Curriculum Vitae

PROFESSOR H.S. WHEATER

Name: Howard Simon Wheater

Date of Birth: 24.6.49

Nationality: British

Present Appointment: Canada Excellence Research Chair in Water Security and Director, Global Institute for Water Security, University of Saskatchewan, Canada
Distinguished Research Fellow and Emeritus Professor of Hydrology, Imperial College, University of London

Degrees:

Ph.D.	University of Bristol	1977
M.A.	University of Cambridge	1974
B.A.	(1st Class Honours) Engineering Science University of Cambridge	1971

Awards:

Prince Sultan bin Abdul Aziz International Water Prize	2006
Institution of Civil Engineers Baker Medal	2004
British Hydrological Society President's Prize	1996
Institution of Civil Engineers Overseas Premium	1984
Senior Scholarship, Queens' College, Cambridge	1971
Entrance Exhibition, Queens' College, Cambridge	1968
Rolls-Royce Industrial Scholarship	1968

Membership of Professional Bodies and Learned Societies:

Honorary Member, British Hydrological Society	2011
Fellow, American Geophysical Union	2010
Fellow, Royal Academy of Engineering (FREng)	2003
Life Member, International Water Academy (Oslo)	1999
Fellow, Institution of Civil Engineers (C.Eng, FICE) (Member 1978)	1999
Member, British Hydrological Society	1983

Appointments:

2010- **University of Saskatchewan, Canada**
Canada Excellence Research Chair in Water Security
Director, Global Institute for Water Security

1978-2010 **Imperial College of Science, Technology & Medicine**

2008-2009	Director, Imperial College Environment Forum
1995-2008	Head, Environmental and Water Resource Engineering
1993-2010	Professor of Hydrology
1990-1993	Reader in Engineering Hydrology, Department of Civil Engineering
1987-1990	Senior Lecturer in Engineering Hydrology, Department of Civil Engineering
1978-1987	Lecturer in Engineering Hydrology, Department of Civil Engineering

1972-1978 **University of Bristol, Department of Civil Engineering**

1976-1978 Research Associate
Integration of tidal power within the UK electricity generating network (SERC).

1975-1976 Research Assistant

Regional analysis of rainfall-runoff relations. Effects of urbanization on flood runoff (Water Research Centre).

1972-1975 Research Assistant
Research into catchment hydrology, physical simulation of hydrological processes, rainfall-runoff simulation techniques for flood management.

1968-1972 **Rolls-Royce Ltd (Aero Engine Division).**
Engineering apprenticeship, Fluid Mechanics research.

Current/Recent Research Grants & Contracts:

Changing Cold Regions Newtork - National Science and Engineering Research Council of Canada – Climate Change and Atmospheric Research 2013 – 2018, CAD $5 million

Canada Foundation for Innovation – Leaders Opportunity Fund (CERC) 2012, CAD $800,000

Grants and Contributions – Environment Canada 2011-2016, CAD $495,000

Canadian Water Network – Tobacco Creek Watershed, 2012-2014, CAD$128,313

Grants and Contributions – Environment Canada 2011, CAD $70,000

Science in Society – Connections and Intersections Award, University of Saskatchewan 2011, CAD $30,000

Hydrological Extremes and feedbacks in the changing water cycle, Changing Water Cycle, Natural Environment Research Council (UK) 2011-2014, £1.06 million

Canada Excellence Research Chair in Water Security
Canadian Government, Province of Saskatchewan, University of Saskatchewan 2010-2017, CAD $30 million

Knowledge and Information Community for Climate Change
European Institute of Technology 2010-2013 Euro 90 million

Radionuclide transport in vegetated soils
UK Nirex/ANDRA 1988-2007, £3.5 million

Initiated £10 million NERC LOCAR Thematic Programme

National Infrastructure for Catchment Hydrology Experiments (NICHE)/Lowland Catchment Research (LOCAR)
Joint Infrastructure Fund 1999-2004, £2 million

Hydrogeochemical functioning of lowland permeable catchments: from process understanding to environmental management
NERC/Environment Agency 2002-2006, £500k

Generation of spatially-consistent rainfall data,
DEFRA 2003-2006, £680K

Spatial-temporal rainfall modelling with climate change scenarios
DEFRA 2003-2006, £154K

