

The Brisbane Declaration

Environmental Flows¹ are Essential for Freshwater Ecosystem Health and Human Well-Being

This declaration presents summary findings and a global action agenda that address the urgent need to protect rivers globally, as proclaimed at the 10th International Rivers *symposium* and International Environmental Flows Conference, held in Brisbane, Australia, on 3-6 September 2007. The conference was attended by more than 750 scientists, economists, engineers, resource managers and policy makers from more than 50 countries.

Key findings include:

Freshwater ecosystems are the foundation of our social, cultural, and economic well-being. Healthy freshwater ecosystems – rivers, lakes, floodplains, wetlands, and estuaries – provide clean water, food, fiber, energy and many other benefits that support economies and livelihoods around the world. They are essential to human health and well-being.

Freshwater ecosystems are seriously impaired and continue to degrade at alarming rates. Aquatic species are declining more rapidly than terrestrial and marine species. As freshwater ecosystems degrade, human communities lose important social, cultural, and economic benefits; estuaries lose productivity; invasive plants and animals flourish; and the natural resilience of rivers, lakes, wetlands, and estuaries weakens. The severe cumulative impact is global in scope.

Water flowing to the sea is *not* wasted. Fresh water that flows into the ocean nourishes estuaries, which provide abundant food supplies, buffer infrastructure against storms and tidal surges, and dilute and evacuate pollutants.

Flow alteration imperils freshwater and estuarine ecosystems. These ecosystems have evolved with, and depend upon, naturally variable flows of high-quality fresh water. Greater attention to environmental flow needs must be exercised when attempting to manage floods; supply water to cities, farms, and industries; generate power; and facilitate navigation, recreation, and drainage.

Environmental flow management provides the water flows needed to sustain freshwater and estuarine ecosystems in coexistence with agriculture, industry, and cities. The goal of environmental flow management is to restore and maintain the socially valued benefits of healthy, resilient freshwater ecosystems through participatory decision making informed by sound science. Ground-water and floodplain management are integral to environmental flow management.

Climate change intensifies the urgency. Sound environmental flow management hedges against potentially serious and irreversible damage to freshwater ecosystems from climate change impacts by maintaining and enhancing ecosystem resiliency.

Progress has been made, but much more attention is needed. Several governments have instituted innovative water policies that explicitly recognize environmental flow needs. Environmental flow needs are increasingly being considered in water infrastructure development and are being maintained or restored through releases of water from dams, limitations on ground-water and surface-water diversions, and management of land-use practices. Even so, the progress made to date falls far short of the global effort needed to sustain healthy freshwater ecosystems and the economies, livelihoods, and human well-being that depend upon them.

¹ *Environmental flows* describe the quantity, timing, and quality of water flows required to sustain freshwater and estuarine ecosystems and the human livelihoods and well-being that depend on these ecosystems.

Global Action Agenda

The delegates to the 10th International Rivers *symposium* and Environmental Flows Conference call upon all governments, development banks, donors, river basin organizations, water and energy associations, multilateral and bilateral institutions, community-based organizations, research institutions, and the private sector across the globe to commit to the following actions for restoring and maintaining environmental flows:

Estimate environmental flow needs everywhere immediately. Environmental flow needs are currently unknown for the vast majority of freshwater and estuarine ecosystems. Scientifically credible methodologies quantify the variable – not just minimum – flows needed for each water body by *explicitly* linking environmental flows to specific ecological functions and social values. Recent advances enable rapid, region-wide, scientifically credible environmental flow assessments.

Integrate environmental flow management into every aspect of land and water management. Environmental flow assessment and management should be a basic requirement of Integrated Water Resource Management (IWRM); environmental impact assessment (EIA); strategic environmental assessment (SEA); infrastructure and industrial development and certification; and land-use, water-use, and energy-production strategies.

Establish institutional frameworks. Consistent integration of environmental flows into land and water management requires laws, regulations, policies and programs that: (1) recognize environmental flows as integral to sustainable water management, (2) establish precautionary limits on allowable depletions and alterations of natural flow, (3) treat ground water and surface water as a single hydrologic resource, and (4) maintain environmental flows across political boundaries.

