Profile: Dr Peter Coombes

Dr Coombes is a Systems Thinker, Scientist, Engineer, Economist, Problem Solver and Policy Analyst, a Provider of alternative perspective and a designer of sustainable cities, projects and buildings. Peter J. Coombes is a director of Urban Water Cycle Solutions and is currently an editor of the Urban Book of Australian Rainfall and Runoff. He was awarded the 2018 GN Alexander medal by Engineers Australia for his contributions to hydrology and water resources. Peter recently contributed to the inquiry into stormwater management held by the Senate of the Australian Parliament and inquiry into Australia's water resources held by the Productivity Commission and was a chief scientist in the Victorian Government. Peter has held senior academic positions at the University of Newcastle, Melbourne University and Swinburne University. He has experience in change processes in government, development of government policy and managing complex engineering business collaborations. His professional and research interests include systems thinking and analysis, hydrology, water resources, economics, molecular sciences, water quality and public policy.(see www.urbanwatercyclesolutions.com, Linkedin: Peter Coombes, Twitter: @PeterJCoombes).

Qualifications

Doctor of Philosophy, University of Newcastle, 2002
Bachelor of Engineering (Civil) (Hons), 1997
Bachelor of Surveying (Hons), 1998
Associate Diploma of Engineering (Hons), 1992
GreenStar Acredited Professional, 2008
B. Econ/B. Law (Undergraduate: 2015 -), Awarded RS Neale Memorial Economics Prize.

Membership of professional associations

Fellow of Engineers Australia, Awarded the GN Alexander Medal in 2018
Member of Australian Water Association
Member of Stormwater Victoria
Deputy Chair and Treasurer of Stormwater Australia and board member (former chair of SIA)
Member of the Econometrics Society

Recent employment

Director of Urban Water Cycle Solutions

January 1997 onwards. Urban Water Cycle Solutions is an independent applied science, engineering, economics and policy organisation dedicated to solving problems, finding alternative solutions and development of systems understanding of the urban, rural and natural water cycles with a view to finding optimum solutions for the sustainable use of ecosystem services, provision of infrastructure and urban planning. The company, led by Dr Peter Coombes, has been involved in a wide range of projects, advised many clients and governments, providing strategic design, policy and economic advice for over two decades. See www.urbanwatercyclesolutions.com for details.

Urban Water Cycle Solutions is also dedicated to transfer of knowledge, science and guidance to international audiences via peer reviewed publications, multi-media forums and pro-bono contributions. We have significant experience in Science to Policy domain and demonstrated strong experience in analysing and creating government policies. The company has many significant clients and collaborators, including:

- Local, State and Commonwealth governments in Australia;
- The United Nations;

- International governments including Canadian, New Zealand, Saudi Arabian and United Kingdom;
- economic and environmental regulators in many countries such as the Victorian ESC, The UK economic regulator Ofwat and UK environmental regulator EA;
- Water Utilities;
- Government Ministers, and
- The private sector.

Urban Water Cycle Solutions (UWCS) has provided a diverse range of outputs that included over 120 projects and more than 20 significant government policies or guidelines. My role includes management of these projects and contributed applied science investigations, strategic analysis, engineering design and economic assessments. In addition, these projects have required my leadership to manage collaboration with multiple contributors or partners and multiple stakeholders.

Recent examples of the diversity of our practice in 2018 are provided as follows. UWCS contributed, as part of a team of experts, to assessment of design innovations in the dairy Industry for the Victorian Environment Minister and Department of Environment, Land, Water and Planning (DELWP). This project is a confidential government assessment. Similarly, UWCS also provided, in partnership with TGM, a strategic assessment of the impacts of climate change on the design and operation of building environments for Deakin University in Victoria. UWCS partnered with Kingspan Energy and Environment and other collaborators to publish an Alternative Water Plan for Greater Melbourne which involved over 20 government and private sector stakeholders. And UWCS also provided an assessment of Legionella risks resulting from the design and operation of infrastructure for a Latrobe Valley Hospital.