EPSRC Flood Risk Management Research Consortium, co-PI (£5.6 million Phase1, £8.5 million Phase2)

Land use management research, EPSRC Flood Risk Management Research Consortium, 2004-2008, £720k; 2008-2011 £525k; NERC FREE £175k

Modelling groundwater flood risk from extreme events
NERC FREE thematic programme, 2007-2010, approx £600k

Research training: 52 PhD students, approximately 100 MSc projects (past and present)

University of Saskatchewan (UofS) Administration:

Canada Excellence Research Chair in Water Security, 2010-
(responsible for conception, development and management of a CAD $30 million research programme)

Director, Global Institute for Water Security, 2011-
(founding Director, responsible for leadership of UofS signature area)

Member, Search Subcommittee for Sustainability Science faculty post, School of Environment and Sustainability, UofS, 2013
Member, Search Committee for six faculty posts associated with Canada Excellence Research Chair in Water Security, 2011-2013
Chair, Search Subcommittee for each of six faculty posts associated with Canada Excellence Research Chair in Water Security, 2011-2013
Member, Search Committee for Executive Director, School of Environment and Sustainability, 2011
Member, Search Committee for Canada Research Chair, School of Public Policy, 2011

Imperial College Administration:

Department of Civil & Environmental Engineering
Director, Imperial College Environment Forum, 2008-2009
Head, Environmental & Water Resource Engineering Section, 1995-2008 (13 academic staff, 45 researchers, 65 MSc students)
Member, Departmental Management Committee, 1995-2008
Chairman, Departmental Examiners' Board, 2005-2008
Director, Engineering Hydrology MSc/DIC Course 1984-2006
Chair, Departmental Research Committee 2001-2005
Member, Grantham Institute for Climate Change Executive Group College, 2008-2010
Founder, College ENTRUST Panel
Member, various College research centres and initiatives

Learned Society Activities, UK, Canadian and International Scientific Administration:

British Hydrological Society
- President 1999-2001
- Chairman, Southern Section, 1984-1996
- Chairman, Research Sub-Committee, 1994-1999
- Chairman, Scientific Programme Committee, Intnl Conf on Hydrology in a Changing Environment, Exeter, 1998
- Chairman, Intnl Conf on Hydrology, Science and practice for the 21st century, Imperial College London, 2004

Chartered Institute of Water and Environmental Management
- Member, Water Resources Panel, 1999-2001

Institution of Civil Engineers
- Member, Water Board, 1999-2001
- Member, Reservoir Safety Advisory Panel, 2000-2006

HYDRA Water Sciences Consortium (Universities of Oxford, Reading, Imperial, University College London, Queen Mary University, Centre for Ecology and Hydrology, British Geological Survey)
- Founding Chair 2007-2010

Natural Environment Research Council
- Chairman, Land & Water Resources Review Panel, Centre for Ecology and Hydrology, 1996-2003
- Member, CEH Programme Development Group, 2003-
- Chairman, LOCAR Working Group, 1998-1999 (initiated £10million national research programme)
- Member, Freshwater Sciences Research Grants & Training Awards Committee, 1993-7
- Member, HYREX Programme Committee, 1992-1996
- Member, Environmental Diagnostics Programme Committee, 1995-2000
- Member, LOCAR Programme Committee, 1999-2006
- Member, FREE Ad-hoc steering group, 2002-2004

Ministry of Agriculture, Fisheries and Food
- Member, Flood Estimation Handbook Advisory Committee, 1994-1999