Integrate water quality management. Minimizing and treating wastewater reduces the need to maintain un-naturally high streamflow for dilution purposes. Properly-treated wastewater discharges can be an important source of water for meeting environmental flow needs.

Actively engage all stakeholders. Effective environmental flow management involves all potentially affected parties and relevant stakeholders and considers the full range of human needs and values tied to freshwater ecosystems. Stakeholders suffering losses of ecosystem service benefits should be identified and properly compensated in development schemes.

Implement and enforce environmental flow standards. Expressly limit the depletion and alteration of natural water flows according to physical and legal availability, and accounting for environmental flow needs. Where these needs are uncertain, apply the precautionary principle and base flow standards on best available knowledge. Where flows are already highly altered, utilize management strategies, including water trading, conservation, floodplain restoration, and dam re-operation, to restore environmental flows to appropriate levels.

Identify and conserve a global network of free-flowing rivers. Dams and dry reaches of rivers prevent fish migration and sediment transport, physically limiting the benefits of environmental flows. Protecting high-value river systems from development ensures that environmental flows and hydrological connectivity are maintained from river headwaters to mouths. It is far less costly and more effective to protect ecosystems from degradation than to restore them.

Build capacity. Train experts to scientifically assess environmental flow needs. Empower local communities to participate effectively in water management and policy-making. Improve engineering expertise to incorporate environmental flow management in sustainable water supply, flood management, and hydropower generation.

Learn by doing. Routinely monitor relationships between flow alteration and ecological response before and during environmental flow management, and refine flow provisions accordingly. Present results to all stakeholders and to the global community of environmental flow practitioners.

Delegates to the 10th International Riversymposium and International Environmental Flows Conference, held in Brisbane, Australia, on 3-6 September 2007, represented the following organizations, governments and institutions:

Abare, AUSTRALIA
 Academy of Natural Sciences, USA
 Adelaide & Mount Lofty Ranges Natural Resources Management Board, AUSTRALIA
 Aga Khan Development Network (AKDN), PAKISTAN
 Agricultural Science & Technology Research Institute, KOREA
 Agriculture University, INDIA
 Anadolu University, TURKEY
 ARI, Department Of Sustainability & Environment, AUSTRALIA
 Arkansas State University, USA
 Asian Development Bank, PHILIPPINES
 Association for Water & Rural Development, SOUTH AFRICA
 Australian Agency For International Development (AusAID), AUSTRALIA
 Australian Government, AUSTRALIA
 Australian National University, AUSTRALIA
 Australian River Restoration Centre, AUSTRALIA
 Australian Rivers Institute, Griffith University, AUSTRALIA
 Australian Water Association, AUSTRALIA
 Australian Water Quality Centre, AUSTRALIA
 AWARD, SOUTH AFRICA
 AWMC, AUSTRALIA
 B4C Bulimba Creek Catchment Coordinating Committee, AUSTRALIA
 Bangladesh University of Engineering & Technology, BANGLADESH
 Bayside Creek Catchment, AUSTRALIA
 Beijing Normal University, CHINA
 Blackwood Basin Group, AUSTRALIA
 BPA Environment, Fish & Wildlife, USA
 Brisbane City Council, AUSTRALIA
 Brisbane Water, AUSTRALIA
 Bureau of Land Management, USA
 Bureau of Meteorology, AUSTRALIA
 Canegrowers, AUSTRALIA
 Cape Action for People & the Environment (C.A.P.E), SOUTH AFRICA
 Cape to Cape Catchments Group, AUSTRALIA
 Cardwell Shire River Improvement Trust, AUSTRALIA
 CDM, USA
 CEA, CHILE
 Central Queensland University, AUSTRALIA
 Central Research Institute for Complex Use of Water Resources, BELARUS
 Central West Catchment Management Authority, AUSTRALIA
 Centre for Ecology & Hydrology, UK
 Centre for Environmental Management, SOUTH AFRICA
 Centre for Public Awareness of Science, ANU, AUSTRALIA
 Centro de Ciencias de Sinaloa, MEXICO
 Centro de Estudios Ambientales (CEDEA), ARGENTINA
 Charity Organisation for Environmental Research, CAMEROON
 Charles Darwin University, AUSTRALIA
 Charles Sturt University, AUSTRALIA
 Chinchilla Shire Council, AUSTRALIA
 Chittering Landcare Centre, AUSTRALIA
 City of New York Dept of Parks & Recreation, USA
 Clark Fork Coalition, USA
 Cochin University of Science & Technology, INDIA
 Colorado State University, USA
 Condamine Balonne Water Committee, AUSTRALIA
 Connell Wagner, AUSTRALIA
 Conservation Council of Western Australia, AUSTRALIA
 Conservation International, USA
 Conservation Volunteers Australia, AUSTRALIA
 Corangamite CMA, AUSTRALIA
 Corvinus University of Budapest, HUNGARY
 CRC for Water Quality & Treatment, AUSTRALIA
 CRC IF, AUSTRALIA
 CSIRO, AUSTRALIA
 CSIRO Land & Water, AUSTRALIA
 CSIRO Mathematical & Information Sciences, AUSTRALIA
 CSIRO Sustainable Ecosystems, AUSTRALIA
 Cubberla-Witton Catchments Network, AUSTRALIA
 Culture and Environment Preservation Association, CAMBODIA
 Daly River Aboriginal Reference Group, AUSTRALIA
 Dawson Catchment Coordinating Association Inc, AUSTRALIA
 Department of Conservation, NEW ZEALAND
 Department of Ecology, Washington, USA
 Department of Environment & Climate Change, AUSTRALIA

