

## Selected Projects

### America and Caribbean

Dominican Rep	Montegrando Dam	Operation of multiple-use dams
Canada	L Simcoe, Ontario MOE	INCA lake nutrient modelling
Falkland Is	Stanley water supply	Outline design of Murrell Dam

### Africa

Tanzania	Dar-es-Salaam WS	Water Supply hydrological studies
Rwanda	Kagera River Basin	Climate change project
East Africa	Lake Victoria LVBC	Lake operational curves
Malawi	Songwe	Hydrology for irrigation
Angola	INARH, Luanda	TA, database, hydrometrics
Mozambique	Master Energy Plan	Hydropower hydrological studies

### Asia

Sabah	Nova Beta Energy	Small Hydro schemes
Sarawak	Pelagus y Belaga	Hydrology for HEP projects
Brunei	Temburong	Water supply dams
Sumatra	Central Batu Raja	River Ogan modelling
Java	BMJ Karawang	Flood modelling / GIS-2D
Bintan	Bintan Resorts	Hydrometric services
India	National hydrology	Hydrology for HEP project
Nepal	Tamakoshi	Small Hydro schemes

### Middle East

Turkey	Yesilirmak	River basin climate change
Jordan	Jordan Valley	Palaeo-climate modelling
Lebanon	Lebanon, Wassani	Water resources
Azerbaijan	BP Sangachal	Oil Terminal Flood studies
Oman	Khazzan Gasfield	Hydrological studies
UAE	NCMS & MOEW	Dam inspections
Yemen	Sayhut, Socotra	Dam feasibility studies
Somaliland	Berbera, Hargeisa	Groundwater and Dams

### Europe

France	Nice, Villa Maryland	Groundwater and soil drainage
Romania	R Aries and Mures	Modelling of gold mine discharge
Norway	SEALINK project	Nutrient flux modelling
Kent/UK	Eynsford	Groundwater flooding
Hants/UK	Silbury Hill	Climate change Palaeo-modelling
Beds/UK	Woburn	Water resource strategy/developmt
Hants/UK	Hampshire Avon	INCA nutrient modelling
E Anglia	Lugg Sediments	River sediment modelling
England	P life cycle	INCA phosphate modelling
Thames	REFRESH Thames	Eutrophication modelling
Scotland	Inverness& Nairn	AQUATOR optimisation
Scotland	Bonar Bridge WS	Hydrological modelling

For more information and to discuss your project requirements, please contact one of the Partners:

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### Associated Businesses

ASEDA Aquatic Ecology

Anthony Stiff Associates

CONSER Consulting Engineers

GEOINDO Survey Services

H2Ogeo, H2EA sarl

Hydroc Consult

Hydro-GIS Ltd

Oxford Scientific Software

Roundhay Environmental Consulting

Southern Hydropower

Oxford Scientific Software

Reservoir Safety Services

### WRA Websites

[www.watres.com](http://www.watres.com)

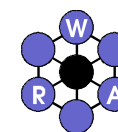
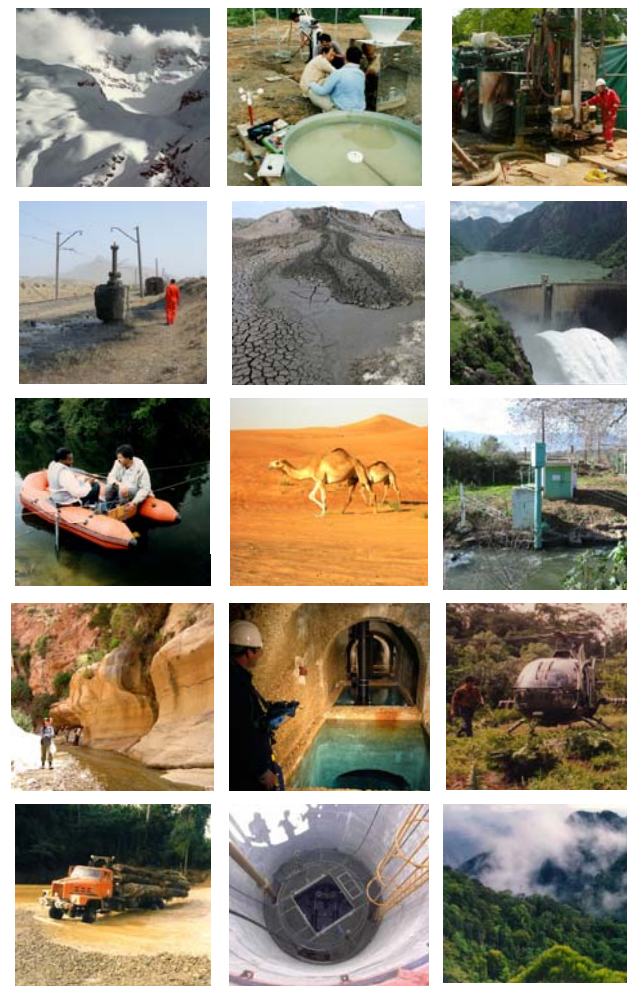
[www.climatedata.info](http://www.climatedata.info)

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A Network of Consultants in Water Resources, Hydrology, Hydrogeology, Water Quality, GIS Hydro-Ecology & Climate Change



**Water Resource Associates**

## Our Services

Hydrogeology & Groundwater Development  
Flood & Drought Hydrology, Extreme Rainfall  
Water Resource Management & Systems Simulation  
Hydrological Database & Software Development  
Hydrological & Water Quality Modelling  
Hydrometric Monitoring & Data Acquisition  
Hydro-Ecology & Climate Change Analysis  
Hydrodynamic modelling, Flood Alleviation & SUDS design  
Flood Risk Assessments & Insurance Reports  
Environmental Impact Assessment & Expert Witness  
GIS Analysis, Mapping, Digital Terrain Modelling & 3-D  
Visualisation

## Hydrological and Water Resources Expertise

WRA covers hydrometric network design, instrumentation, data capture and processing, flood estimation and forecasting, low flow, yield and drought studies, hydropower assessment, modelling complex conjunctive use water resources systems, arid zone and wetland hydrology, climate change impact, transboundary resources and implementation of the Water Framework Directive.