Environment Agency of England and Wales
Member, Flood Warning and Management
R&D Advisory Group, 1999-2001
Member, Scientific Advisory Panel, 2004
Member, Nitrate Vulnerability Assessment Advisory Panel 2006
Reviewer, Catchment Flood Management Plans, 2007-2008
Member, Climate change and flood risk impacts assessment project steering group, 2008-
Member, Science advisory panel for catchment science research, 2009
Department of Environment, Food and Rural Affairs/EA Broad Scale Modelling Thematic Advisory Group 2000-2005
Chair, Criteria Review Panel (development of guidelines for exclusion criteria for the siting of a subsurface repository for high and intermediate level nuclear waste) 2007-2008
Member, Extreme rainfall research project steering group, 2007-2009
Department of Innovation Universities and Skills, Land Use Foresight Panel
Member, 2008-2010
UNESCO
Member, International Hydrological Programme Advisory Panel, 2002-
Chair, G-WADI Steering Committee, 2002-
Reviewer, Flemish Government Trust Fund
Member, UNESCO Mission to Sudan, 2007
Prince Sultan bin Abdulaziz International Prize for Water, Council member, 2007-
World Climate Research Programme
Vice-chairman, Global Water Experiment (GEWEX) steering committee, 2009-
Scientific Advisor to the Ministry of Foreign Affairs, Republic of Hungary with respect to the Gabcikovo-Nagymaros Barrage System (GNBS) case and Counsel and Advocate for Hungary, at the International Court of Justice, The Hague, 1993-97
Consultant to the State of Nevada, USA concerning a proposed US Department of Environment licence application for a nuclear waste repository at Yucca Mountain, 2003-
Scientific Advisor to the Republic of Argentina with respect to environmental impacts of proposed industrial developments on R Uruguay water quality at the International Court of Justice, The Hague, 2006-2010
Member, International Court of Arbitration for the Indus Waters Treaty, The Hague, 2010-2013
Member, Provincial Environmental Monitoring Panel, Alberta Environment, 2011
Chair, Council of Canadian Academies Expert Panel on Sustainable Management of Water in the Agricultural Landscapes of Canada, 2011-2013
Member, Water Partner Advisory Committee to the Council of the Federation Water Stewardship Council, 2011 -
Member, Board of Directors, Sylvia Fedoruk Canadian Centre for Nuclear Innovation, 2011 –
Member, Advisory Committee, Canadian Agri-Food Policy Institute (CAPI), 2013-
Member, International Advisory Committee, Heihe Watershed Allied Telemetry Experimental Research (HiWATER) Team, China, 2012-

Editorial Activities:

International Board of Advisers, ASCE Journal of Hydrologic Engineering, 2004-
Editor, Nordic Hydrology 2003-2007
Editor, Hydrology Research, 2007-
Editor, Progress in Environmental Science, 1998-2001
Editor, Environment International, 2001-2008
Reviewer for: Proc. Roy. Soc., Water Resources Research, Geophysical

Research Letters, J. Hydrology, J. Hydrological Processes, Hydr. Sci. Jnl., HESS, Hydrology Research, Nordic Hydrology, Advances in Water Resources, Forestry Journal, Flood Risk Management Journal, Envtl Modelling and Software, Geotechnique, Hydrogeology Journal, Proc. Instn. Civil Engrs, CIWEM journal, etc.

External Examining & Assessment:

Referee: Stockholm Water Prize

Professorial Appointments: Elector, University of Cambridge; University of Tufts, USA, University of Wales, University of Arizona, USA, University of California, Irvine, USA, Trinity College Dublin, University of Aberdeen, University of Bristol

Academic Appointments/Promotions: University of Edinburgh, Heriot Watt University, Cranfield University, Sheffield University, Newcastle University, Technical University of Denmark, Catholic University of Leuven, Belgium, University of Khartoum, University of Jordan, University of Riyadh, Khumasi University, Ghana, University of Botswana, Institute of Hydrology/Centre for Ecology and Hydrology, Wallingford, Macaulay Institute, Aberdeen.

DSc: Universities of Bristol, Birmingham

PhD: Universities of Bradford, Bristol, Birmingham, Lancaster, London, Melbourne, Newcastle, Reading, Salford, Southampton, Woollangong

External Examiner, University of the West Indies Department of Civil Engineering, 2001-2007

External Examiner, National University of Ireland, Galway, Department of Engineering Hydrology, 2005-2008

External Examiner, University of Bristol, 2006-2009

Review Panel, Danish Technical University, Department of Environmental Engineering, 2007

Review Panel, Predictions Under Change - for US National Science Foundation, 2011

Review Panel, ETH Zurich, Department of Civil, Environmental and Geomatic Engineering, 2012

Research Grant Assessment: NERC, EPSRC, MAFF, British Council, Leverhulme Foundation, Royal Society, NOAA (USA), Swiss National Science Foundation, Austrian Science Fund, US-Israel BSF, etc.