Department of Environment & Heritage, AUSTRALIA
 Department of Environment & Water, AUSTRALIA
 Department of Natural Resources & Water, AUSTRALIA
 Department of Primary Industries & Fisheries, AUSTRALIA
 Department of Primary Industries & Water, AUSTRALIA
 Department of Primary Industries, Water & Resources Policy Branch, AUSTRALIA
 Department of Sustainability & Environment, AUSTRALIA
 Department of the Environment & Water Resources, AUSTRALIA
 Department of Water, Western Australia, AUSTRALIA
 Department of Water & Energy, AUSTRALIA
 Department of Water Affairs & Forestry, SOUTH AFRICA
 Department of Water, Land & Biodiversity Conservation, AUSTRALIA
 Deschutes River Conservancy, USA
 DH Environmental Consulting, SOUTH AFRICA
 DHI Software, DENMARK
 DHI Water & Environment, AUSTRALIA
 Disaster Prevention Research Institute, JAPAN
 Division of Water Resources, Ministry of Mines & Energy, SOLOMON ISLANDS
 East China Normal University, CHINA
 Ecosystem Economics LLC, USA
 EGC Pty Ltd, AUSTRALIA
 Ehime University, JAPAN
 Engineers without Borders, AUSTRALIA
 Environment Canterbury, NEW ZEALAND
 Environment Centre N.T., AUSTRALIA
 Environment Protection Authority – VIC, AUSTRALIA
 Environment Victoria, AUSTRALIA
 Environment Waikato, NEW ZEALAND
 Environmental Agency of England & Wales, UK
 Environmental Biotechnology CRC, AUSTRALIA
 Environmental Defenders Office (NSW), AUSTRALIA
 Environmental Defenders Office (Qld) Inc, AUSTRALIA
 Environmental Defense, USA
 Environmental Planning & Science (Land & Water Management), AUSTRALIA
 Environmental Protection Agency, AUSTRALIA
 EnviroNorth Environmental Consultants, AUSTRALIA
 European Rivers Network, AUSTRALIA
 eWater Cooperative Research Centre, AUSTRALIA
 Fitzroy Basin Association, AUSTRALIA
 Fitzroy River & Coastal Catchments Inc., AUSTRALIA
 Florida International University, USA
 FONAG, ECUADOR
 Forests NSW, AUSTRALIA
 FRC Environmental, AUSTRALIA
 GHD Pty Ltd, AUSTRALIA
 Gladstone Area Water Board, AUSTRALIA
 Glenelg Hopkins CMA, AUSTRALIA
 Gold Coast City Council, AUSTRALIA
 Goulburn Broken Catchment Management Authority, AUSTRALIA
 Grand River Conservation Authority, CANADA
 Great Lakes Council, AUSTRALIA
 Greater Wellington Regional Council, NEW ZEALAND
 Greening Australia, AUSTRALIA
 Greening Australia Capital Region, AUSTRALIA
 Greening Australia NSW, AUSTRALIA
 Griffith University, AUSTRALIA
 Ground Water Institute, INDIA
 Habitat Management Services, AUSTRALIA
 Halcrow, UK
 Hawkesbury City Council, AUSTRALIA
 Hawkesbury-Nepean CMA, AUSTRALIA
 Ho Chi Minh City Irrigation Management Public Company, VIETNAM
 Horizons Regional Council, NEW ZEALAND
 Hunter-Central Rivers CMA, AUSTRALIA
 Hydro Tasmania, AUSTRALIA
 ICPDR, AUSTRIA
 Institute for Water of the Republic of Slovenia, SLOVENIA
 Institute for Water Research, Rhodes University, SOUTH AFRICA
 Institute of Environmental Systems Research, GERMANY
 Institute of Hydrobiology, CAS, CHINA
 Institute of Hydroecology & Ichthyology of Armenian Academy of Sciences, ARMENIA
 Instituto Mexicano de Tecnologia del Agua, MEXICO
 International Centre for Integrated Mountain Development (ICIMOD), NEPAL
 International Centre of Excellence in Water Resources Management, AUSTRALIA
 International Riverfoundation, AUSTRALIA
 International Rivers Network, USA
 International Water Management Institute (IWMI), NEPAL
 International Water Management Institute (IWMI), SRI LANKA