It has been a significant achievement to operate UWCS for over two decades and to provide many nationally and internationally significant projects with collaboration across multiple organisations. We have also provided pro-bono assistance or collaboration to organisations such as Ofwat, WaterAid, Engineers Australia, Rainwater Harvesting Association of Australia, Universities (eg; Imperial College London) and environmental NGOs. UWCS also provides reviews of infrastructure planning and designs, government policy and technical publications. Management of our website http://urbanwatercyclesolutions.com that provides scientific, technical, policy and practical knowledge to society is one example of our successful strategies with 93% increase in engagement, 11% increase in time spent reading articles and 7% decline in "bounces" from users of the website since 2014.

Deputy Chair, Treasurer and Director of Stormwater Australia

October 2018 onwards. Stormwater Australia links the diverse and multi-disciplinary interests of the Stormwater Industry and represents them at national forums. These activities include promotion of innovative and sustainable practice technologies, standards and policies to minimise adverse environmental, social and economic impacts. Stormwater Australia also facilitates an understanding of the roles and responsibilities of agencies and partners working to improve the management of our natural and built stormwater systems, provides an advisory and reference service for the industry and promotes the concept that stormwater is a resource. Better management of current problems and the implementing of improvements to existing systems is a major aim of the Association.

Appointed as a Director of Stormwater Australia in October 2018 and elected as Deputy Chair of the Association in December 2018. This role includes mentoring and guidance to younger board members as the association strives from a workable national framework of governance.

Committee Member: AWA Water Efficiency Specialist Network

March 2018 onwards. Committee member of the water efficiency specialist network that aims to lead the national conversation on water efficiency. We believe that reduced water wastage is key to keeping water affordable for all users and providing resilient water systems for all communities. Our position is that water efficiency is not just a crisis response, but that maximising the utility of available water resources should be part of any approach to water planning or management that seeks to be prudent from an engineering, economic, environmental or governance perspective. Objectives:

- To collaboratively advance the conversation on the best-practice approaches to planning and implementation of water efficiency
- To demonstrate and represent the case for investment in water efficiency to the community, water utilities and policy makers
- To highlight how optimal outcomes for local communities can converge with good business outcomes for the water industry
- To advocate for water efficiency to be effectively embedded in all urban water planning, land use planning, building and development requirements

Adjunct Professor of Water Resources

Swinburn University

January 2016 to January 2017, Melbourne Australia. Dr Peter Coombes was an adjunct Professor of Water Resources in the Department of Civil and Construction Engineering in Faculty of Science, Engineering and Technology at the Swinburne University of Technology. He is lecturing in water and energy resources and sustainability.

Revision of Australian Rainfall and Runoff

Engineers Australia

November 2014 onwards. Australian Rainfall and Runoff (ARR) is Australia's national guideline for managing stormwater runoff and flooding. The initial key task was to assist the Engineers Australia ARR Technical Committee with the first substantial revision of Australian Rainfall and Runoff since 1987, and to provide strategic direction for the project. This involved forming a stakeholder reference group and drafting a discussion paper on the need to integrate the stormwater component of Australian Rainfall and Runoff with the modern approaches to urban water management. The discussion paper was used as a facilitate discussion with industry about modern analysis and design methods for urban stormwater management.

I was then appointed as the lead editor the Urban Book of Australian Rainfall and Runoff. This task included co-authoring Chapter 3 Philosophy of Urban Stormwater Management and Chapter 6 Modelling Approaches, and coordination of science, practical and review inputs from the authors and the industry. This project required an international review of emerging science and practices that impact on design and management to avoid flooding of urban areas and degradation of waterways. Strong leadership skills were needed in this substantial behaviour change project to incorporate thirty years of emerging science and practice in the revised ARR Urban Book. The ARR Urban Book has been peer reviewed and was published on 4 December 2018.