Overseas Development:

Overseas lecture courses given include:

1979-1984	University College, Galway, Eire, International Hydrology MSc course
1982	University of Dar-es-Salaam, ANSTI/UNESCO International Hydrology MSc
1984	Catholic University of Chile, Santiago, Hydrology short course
1986	CETESB, Sao Paulo, Brazil, Hydrology & Water Quality short course
1990	Tsinghua University, Beijing, China, Water Quality lectures
1998	UNESCO Workshop, Amman, Jordan, Wadi Hydrology
2005	Chair and Organiser, G-WADI International Workshop on Hydrological Modelling of Arid and Semi-Arid Areas, Roorkee, India
2006	UNESCO/ICARDA workshop on rainwater harvesting, Aleppo, Syria
2006	International Conference on Dryland Management, Tunis
2007	Chair and Organiser, G-WADI International Workshop on Groundwater Modelling in Arid and Semi-Arid Areas, Lanzhou, China
2008	UNESCO workshop, Arid Zone Water Resources Management, Santiago, Chile
2009	International Workshop on Arid Zone Water Resources Management under Climate Change, Trieste, Italy
2009	UNESCO workshop on Arid Zone Water Resources, Amman, Jordan

Recent Invited International Lectures:

UNESCO Arab Region, IHP Workshops, Beirut (1999); American Geophysical Union Fall Meeting, San Francisco (1999); Intnl Water & Energy Conference, Las Vegas (2000); Intnl Arid Zone Hydrology Conference, Cairo (2000); Starker Lecturer, Oregon State University (2000); American Geophysical Union Fall Meeting, San Francisco (2002); Kyoto Water Summit (2003), International Conference of Water Resources in Arid and Semi-Arid Regions, Muscat (2007), International Conference on Developments in Water Resource Management, Malaysia (2009), International Council of Academies of Engineering and Technological Sciences, CAETS, Calgary (2009); American Geophysical Union Fall Meeting, San Francisco (2009); International Association of Hydrological Sciences – Putting PUB into Practice (2011); Canada-Israel Innovation Workshop, Ottawa (2011); Collaboration on Agri-Environmental Issues Dialogue, Ottawa (2011); International Statistics Institute's World Statistics Congress, Dublin (2011); American Association for the Advancement of Science (2012), Water Security, Risk & Society – International Water Security Conference, Oxford (2012); American Geophysical Union Fall Meeting – San Francisco (2012); Shared Waters-Shared Responsibility: Working across Borders to Protect and Restore Lake Winnipeg and the Red River Basin – Minneapolis (2012); Peter Wolf Early Career Hydrologist's Symposium – London (2013)

Principal Areas of Expertise:

Canada Excellence Research Chair Programme

Climate Change and Water Security

Understanding the impacts of a changing climate on water resources is an area of global concern, particularly in climates such as Western Canada where the cold region, semi-arid climate creates a hydrological system that is extremely vulnerable to climate change and can be profoundly affected by temperature and precipitation variability. Research by interdisciplinary sub-groups at key sites across the Saskatchewan River Basin is contributing to the development of modelling systems to better understand climate change effects on water security and to improve management practices to adapt to challenges associated with too much or too little water.

Objectives of this research include: improve understanding of interactions between terrestrial ecosystems and atmospheric processes, and impacts of climate variability on water-related ecosystem functions; improve quality of global/regional climate models and enable better downscaling for water-related climate change impacts assessment; improve assessment of water supply and quality variability, including climate change impacts; and enable policy development by commercializing new decision support tools for water security analysis.

Land-Water Management and Environmental Change

There is a demand for increased knowledge regarding the impact of activities on the land upon water quality and quantity. For example, it is important to understand how agriculture management practices and urban water management affect water quality and the movement of water through a watershed. Research in this area is examining: effects of agricultural management on hydrological function, discharges and connectivity to the river system; impacts of agricultural and urban water management (impact of nutrients, pathogens, and pharmaceutical products on water quality); lake biogeochemical processes (ecosystem sensitivity to climate variability and pollutant stress); and development of feasible policy interventions and associated lake water quality and ecosystem responses.