International WaterCentre, AUSTRALIA
 IPH-UFRGS, BRAZIL
 Ipswich City Council, AUSTRALIA
 Irrigation Association of Australia,
 AUSTRALIA
 James Cook University, AUSTRALIA
 Japan Water Agency, JAPAN
 Japan Water Resources Environment
 Technology Center, JAPAN
 John Wilson & Partners Pty Ltd, AUSTRALIA
 KBR, AUSTRALIA
 Kaipara District Council, NEW ZEALAND
 Kedron Brook Catchment Network,
 AUSTRALIA
 Kellogg Brown & Root Pty Ltd, AUSTRALIA
 Komati Basin Water Authority, SWAZILAND
 Korea Land Corporation, KOREA
 Kyoto University, JAPAN
 Laguna Lake Development Authority,
 PHILIPPINES
 Lake Simcoe Region Conservation Authority,
 CANADA
 Land & Water Australia, AUSTRALIA
 Lesotho Highlands Development Authority,
 LESOTHO
 Lesotho Highlands Water Commission,
 SOUTH AFRICA
 Lloyd Consulting Pty Ltd, AUSTRALIA
 Logan City Council, AUSTRALIA
 Los Algarrobos Civil Association,
 ARGENTINA
 Lower Murray Darling Catchment
 Management Authority, AUSTRALIA
 Makerere Institute of Social Research,
 UGANDA
 Makerere University, UGANDA
 Maroochy Shire Council, AUSTRALIA
 Mary River Catchment Coordination
 Committee, AUSTRALIA
 Mekong River Commission, LAOS
 Melbourne Water, AUSTRALIA
 Merri Creek Management Committee,
 AUSTRALIA
 Mhlathuze Water, SOUTH AFRICA
 Mid Coast Water, AUSTRALIA
 Ministry for the Environment, NEW ZEALAND
 Ministry of Agriculture & Forestry,
 NEW ZEALAND
 Ministry of Water, TANZANIA
 Mitchell River Watershed Management
 Group Inc., AUSTRALIA
 Moggil Creek Catchment Management
 Group, AUSTRALIA
 Monash University, AUSTRALIA
 Monash University, AUSTRALIA
 Moreton Bay Environment Alliance,
 AUSTRALIA
 Murray CMA, AUSTRALIA
 Murray Wetlands Working Group,
 AUSTRALIA
 Murray-Darling Basin Commission,
 AUSTRALIA
 Murrumbidgee Catchment Management
 Authority, AUSTRALIA
 N4C Norman Creek Catchment Coordinating
 Committee, AUSTRALIA
 Nakdong River Environment Research
 Center, South Korea, KOREA
 National Fish & Wildlife Foundation, USA
 National Water Commission, AUSTRALIA
 Natural Heritage Institute, USA
 Natural Resources, Environment & the Arts,
 AUSTRALIA
 Nature Conservation Council of NSW,
 AUSTRALIA
 Ningbo Municipal Research & Design
 Institute of Environmental Protection,
 CHINA
 Noblewater, AUSTRALIA
 North Central Catchment Management
 Authority, AUSTRALIA
 North Central Texas Council of Govts, USA
 North East Catchment Management
 Authority, AUSTRALIA
 Northern Catchments Network, AUSTRALIA
 NSW Department of Primary Industries,
 AUSTRALIA
 NSW Department of Water & Energy,
 AUSTRALIA
 NSW Dept of Environment & Climate
 Change, AUSTRALIA
 NSW Murray Wetlands Working Group,
 AUSTRALIA
 Office of Lake Macquarie & Catchment
 Coordinator, AUSTRALIA
 Ok Tedi Mining Limited, PAPUA NEW
 GUINEA
 Opus International Consultants, AUSTRALIA
 Oregon State University, USA
 Oregon Water Trust, USA
 Otago Regional Council, NEW ZEALAND
 Oxford University, UK
 Oxley Creek Catchment Association Inc,
 AUSTRALIA
 OYO Corporation, JAPAN
 Pacific Hydro, CHILE
 Pakistan Water Partnership (PWP),
 PAKISTAN
 Pangani Basin Water Board, TANZANIA
 Parramatta City Council, AUSTRALIA
 Parsons Brinckerhoff, AUSTRALIA
 PD Naidoo & Associates, SOUTH AFRICA
 Pine Rivers Catchment Association Inc,
 AUSTRALIA
 Planet Radio, AUSTRALIA
 PLW Development Solutions Limited, UK

