan during Feb 18 – 21, 2013. (Invited)
17. Invited as resource person for small hydro development during IRENA General Assembly meeting on Jan 13 – 14, 2013 and presented two themes at Abu Dhabi, UAE. (Invited)
18. Invited and delivered as guest speaker on Hydropower in Rural Development - Overview of solutions in India at symposium on “The Place of Water Power in the Renewable Energy Panel held during November 20 – 21, 2012, in

- Grenoble, France". Also visited Lucerne University of Applied Science and Arts School of Engineering and Architecture and Laboratory of Hydraulics, Hydrology und Glaciology (VAW) of ETH, Zürich, Switzerland. (Invited)
19. Invited as member of delegation of DST, Govt. of India for the 'Indo Swiss Symposium on Renewable Energies and Rational Energy End-use' and presented "Small Hydro In India" held at EPFL, Lausanne, Switzerland from October 22 – 25, 2012. (Invited)
  20. Invited by UNIDO to visit and prepare a report for building and visited Dar es salaam during June 6-11, 2012.
  21. Invited by Ethiopian Electricity Agency to visit them and discuss on collaboration for capacity building , Addis Ababa, Ethiopia June 12-13, 2012 (Invited)
  22. Invited by Arena International as key speaker at 4th annual Small Hydro 2012 conference being organized by Arena International during 25th – 26th April 2012 in Toronto, Canada (Invited)
  23. Invited to chair the first plenary session on "Small hydro in Europe and worldwide" at hidroenergia 2012, international conference being organized by European Small Hydropower Association (ESHA) and the Polish Association for Small Hydropower Development (TRMEW) during may 23-26, 2012 at Wrocław, Poland (Invited)
  24. Invited by World Bank Washington and presented Cumulative Impact Assessment of Hydropower Development in Nepal, March 12-13, 2012 , Kathmandu, Nepal (Invited)
  25. Invited by USAE and AEPC for regional workshop on Micro Hydropower Development: Prospects & Challenges in South Asia (September 12 - 14, 2011) in Kathmandu, Nepal and presented country paper on Micro hydro power (Invited)
  26. Invited by Intergovernmental Panel on Climate Change (IPCC), a scientific intergovernmental body setup by World Meteorological organization (WMO) and United Nations Environment Programme (UNEP), working group III as "Coordinating Lead Author" for preparing special report on Renewable Energy Sources and Climate Change Mitigation preparing – chapter 5 on Hydropower. The global report is released on June 14, 2011. (Invited). Attended first meeting at São José dos Campos, SP, Brazil, During Jan 26-29, 2009, second meeting at Oslo Norway during Aug 31 – Sept 04, 2009, Expert meeting At Washington DC, USA during Feb 1-2, 2010) and Third meeting at Oxford UK during Feb 28- March 05, 2010., fourth meeting at Mexico city Sept 17-24, 2010, fifth meeting and fifth meeting at Potsdam Jan 17 – 20, 2011 and Final concluding meeting at Abu Dhabi May 3-8, 2011 (Invited)
  27. Invited by UNIDO, Vienna to prepare a Strategy Document for small hydropower development ( 2011) (Invited)
  28. Invited by UNIDO, Vienna to prepare a report on Capacity Building on small hydropower development in Cambodia and visited April 01-07, 2010. (Invited)
  29. Invited by UNIDO, to organize two training programmes in July and Sept 2010 on SHP capacity building at Cambodia (Invited)
  30. Invited by DFCC bank, Sri lanka for Low Head Hydropower Development under World Bank funded RERRED project Feb 18-20, 2010 (Invited)
  31. Invited and visited leading hydro turbine manufacturer Voith Hydro, Heidenheim, Germany on Aug 28, 2009. (Invited)
  32. Invited by Koran International Turkey, to visit Turkey as shp expert to discuss with turkey Minister of Energy, govt agencies, Istanbul IU technical University and Tamsan for small hydro development during March 01 – 04, 2009 (Invited)
  33. Invited by to be member of Science Planning Group (SPG) in the area of Sustainable Energy by International Council for Science Regional Office for Asia and the Pacific Kuala Lumpur (Malaysia) and to contribute an article on Hydro Energy. Attended its meeting held at Kuala Lumpur (Malaysia) during Nov 14 – 15, 2008. (Invited).
  34. Invited by AIL to visit Equatorial Guinea for water supply project design work Sept 30 – Oct 2, 2008 (Invited).
  35. Invited by Minister of Mining and Energy of Brazil and the Director-General of the United Nations Industrial Development Organization (UNIDO) to participate as a speaker in the Global Renewable Energy Forum, being held in Foz do Iguaçu, Brazil, from 18 to 21 May 2008 (Invited).
  36. Invited to South Asia Regional Workshop on Developing Regional Standards for Micro-Hydro Sector, Colombo, Sri Lanka, March 25-27, 2006 for presenting on National micro hydro standards and quality programmes in India (Invited).
  37. Invited and visited as international specialist for small hydropower development in Indonesia (Nias Island) by UNIDO Feb 4-12, 2006 (Invited)
  38. Participated in The first meeting of EU funded 10 institutions of 8 countries, research project review meeting at Brno, Czech Republic June 12-19, 2005. Also was invited by UNIDO, Vienna for discussion with them on small hydropower programme and related training activities on June 17, 2005
  39. Invited By Iran and Water Development corporation, Govt of Iran to visit and advise on small hydropower during may 13-21, 2005 (Invited)
  40. Invited to South Asia Regional Workshop on Developing Standards for Micro-Hydro Sector, Colombo, Sri Lanka, Sept. 5-7, 2004 for presenting on Existing micro hydro standards and quality programmes in India (Invited)
  41. Invited and participated in International Conference on Innovation in Hydraulics Efficiency Measurements at Lucern, Switzerland and visited other reputed international laboratories during July 13-21, 2004. (Invited)
  42. Invited and visited as international specialist for small hydropower development in Sudan by UNIDO, June 23-July 4, 2004.
  43. Invited and delivered specialist lecture – International Seminar and Training Course on Small Hydropower at Colombo, Sri Lanka, June 9-12, 2004.
  44. Invited and Delivered specialist lecture – International Training Programme on Power Generation, Dhaka, July 18-20, 2003. (Invited)
  45. Invited and Participated – UNESCO/DFID Sponsored, HKH – Friend Workshop at Kathmandu, May 7-9, 2003. (Invited)