Objectives of this research include: improvement of agriculture land-water

management by understanding the effects of multiple stressors on water quality/quantity in watersheds; development of water quality modelling tools by understanding interactions between hydrology, water quality and aquatic ecology of research sites; and development of new decision support tools for management and remediation of diffuse pollution (mitigating impacts on aquatic ecosystem health).

Sustainable Development of Natural Resources

Sustainable use and protection of water resources is a pressing challenge amidst natural resource development in areas including the energy sector, mining and forestry. Inter-disciplinary science and creative partnerships between government, universities and industry will be crucial to the delivery of tools required for effective management and environmental protection of watersheds. Areas such as the Alberta Athabasca oil sands represent a complex combination of scientific, technical and societal challenges. Through research in this and other areas, the opportunity exists to develop new science and management practices which could change water use and land and water reclamation, not just in the oil sands, but in other mining operations.

Objectives of this research include: development of new assessment and remediation technologies by understanding interactions between ecotoxins, the hydrological cycle and wetland ecology; better understanding of ecological and human toxicity of oil sands pollutants by integrating pollutant assessments across terrestrial and aquatic ecosystems, development of integrated decision-support tools for risk assessment and remediation of contaminated land and water based on understanding of how pollutants biodegrade and how they are sequestered; and examination of potential for development of extraction and processing technologies that have a reduced environmental footprint.

Socio-hydrology

The new discipline of Socio-hydrology views water management as a complex human-environmental system. It is concerned with the ability of water systems to meet changing human and environmental needs, I integrating humans and their activities into water science and ensuring water decision-making incorporates a range of values and perspectives about the meaning, value and use of water.

Socio-hydrology recognizes that many of the current stresses on water systems stem from social factors such as demography, the global economy, changing societal values and norms, technological innovation, laws and customs, and financial markets. It also acknowledges that the inability of many water systems to adjust to change is because of outdated governance, institutional rigidity, and failure to adequately perceive threats to water security, ill-functioning markets, and undue focus on physical at the expense of social change. It combines social science interests in human values, markets, social organizations and political institutions with the traditional focus of water science on climate and hydrology. Increasingly, it is recognized that some of the most critical vulnerabilities in contemporary water systems lie at the intersection between human activities and physical systems, such as when governance systems are incapable of dealing with climate-induced changes in water supply.

Socio-hydrology also incorporates research into the process by translating traditional scientific information into tools for water decision making. These processes are inherently social and value-based. They depend upon the way various water stakeholders (e.g. municipalities, farmers, mining companies, environmental groups, Aboriginal Peoples) define the problem of water security and the values they place on different aspects of it: its reliability, quality, cost, and ability to meet environmental needs. Socio-hydrology is at the forefront of

efforts to establish and study participatory processes for decision making in the water sector.

Objectives of this research include: build better relationships with stakeholder communities to develop a common understanding of values and what each identify as threats to water security; understand divergent perspectives and the major driving forces for future insecurity; assess social and natural science questions deemed important by stakeholder community and draw on local knowledge to inform research; study societal response to water stress and to economic and policy instruments; and inform policy options to address water uncertainty and impediments to effective water governance.

Rainfall modelling and climate change studies
Stochastic models of rainfall have been developed for various applications with support from NERC and DEFRA. Poisson-process based single site models have been developed for UK and US applications, including regional UK application in conjunction with continuous simulation rainfall-runoff modelling for flood design and management. A suite of models for spatial rainfall analysis and spatial-temporal simulation has been developed for UK government, ranging from radar-based continuous space-continuous time methods to Generalised Linear Modelling of daily rainfall including both temporal and spatial non-stationarity. Applications include modelling impacts of climate variability on flooding in W. Ireland, next-generation rainfall-runoff modelling for UK flood practice, rainfall-runoff modelling for Iran, land use change in the Upper Nile. Recent developments include the development of GLMs for statistical downscaling of GCM and RCM climate change scenarios, providing spatial fields of precipitation and evaporations for impacts assessment. Applications include UK and Southern Africa flood and water resources assessment.
Prof Wheater currently leads on water for Imperial's Grantham Institute for Climate Change, and advises British Energy on climate change impacts assessment.