Chief Scientist

Victorian Government

June 2013 to November 2014. Dr Peter Coombes from Urban Water Cycle Solutions was appointed as the Chief Scientist at the Office of Living Victoria (OLV) with responsibility to provide science and policy advice to support the Living Victoria water reforms. The key task was to provide robust, independent scientific, engineering and economic analysis to inform the evidence based role of the Department. A major element of this role was the use of the Systems Framework approaches developed over the last 20 years by Dr Coombes to provide insight into reform programs that deliver the optimum liveability and sustainability outcomes at a reasonable cost. This challenging role required independent analysis and review of proposals and policies originating from government departments, water monopolies and the private sector which was a strong departure from past practice of "insider review". This position involved substantial interaction with senior bureaucrats, cabinet members and multiple stakeholders.

This role supported a number of key policy and strategy outcomes, including the Melbourne Water Future and Ballarat Water Future strategies that were ratified by the Victorian Cabinet in 2013 and 2014. The Chief Scientist was essentially required to foster an institutional behaviour change process to develop modern government water policies by challenging legacy assumptions and arrangements with evidence. Whilst the process was contested, significant lasting change was established in urban water cycle management which includes systems thinking, modern objectives and integration across society. Significant awards were also received for the applied science discoveries from this position, including runner up in the GN Alexander Medal in 2015 and winning the GN Alexander Medal in 2018.

Stormwater, flood management and IWCM strategy

Metropolitan Planning Authority, Melbourne Water, and Department of Planning and Community Development

January 2009 to September 2013. Dr Peter Coombes from Urban Water Cycle Solutions was commissioned by the Metropolitan Planning Authority (MPA) to provide advice and designs for the draft East Werribee Precinct Structure Plan. This analysis was supported by Mark Colegate from TGM and finalised our previous innovative solutions to solve the historical flooding and water quality challenges at the site. This work built on previous work that commenced in 2009 where Dr Coombes and Bonacci Water developed a conceptual integrated water cycle management (IWCM) strategy that incorporated the objectives of a Multi-Agency Working Group and investigated options for use of regional stormwater and local rainwater harvesting, aquifer storage and recovery, wastewater reuse within the Precinct and water efficiency. The IWCM strategy was dependent on a stormwater management solution that mitigates the significant legacy of flooding and stormwater pollution at the site and incorporates the principles of water sensitive urban design (WSUD). The stormwater management elements of the proposed IWCM strategy were incorporated into a Development Services Scheme (DSS) developed by Dr Coombes in 2010 for Melbourne Water Corporation.

Advisor and Systems Analyst – integrated stormwater and flood management

Australian Capital Territory Environment and Sustainable Development Directorate

October 2012 – June 2013 (9 months) Canberra, Australia. Developed a systems framework for integrated catchment management for the ACT and surrounding region including downstream impacts on the Murray Darling Basin. This analysis supported the ACT government business case for integrated catchment management. The ACT government successfully submitted the business case

to the Australian Federal government and the supporting analysis was positively reviewed as part of the process. The systems analysis highlighted the impacts of cumulative loads of pollutants and runoff volumes on regional waterways and catchments. A new policy regime was recommended. This analysis was accepted by the Commonwealth Treasury resulting in an award of $85 million to the ACT government.

Systems analyst – flood investigations for the Western Highway

VicRoads

October 2010 – June 2014, Ballarat, Australia. Dr Peter Coombes from Bonacci Water and Urban Water Cycle solutions led the development of a systems framework for integrated catchment management for understand flood risks for the upgrade of the Western Highway for VicRoads. This project required first principles analysis of hydrology and hydraulics across different topography, weather and catchment areas to define flood risks of gauged and ungauged catchments. An innovative combination of two dimensional analysis using historical flooding records from multiple sources (including from interviews and photos) was utilised to resolve the actual flood dynamics of the regions.

Science and Policy Advisor

Victorian Government

July 2012 to June 2013. This position was based on an independent review of the Metropolitan Water Supply Demand Strategies proposed by Victorian water utilities by Dr Peter Coombes at Urban Water Cycle Solutions. This comprehensive review involved multiple stakeholder interviews and independent analysis of assumptions to provide the recommendations for reform of the Victorian water industry and business planning for the Victorian water bureaucracy. These recommendations were ultimately utilised by the Office of Living Victoria. A draft Melbourne Integrated Water Cycle Management Strategy was also provided to the Victorian Water Minister in December 2012 as a starting point for ultimate delivery of Melbourne's Water Future to Cabinet. The Secretary of the Department of Sustainability and Environment appointed Dr Coombes to the role of Chief Scientist but departmental legal processes delayed this appointment until June 2013. As an interim, this advisory position was extended to include contribution to the development of Melbourne's Water Future strategy and the ultimate submission to the Victorian Cabinet.