46. Visited Centre for Ecology & Hydrology, UK, Wallingford Hydraulic Research Institute, Dulas Engg, UK in Dec. 02-07, 2002. (Invited)
47. Member of Delegation of Ministry of Non-conventional Energy Sources, Government of India and visited Small hydropower related government institutions, manufacturers and sites in Norway, Switzerland and UK during Nov. 12-Dec. 02, 2000. (Invited)
48. Participated in UNESCO sponsored Hindu Kush Friend Workshop at ICIMOD Kathmandu, April 12-14, 2000. (Invited)
49. Organised International short-term course on SHP at Kathmandu during April 17-22, 2000.
50. Participated in the Energy Network Exchange visit to SHP sites in Sri Lanka by Intermediate Technology Development group, Sri Lanka during June 7-11, 1999. (Invited)
51. Organised jointly an International Course on SHP at Dhaka/Bangladesh during May 6-9, 1999.
52. Participated in UNESCO Workshop on lean flows by ICIMOD, Kathmandu during April 23-25, 1999. (Invited)
53. Visited Water & Energy Commission Secretariat, HMG Nepal, Kathmandu for Nepal district SHP - GIS database project during March 6-8, 1999.
54. Participated in the Small Scale Hydro Resource and Technology IEA sponsored Workshop at NICE, France, Oct. 13-14, 1998. (Invited)
55. Visited 11 Small hydro stations in China (IN-SHP and ICIMOD), Aug. 30-Sept. 04, 1989. (Invited)
56. Technical discussion with REMC, AIT Bangkok, Sept. 1998. (Invited)
57. Participated in the 'Experts' consultation on Private MMHP Development in the Hindu Kush Himalayan Region - A review of inputs and Methodologies, ICIMOD, Kathmandu, Nepal (Feb. 9-13, 1998). (Invited)
58. Visited Canada, attended different meetings with SCP Gestion Conceil (Sherbrooke), EDC, CIDA, CANMET, financial institutions and visited 11 shp power stations with auto operations (Aug. 9-22'97). (Invited)
59. Attended Indo-US Hydro Forum Meeting on Aug. 08'97 at Atlanta and delegated/participated in the Water Power' 97 International Conference (Aug. 3-8'97 at Atlanta, USA). (Invited)
60. Represented AHEC at India Trade Exhibition during May 17-20'97 in Kathmandu, Nepal.
61. Attended International Meeting on Renewable Energy-Enet work at Bhutwal, Nepal during March 9-11'96. (Invited)
62. Visited 8 Norwegian organisations for possible cooperation during April 23-29' 95 in Norway under NORAD support. (Invited)
63. Invited and participated in Expert Consultative Committee meeting at ICIMOD, Kathmandu, Nepal during Jan 11-16'94. (Invited)
64. P.G. Diploma cum Research Project in Hydro Power Development at Norwegian Institute of Technology, Trondheim, Norway, Aug. 1988-June, 1989.
65. Hangzhou Research Centre, China for SHP projects Aug. 18-29, 1986. Travelled across the country to visit 12 hydropower stations.
66. Invited by Twente Technical Univ., Enschede, Netherlands June 1985 to study energy systems.
67. Delegate and presented a research paper in V World Congress on Water Resources, Brussels, June 1985.
68. Turlock irrigation district in California to see SHP installations, 1983.
69. Colorado State University, USA & Boston University for Indo-US collaborative research project 1983-84.

## Sponsored Research and Industrial Consultancy Projects

Sl. No.	ITEM	NUMBERS
<b>A.</b>	<b>R&amp;D/MONITORING/EVALUATION/TESTING</b>	
1.	R&D/Monitoring Projects for shp	49
2.	Techno-economic and Appraisal for shp	102
3.	Performance & RMU Related Testing for shp	18
4.	Performance Testing of Hydropower Stations for shp	148
5.	Regulatory Studies and Training for shp	18
6.	Lender's Engineer/Nominee Director for shp	4
7.	Serving as Technical Expert Organisation for SHP	4
		343
<b>B.</b>	<b>Planning/designs/execution</b>	
8.	Detailed Project Reports for shp	225
9.	Pre-Feasibility Reports for shp	218
10.	Planning, Designs and Execution for shp	19
11.	Detailed Engineering Designs and Construction Drawings and Review for shp	85
12.	Technical Specifications of turn key execution/equipment supply for shp	27
13.	Renovation and Modernisation of SHP Stations	74
14.	Drainage/Irrigation Related Projects	12
15.	Remote Sensing and GIS based Projects	13
16.	Environment Impact Assessment and Ecorestoration of rivers and lakes	77
		750
<b>C.</b>	<b>PROJECTS WITH INTERNATIONAL COOPERATION</b>	
17.	Projects with International Inputs	21
<b>D.</b>	<b>Secretariat for Virtual Centre of Water for Welfare of Uttarakhand Govt.</b>	1