Unsaturated zone and groundwater hydrology
Extensive research has been undertaken into modelling of unsaturated flow and solute transport, and the soil-plant-atmosphere continuum. A major (20 year) research contract with UK Nirex Ltd. involved lysimeter experiments of radionuclide transport in soils and vegetation uptake, and the integrated modelling of these processes for safety assessment of radioactive waste management. 1, 2 and 3D models have been developed, including redox-dependent geochemical interactions and the representation of uncertainty. The research has been summarised in a recent book.

Research over the last 10 years has focussed on the Chalk of southern England. A £10 million Thematic Research Programme was initiated, including a £2million infrastructure grant to Imperial, to support national research into groundwater-dominated catchments. Research has included the development of experimental and modelling research to represent flow and transport in the fractured porous medium of the Chalk unsaturated zone, including diffuse pollution (nitrate transport). Current research is focussing on the response to hydrological extremes – a major project is funded under the NERC Flood Risk from Extreme Events programme, to develop tools for groundwater flood risk assessment, and parallel research is investigating the role of the deep unsaturated zone in supporting river flows under drought conditions, linked to climate change scenarios.

Research in groundwater contaminant transport has included numerical methods

for advectively-dominated contaminant transport, field and modelling studies of saline intrusion, field and laboratory studies of non-aqueous phase liquids in groundwater, laboratory and numerical modelling of microbial de-nitrification processes, and modelling of chemically-reactive contaminant transport. A recent EPSRC/BG project has investiged microbial degradation of organic pollutants at a Gas works site and developing models for coupled flow, transport, geochemical interactions and microbial degradation. Other research is developing a framework for uncertainty analysis for well protection zones and investigating the value of data in risk reduction.

Groundwater recharge studies include UK applications and research into surface water/groundwater interactions in ephemeral flow systems, in Saudi Arabia, Oman, Botswana and the USA.

Recent consultancy includes advice to British Nuclear Fuels Ltd. on hydrological, hydrogeological and groundwater modelling studies at the Drigg nuclear repository, Cumbria and a study of Karst groundwater flooding in the Irish Republic. Currently Prof Wheater is a consultant to the State of Nevada concerning safety assessment of a proposed high level nuclear waste repository at Yucca Mountain. He has also recently advised UK government on siting criteria for a deep nuclear waster repository.

Rainfall-runoff modelling, flood hydrology and urban hydrology
Major flood investigations have been carried out for the Water Research Centre, Severn-Trent Water, Thames Water, the Basque Regional Government, the Oman Government and numerous consultants. UK studies have included urbanisation effects, with respect to a new town development in Hampshire. New point and spatial rainfall modelling methods have been developed for continuous simulation modelling with NERC and MAFF/DEFRA support.

A suite of MATLAB-based rainfall-runoff modelling software tools has been developed for rainfall-runoff modelling, recently extended from lumped to semi-distributed models; the toolbox has had wide international uptake. A major effort has gone into model regionalisation studies for ungauged catchment rainfall-runoff modelling, with application to the UK, USA and Southern Africa; a book on this work has been popular; a second edition has been requested and is in preparation.

A study of Karst flooding problems in W. Ireland has included analysis of non-stationarity in rainfall (Southern Water, on behalf of Irish Govt.).
Prof. Wheater is currently leading a national programme of research on land use impacts on flooding as part of a £15million EPSRC research programme, co-sponsored by NERC, DEFRA, the EA, Scottish Executive, Northern Ireland Rivers Authority, An extensive multi-scale hydrological experiment has been developed in Wales, working with a cooperative of farmers, to investigate effects of land use intensification on flood response at plot, hillslope and catchment scales, and new modelling tools have been developed to address the upscaling problem, based on detailed physics-based models and meta-modelling. This work has been integrated with sediment and water quality research, and with social analysis and the development of decision support visualisation tools.

Research on groundwater flooding is underway under the NERC FREE (Flood Risk from Extreme Events) programme.