## Groundwater and Wells

WRA has experience of groundwater development and management in most global geologies. The company has provided advice on centralised management of groundwater for large-scale irrigation and water supply projects, as well as developing frameworks for provision of Rural Water Supply & Sanitation Schemes & installing individual borehole and well supplies.

Environmental issues and sustainable water supplies are central to many water resource projects. Support has been given to the British water industry at many levels. Writing and use of specialised software for tackling complex problems include borehole design, pumping test analysis and deployable output assessment. WRA can offer hydrometry as well as soil and aquifer test services.

## Water Quality and Hydro-Ecology

Water quality and hydro-ecological studies are key WRA activities, including modelling, management, and development of software for rivers, lakes and catchments. Capability includes environmental impact assessment, integrated catchment management and investigation of land-use and climate change, assessment of nitrogen balance, movement of metals, acidification and real-time forecasting and control. Services include hydrochemistry, time series analysis, water quality sampling and analysis, liming control software for acid rivers and lakes, aquatic and river corridor surveys.



## The Way We Work



**The Partners and Associates** operate from their own offices, using centralised communications and computing facilities. Common software and fast data exchange ensure that work is carried out efficiently and that a corporate identity and archiving system is maintained. This flexible working plan enables us to be responsive to client needs: there are no long chains of management and no expensive overheads. When necessary, support staff are recruited on contract and supervised directly by the Project Partner or Associate.

The Partners are personally more involved in hands-on processing and analysis of data than is usual in the consultancy world. By combining extensive professional experience of project execution at senior level with high levels of computer competence (both in using a wide variety of commercial software and in developing new software of our own), we believe we can offer unrivalled efficiency in tackling problems in the water environment.

The Associates have worked with one or more of the Partners, which provides further integrity of the WRA team. Work may be commissioned directly by clients, and WRA can also act as specialist sub-contractor to larger firms.

WRA personnel have undertaken a wide variety of water resource projects throughout the world. The company offers experience in leading technical development and research programmes for aid donors and for the UK Environment Agency. WRA can also provide experienced project managers and team leaders for multidisciplinary water resource projects.

## WRA Software

WRA has developed state-of-the-art software that is widely used as the preferred tool for water resource, hydrological & water quality modelling and can provide bespoke software solutions for clients.

**HYSIM:** Hydrological catchment simulation.

**HYSIM-CC:** Climate Change modelling package.

**AQUATOR:** Water Resources System Simulation and Optimisation

**CDIG:** Digitising software for hydrological manuscript data and charts.

**DISPRIN:** River water quality and dispersion model.

**INCA:** Integrated catchment water quality modelling suite including nutrients, sediment & macrophyte dynamics.

**QUASAR-LITE:** Excel Version of the in-stream component of the QUASAR-INCA Water Flow and Water Quality Model.

**HYDRO:** Multi-purpose reservoir operation and analysis

**BRDA:** British Rainfall Digital Archive of extreme historical UK rainfall events.

**TRMM-SYS:** Global Rainfall database and analysis software.

WRA uses **ArcGIS** with Spatial Analyst and 3D Analyst extensions.

## WRA The Company



Water Resource Associates Ltd was formed in 1994 and provides specialist consultancy services, world-wide. The Partners have up to 20 years' experience in WRA and have previously worked for a range of organisations including the UK CEH, firms of consulting engineers, the British water industry and international agencies. They have experience of working on problems in the water environment in over 120 countries across the full spectrum of arid to humid climates. In 2012, WRA became a limited liability partnership, WRA LLP.

## Partners

**Frank A K Farquharson** Flood hydrology, water resources  
**Paul A C Holmes** Groundwater development, water resource planning  
**Dr A Nick Mandeville** Foreign hydrological services, RIS author  
**Ron E Manley** Engineering hydrology, HYSIM author, climate change  
**Dr Harvey J E Rodda** GIS applications, flood risk and insurance  
**Prof Paul G Whitehead** Water quality modelling, INCA author

## Associates

**Dr Sean T Avery** African hydrology & water resources  
**Robert P C Brown** Hydrological & water resource modelling  
**Daniel Butterfield** Software development and GIS  
**Dr David Carless** Hydropower, renewable energy & GIS  
**Dr Jill Crossman** Hydro-ecology and nutrient modelling  
**Dr Alejandro Dussailant-Jones** S American and Caribbean hydrology  
**Rachel J Evans** Water industry planning and modelling  
**Prof Martyn Futter** Water quality modelling  
**Gina Gaspar** HydStra Hydrological database and networks  
**Dr Chris S Green** Hydrologic software, AQUATOR author  
**Dr Robin L Hall** Land-use, erosion and evaporation modelling  
**John Roy** Irrigation engineering for agriculture, landscape and golf  
**Dr David T Plinston** TRMM Database analysis and modelling  
**Dr Patrick J Reynolds:** Environmental management  
**F Julian Smith** Engineering hydrology and hydraulic modelling  
**Dr Debbie Snook** Hydro-ecology, freshwater aquatic surveying  
**David Walker** Hydrogeology, Dewatering, Groundwater modelling  
**Dr Robert Willows** Risk assessment & statistical modelling  
**Dr Richard F Wright:** Aquatic & Terrestrial Ecosystems, Acidification