Systems analyst – flood management, stormwater and IWCM strategy for Ararat Prison

Department of Justice

October 2010 – June 2013, Ararat, Australia. Dr Peter Coombes from Bonacci Water and Urban Water Cycle solutions led the development of an integrated water cycle management strategy for the upgrade of the Ararat Prison. The project utilises rainwater harvesting and wastewater reuse for water supply, and to manage impacts on regional wastewater infrastructure and river catchments. This analysis also determined the flood risks on the upgrade of the Ararat Prison and designed a strategy to mitigate local and regional flooding impacts on the site. An innovative combination of two dimensional analysis using historical data from multiple sources (including from interviews, photos and gauged data) was utilised to resolve the actual flood dynamics of the upper Hopkins River catchments.

Managing Director

Bonacci Water

January 2008 – June 2012 (4 years 6 months) Melbourne, Australia. This position involved the establishment and management of a new division of the established engineering company Bonacci Group. This new multi-disciplinary business provided systems analysis, development of policy, strategy and designs for sustainable management of water resources, and optimum design of infrastructure and buildings. Bonacci Water achieved financial success from start-up and ultimately achieved an annual value of about $2 million in a difficult business environment already dominated by existing consultancies with established relationships with bureaucracy.

Highlights from this position included initiation of and contribution to drafting of a new water cycle management policy and strategy for the State of Victoria (now called Living Victoria policy), development of a Systems Framework for the Greater Sydney region and a report on water cycle futures for Sydney Water Corporation, development of an alternative water cycle strategy for the city of Springfield in Queensland, advice to UNESCAP on development eco-efficient water policy, provision of regional analysis of flood risks for VicRoads and assistance with the design of many low impact buildings and projects

This role included coordination of up to 30 employees and collaboration with multiple agencies, government departments, utilities, developers, academics and other consultancies in Victoria, throughout Australia and internationally. This position often required leadership of professionals from Bonacci Water and a number of consulting companies to provide engineering and policy inputs to diverse groups of stakeholders. For example, Bonacci Water completed systems investigations of water resources and town planning policies for the Victorian government's Living Victoria Ministerial Advisory Council which included over 200 stakeholder meetings and workshops. This process involved collaboration across the multiple organisations and agencies to produce highly influential policy advice. This position involved the establishment and management of a new division of an established engineering company. This multi-disciplinary business provided systems analysis, development of policy, strategy and designs for sustainable management of water resources, and optimum design of infrastructure. Bonacci Water achieved financial success from start up and ultimately achieved an annual value of about $2 million in a difficult business environment already dominated by existing consultancies with established relationships with bureacracy. This role included coordination of up to 30 employees and collaboration with multiple agencies.

Advisor

United Nations ESCAP

January 2009 – December 2009 (1 year) Asia Pacific. Collaborate with the UN ESCAP to provide an advisory report on development of eco-efficient water infrastructure. This process involved research, participation in workshops and discussions, and ultimately delivery of a report to UN ESCAP.

Research Leader for Innovative Water Sensitive Urban Design

eWater Cooperative Research Centre

January 2005 – June 2009 (4 years 6 months) Newcastle, Australia. Served as the National Research Leader in the eWater CRC for the E2 research program to investigate innovative water sensitive urban design strategies. This research programme included integration of hydrology, hydraulics, asset management, behavioural water demands, economics and ecosystems within biophysical systems approaches.

Associate Professor

University of Newcastle

January 2004 – December 2007 (4 years) Newcastle, Australia. Associate Professor of Integrated Water Cycle Management. Initiated, led and contributed to a range of applied research projects in molecular sciences and systems analysis of biophysical systems including water resources and urban planning. Supervised 5 completed PhD research programs and generated more than 50 peer reviewed publications.