Pollution Probe, CANADA
 Probe International, CANADA
 Projeto Aguas do Rio Doce, BRAZIL
 Pukyong National University, KOREA
 Pullen Pullen Catchments Group,
 AUSTRALIA
 Pusan National University, South Korea,
 KOREA
 Queensland Conservation Council,
 AUSTRALIA
 Queensland Environmental Protection
 Agency, AUSTRALIA
 Queensland University of Technology (QUT),
 AUSTRALIA
 Ramsar Convention on Wetlands,
 SWITZERLAND
 Reef Plan Secretariat, AUSTRALIA
 Rio Tinto, AUSTRALIA
 River Research Centre, INDIA
 River Restoration Centre, UK
 Rosalie Shire Council, AUSTRALIA
 Rural Solutions SA, AUSTRALIA
 S. Brizga & Associates Pty Ltd, AUSTRALIA
 SA Department for Environment & Heritage,
 AUSTRALIA
 SA Government, AUSTRALIA
 SA MDB NRM Board, AUSTRALIA
 Save Our Waterways Now, AUSTRALIA
 Save the Mary River Coordinating Group Inc,
 AUSTRALIA
 Schweizerische Greina-Stiftung,
 SWITZERLAND
 Seoul National University, KOREA
 SEQ Healthy Waterways Partnership,
 AUSTRALIA
 SEQWater, AUSTRALIA
 Shoalhaven City Council, AUSTRALIA
 Sironko District, UGANDA
 Sisters of Mary, AUSTRALIA
 SKM, AUSTRALIA
 SMEC Australia, AUSTRALIA
 Sonoran Institute & The University Of
 Arizona, USA
 Sontek/YSI, AUSTRALIA
 South West Catchments Council,
 AUSTRALIA
 Southern Institute of Water Resources
 Research, VIETNAM
 Southern Waters Ecological Research and
 Consulting, SOUTH AFRICA
 Stanwell Corporation, AUSTRALIA
 State Hydrological Institute, RUSSIA
 Stockholm International Water Institute,
 SWEDEN
 Streamline Research Pty Ltd, AUSTRALIA
 SunWater, AUSTRALIA
 Sutherland Shire Council, AUSTRALIA
 Swan Catchment Council, AUSTRALIA
 Swedish Univeristy of Agricultural Sciences,
 SWEDEN
 Sydney Catchment Authority, AUSTRALIA
 Syrinx Environmental PL, AUSTRALIA
 Tasmanian Aquaculture & Fisheries Institute,
 AUSTRALIA
 Territory & Municipal Services, AUSTRALIA
 Tetra Tech Inc, USA
 The Australian National University,
 AUSTRALIA
 The Green Corridor Project (BRICMA),
 AUSTRALIA
 The Nature Conservancy, AUSTRALIA
 The Nature Conservancy, CHINA
 The Nature Conservancy, COLOMBIA
 The Nature Conservancy, HONDURAS
 The Nature Conservancy, MEXICO
 The Nature Conservancy, USA
 The University of Hong Kong, CHINA
 The University of Melbourne, AUSTRALIA
 The University of Queensland, AUSTRALIA
 The Wilderness Society, AUSTRALIA
 Thies Services Pty Ltd, AUSTRALIA
 Tien Giang Irrigation Management Public
 Company, VIETNAM
 Tipa & Associates, NEW ZEALAND
 Torbay Catchment Group, AUSTRALIA
 Toyo University, JAPAN
 Trout Unlimited, USA
 Tweed Kenya Mentoring Program, KENYA
 Tweed Shire Council, AUSTRALIA
 Ume University, SWEDEN
 UNEP, KENYA
 UNESCO, FRANCE
 UNESCO IHE, NETHERLANDS
 Universidad Autonoma de Sinaloa, MEXICO
 University of Agriculture, NIGERIA
 University of Applied Sciences, GERMANY
 University of Auckland, NEW ZEALAND
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 University of California, Berkeley, USA
 University of California, Davis Extension, USA
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 University of Guelph, School of Engineering,
 CANADA
 University of Johannesburg, APK,
 SOUTH AFRICA
 University of London, UK
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 University of North Texas, USA
 University of Peradeniya, Sri Lanka,
 SRI LANKA
 University of Southern Queensland,
 AUSTRALIA
 University of Technology Sydney,
 AUSTRALIA
 University of the Witwatersrand,
 SOUTH AFRICA