Surface water quality

Water quality research overseas has included development of integrated river and lake water quality models for decision support for pollution control in China (EU, in collaboration with Tsinghua University, Beijing and Suez Lyonnaise-des-Eaux), and advice to the Republic of Hungary concerning the water quality impacts of the Gabcikovo-Nagymaros Barrage system. Recent UK research funded by NERC and the Environment Agency of England and Wales focussed on the development of decision support models of nutrients for lowland catchment management, including diffuse and point source loads and in-stream processes. A recent EU contract has developed modelling systems for nutrient response of the Wash catchments in Eastern England, as a pre-pilot study for the EU Water Framework Directive. Earlier research into hydrology and water quality in upland Britain has addressed surface water acidification (Royal Society funding (in collaboration with Norwegian and Swedish Academies of Science) and NERC (Environmental Diagnostics) support). Published research includes field process and modelling studies.

UK water resource management
A major (£10million) national initiative (LOCAR) has been developed to study lowland permeable catchments, including a £2million infrastructure grant to Imperial College. A principle focus is to improve interdisciplinary science to support integrated water resources management of the UK's major aquifers, the Chalk and the Triassic Sandstone Three catchments have been instrumented in detail to monitor hydrological fluxes and water quality, including special instrumentation to investigate aquifer properties and stream-aquifer interactions. A £500k grant from NERC and the Environment Agency is focussing on the development of decision support modelling tools for nutrient management. See also surface water quality.

Recent research on water resource systems sponsored by Thames Water has focussed on new methods of assessment of risk and uncertainty in water resources management. This work was awarded the ICE Baker Medal in 2004.

Arid zone hydrology and water resource development
Major projects include:- Northern Oman Flood Study (1981) (Principal Investigator) and Five Wadis Study, S.W. Saudi Arabia (1985-88) (Senior Expert) in addition to numerous smaller-scale flood and water resource studies in the Middle East and Africa (Yemen, Jordan, Oman, UAE, Botswana). Published research includes rainfall analysis and simulation, rainfall-runoff modelling, groundwater recharge management. Recent research includes sustainable development of alluvial groundwater (Botswana), stochastic spatial-temporal rainfall modelling and rainfall-runoff processes (Iran), climate change impacts on water resources (Botswana) Flood Hydrology (Oman). Currently Chair of the UNESCO G-WADI programme, which seeks to disseminate state-of-the-art hydrology and water resources management practice for arid and semi-arid areas. Prof Wheater was recently awarded the Prince Sultan bin Abdulaziz International Prize for Water for his arid zone work.

Large-scale hydrological modelling
Research into improved hydrological modelling for global climate models has included new methods for disaggregation of spatial rainfall and evaluation of SVAT schemes at point and catchment scale, contributing to the NERC TIGER programme and the GCIP study of the Mississippi. Recent research in collaboration with the Hadley Centre has focussed on improved GCM modelling of the Nile, including representation of lakes and wetlands, and the assimilation of surface hydrological observations. Prof. Wheater has recently been appointed to the World Climate Research Programme GEWEX steering committee.

International Consultancies & Research Contracts:

Royal Oman Police & Diwan of HM Sultan Qaboos of Oman; Ministry of Agriculture & Water, Riyadh (as consultant to Dames & Moore); Royal Commission of Jubail, Saudi Arabia; Dar Al Handasah (flood protection of Medinah & Mecca); Howard Humphries (UAE); Balfour Beatty International (Sri Lanka); Maunsells (Oman); Zambian Cons. Copper Mines; CETESB, Sao Paulo (Brazil); Basque Regional Government (Spain); Dar Al Handasah (Yemen); Shimizu Corporation (Japan); European Community (Nepal); JCE (Jordan); Travers Morgan (Oman); Government of Hungary; Southern Water Global (Eire); DANIDA (Botswana); European Union (China); UNESCO; Republic of Argentina.

UK Consultancies and Research Contracts:

Anglian Water Authority, Severn Trent Water Authority, Thames Water Authority, Royal Society, UK Nirex Ltd., British Nuclear Fuels Ltd., Balfours, W.S. Atkins, Watson Hawksley, Hydro-logic Ltd., Electrowatt, Her Majesty's Inspectorate of Pollution, Eagle Star Property Management, Natural Environment Research Council, Binnie and Partners, Thames Water Utilities Ltd, EPSRC, Halcrow, Environment Agency, Department of Environment, Food and Rural Affairs, British Energy, Department for Innovation, Universities and Skills.

Canadian Consultancies and Research Contracts:

Provincial Environmental Monitoring Panel (Alberta Environment)