Member of working group

Prime Minister's Science, Engineering and Innovation Council

January 2006 – December 2006 (1 year) Canberra, Australia. Member of PMSEIC working group for water resources reporting to the Australian Federal Government

Advisor

National Water Commission

January 2005 – December 2006 (2 years) Canberra, Australia. Member of the advisory panel on urban water management reporting to the National Water Commission and the Australian Government.

Postdoctoral Fellow

University of Newcastle

May 2002 – May 2004 (2 years 1 month) Newcastle, Australia. Development of systems analysis of and optimum solutions for integrated water cycle management including shadow prices. Contributed to research programs investigating integrated water cycle management. Published over 20 peer reviewed articles in scientific literature.

Member of advisory panel for Our Water Our Future policy

Victorian Government

January 2005 – December 2006 (1 year) Melbourne, Australia. The Victorian Government developed the Our Water Our Future policy for management of water resources. Served on the advisory panel for alternative water resources as part of developing the Our Water Our Future policy.

Key strengths

- Systems thinker and strategist
- Ability to understand and solve complex problems with associated leadership
- Investigation and design of stormwater management, flood mitigation, water supply and wastewater management strategies
- Capacity building and management of multiple disciplinary teams involved in change processes
- Strong experience of political processes involved with water cycle management policies at international, federal, state and local government levels. Indeed this experience includes initiating policy reform at Ministerial levels.
- Research leadership and management in challenging environments

- Data collection, forenzic analysis, software development and simulation of systems
- The ability to design and deliver integrated systems, particularly water cycle systems
- Technical investigation and academic research using first principles engineering analysis, investment economics and microbiological science
- Extensive government, policy and regulatory understanding of water, urban development, planning and sustainability issues
- Creation of evidence based policies and regulation
- Excellent oratory skills - public speaking, seminars, technical lectures and media engagements
- Strong written communication style - technical publications, consultancy reports, public policy and public commentary such as opinion pieces

Summary of experience

Consulting and research

- Designed and developed over 120 sustainable developments in Australia and internationally
- Author of over 150 research publications, including book chapters, journal articles, keynote papers and conference publications, and supervision of 5 completed PhD research programs
- Delivery of many research and consulting projects across science, engineering and economic issues relating to water resources including integrated water cycle management, source control, catchment management, ecological sustainability, water demand, water balance modelling, water resource economics and bio-chemistry
- Awarded more than $3 million in competitive and industry research funding
- Founding and Managing Director of Bonacci Water (2008 - 2012)
- Managing Director of Urban Water Cycle Solutions (1998 -)
- National research leader for innovative Water Sensitive Urban Design strategies in eWater CRC (2005 – 2010)
- Chairman of the Stormwater Industry Association
- Initiator and advisor on the creation of the Bluescope Water by Bluescope Steel

Government advisory

- Chief Water Scientist at Office of Living Victoria in the Victorian Government (2012 - 2013)
- Member of water advisory panel of the Prime Minister's Science, Engineering and Innovation Council (2006-07)
- Member of the Urban Water Advisory Panel of the National Water Commission (2006 - 2008)
- Advisor, United Nations Water Security Section, Environment and Development Division
- Advisor to international Governments including Canada, Saudi Arabia, India, Korea and New Zealand
- Assisted New South Wales, Victoria, Western Australian and Queensland Governments in the development of water, planning and regulatory policy (1999 -)
- Author of policy reviews and design guides for Water Sensitive Urban Design and Integrated Water Cycle Management across all levels of Government
- Member of Victorian Government's Our Water Our Future panel on alternative water sources (2007)

- Advisor on regional stormwater management projects for the Victoria Department of Sustainability and Environment (2006).
- Author of and expert adviser to the Victorian Government *Living Melbourne, Living Victoria* water policy for Greater Melbourne (2010 - 2014)
- Author of the integrated systems analysis, alternative water and business strategy for the Greater Sydney region for the Board of Sydney Water Corporation.
- Leader and co-developer of the original capacity building program for integrated water cycle management and water sensitive urban design in the Hunter region of New South Wales that involved 16 local government areas, water authorities, government agencies and the community (1998 – 2002).
- Special project officer, Infrastructure and Planning Manager, Newcastle and Maitland City Councils
- Director of the program to develop the Melbourne Integrated Water Cycle strategy for the Office of Living Victoria
- Leader of water reform process for restoring the Al Asfar Lake system in the historical city of Al Hasa in Saudi Arabia