University of Western Australia, AUSTRALIA
University of York, Environment Dept, UK
UNSW Water Research Laboratory,
AUSTRALIA
Upper Deschutes Watershed Council, USA
US Army Corps of Engineers, USA
US Army Corps of Engineers, Hydrologic
Engineering Center, USA
US Fish & Wildlife Service, USA
US Forest Service, USA
US Geological Survey, USA
Victoria University, AUSTRALIA
Wageningen University, NETHERLANDS
Waikato Regional Council, NEW ZEALAND
Waitakere City Council, NEW ZEALAND
Walla Walla Community College - Water &
Environmental Center, USA
Water Affairs & Forestry, SOUTH AFRICA
Water Research Commission, SOUTH
AFRICA
Water Technology Pty Ltd, AUSTRALIA
Waterfind Environment Fund, AUSTRALIA
Wesley Research Foundation, AUSTRALIA
Wide Bay Water Corporation, AUSTRALIA
WL | Delft Hydraulics, NETHERLANDS
World Bank, USA
World Conservation Union (IUCN),
SRI LANKA
World Conservation Union (IUCN),
SWITZERLAND
World Conservation Union (IUCN),
THAILAND
World Conservation Union (IUCN) Eastern
Africa Regional Office, TANZANIA
World Conservation Union (IUCN)
Mesoamerica, COSTA RICA
WorldFish Center, MALAYSIA
WWF-Australia, AUSTRALIA
WWF-Chihuahuan Desert Program, USA
WWF-China Programme Office, CHINA
WWF-East Africa Regional Programme
Office, KENYA
WWF-Germany, GERMANY
WWF-India, INDIA
WWF-International, AUSTRALIA
WWF-Pakistan, PAKISTAN
WWF-Papua New Guinea, PAPUA NEW
GUINEA
WWF-Spain, SPAIN
WWF-Sweden, SWEDEN
Wyong Shire Council, AUSTRALIA
Xstrata Coal, AUSTRALIA
Yamanashi Institute of Environmental
Sciences, JAPAN
Yantai Institute of Coastal Zone Research for
Sustainable Development, CHINA
Yarne & Associates, Inc, USA

Yellow River Conservancy Commission,
CHINA
Zitholele Consulting Pty Ltd, SOUTH AFRICA