Conferences and publications

- Chair, 13th International Rainwater Catchment Systems Conference, Sydney, 2007
- Chair, 5th International Water Sensitive Urban Design Conference, Sydney, 2007
- Co-author of "Australian Runoff Quality"
- Editor and co-author of "Australian Rainfall and Runoff"

Career highlights

- Systems Framework research and development acknowledged by Engineers Australia as one of the most significant contributions to water resources and hydrology in 2014-15 and awarded the G.N. Alexander Medal in 2018
- Co-author of Australian Rainfall and Runoff for Engineers Australia
- Appointment as Office of Living Victoria's Chief Water Scientist and contribution to the successful submission of Melbourne's Water Future strategy to the Victoria Government Cabinet.
- Strong experience in leading high level teams in complex and challenging political environments
- Development of non-linear economic methods that account for the actual depreciation of water assets that allow more realistic planning for infrastructure management
- Establishment of the one of the first stormwater management divisions within a local government authority.
- Development of integrated systems analysis approaches that allow understanding of the decentralised, multiple scaled and regional impacts of water and energy solutions throughout cities, regions and countries. This process provides understanding of the performance of solutions at multiple scales in response to multiple objectives.
- Developed and refined first principles methods for combining hydrology, hydraulics, topography, weather and demographics in analysis of flooding, stormwater runoff, wastewater discharges, water use and environmental impacts in a systems framework.
- Development of dynamic systems economic methods to allow understanding of the value of solutions at multiple scales across society.

- Delivery of systems analysis and policy research, and applied policy processes to led to government policies to allow and encourage urban rainwater harvesting and decentralised water management. In particular, research and policy advice that ultimately led to creation of the state environmental policy BASIX in New South Wales. This project included interaction with the NSW Cabinet.
- Completion of PhD research that developed a systems approach to water cycle management and economics. Followed by the award of an Australian Research Council Post Doctoral Fellowship and ultimately an Associate Professor at University of Newcastle and Melbourne University. Awarded over $3 million in competitive and industry research funding, and completion of a large number of influencial publications in less than a decade.
- Leader and strategist in the orginal capacity building program for water cycle management and Water Sensitive Urban Design in the Hunter Region of New South Wales. This was essentially a change program to move the water and planning industries from traditional approaches to a more diverse range of solutions and to augment the capacity of those professions. Importantly, this original program has been replicated throughout Australian in a range of similar strategies such as Clearwater in Melbourne and WSUD in Sydney.
- A contribution over a period of more than twenty years as a forenzic and systems analyst to find solutions to significant problems throughout the Australian and international water industry. This has involved the resolution of a wide range of challenges from country towns, regional flooding and metropolitan water resources. This contribution has also included key roles in many major projects.
- Founding and Managing Director of Urban Water Cycle Solutions and Bonacci Water. Both companies have been dedicated to development of systems and forenzic analysis leading to transparant policy and project advice to industry and government. Both companies have achieved financial success from start up (Bonacci Water ultimately achieved an annual value of about $2 million) in a difficult business environment already dominated by existing consultancies with established relationships with bureacracy.
- Contribution to and leadership in many policy policy processes including The Living Victoria Living Melbourne water policy reform process, the Sydney Water Alternative Water Strategy, The Water Advisory Group of the Prime Minister's Science Engineering and Innovation Council and Urban Water Advisory Group of the National Water Commission.
- Initiated and contributed to the creation of Bluescope Water as a subsiduary company of Bluescope Steel to provide an alternative water solutions throughout Australia
- Provided advice to the Canadian national government that led to policies for wastewater reuse, stormwater and rainwater harvesting.
- Leader of a program to restore the Al Asfar Lake system at Al Hasa in Saudi Arabia. This role included liasion with all levels of the government and coordination of efforts to change attitudes and policies relating to the water cycle.