**Francis Hock Soon CHIEW**

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Dr Francis Chiew has more than 25 years’ experience in research, teaching and consulting in hydroclimate and water resources, and in research and project management. Francis joined CSIRO as a Science Leader in Canberra in 2006, after a 15-year academic career at the University of Melbourne. In the past ten years, Francis has led about 30 hydrologists working on water resources assessment, forecasting and prediction, climate change adaptation and integrated basin management, in projects totalling more than AUD$5m per year.

Francis is highly regarded internationally for his specialist expertise in hydroclimate, hydrological modelling, climate and land use impact on water, and integrated basin management. He has received various awards and published over 250 papers, and his research is widely adopted and cited (more than 10,000 Google Scholar citations and h-index of 53). The research that Francis and his team does contributes to global advancement in hydrological sciences, and has a direct path to impact guiding water resources planning and adaptation in Australia and globally.

Francis is a member of several global and national water expert committees including lead author of the IPCC AR5 and AR6 Assessment Reports. Francis is also active in converting research outcomes into modelling tools and guidelines for the water industry. More recently, Francis has led high impact climate and water modelling initiatives and water resources assessments in Australia, and collaborative hydroclimate projects and consultancies in South Asia, China and South America.

###### Academic Qualifications

* Ph.D. in Hydrology (Integrated surface and groundwater modelling) (University of Melbourne, 1991)
* Bachelor of Engineering (First Class Honours, Civil Engineering) (University of Melbourne, 1986)

Employment History

2006– Senior Principal Research Scientist (Chief Scientist)  
CSIRO (Commonwealth Scientific and Industrial Research Organisation), Canberra, Australia

2004–2006 Associate Professor  
Department of Civil and Environmental Engineering, University of Melbourne, Australia

1991–2003 Senior Research Fellow & Research Fellow  
Department of Civil and Environmental Engineering, University of Melbourne, Australia

Professional Affiliations

* Engineers Australia (Chartered Professional Engineer)
* American Geophysical Union
* International Association of Hydrological Sciences
* Modelling and Simulation Society of Australia and New Zealand (Fellow)
* International Water Association

Major Awards

Personal Achievement Awards

* 2009 Biennial Medal of the Modelling and Simulation Society of Australia and New Zealand (MSSANZ)
* 2004 Tison Medal (for best paper published by International Association of Hydrological Sciences)

Major role in Team Awards

* 2017 Australian Museum Eureka Award Finalist (Australian National Outlook)
* 2016 CSIRO Impact from Science Award (Water Information Research and Development Alliance)
* 2013 Australian Museum Eureka Award Finalist (South Eastern Australian Climate Initiative)
* 2009 Australian Museum Eureka Award Finalist (Murray-Darling Basin Modelling)
* 2008 CSIRO Chairman’s Medal (Murray-Darling Basin Sustainable Yields)

**Professional Skills**

* 25 years science experience and specialist expertise in hydrology, hydrological modelling, hydroclimatology (climate impact on water and water forecasting) and integrated basin management (see selected publications on the next page).
* Academic teaching and supervision (coordinated and taught full undergraduate and postgraduate courses in hydrology and engineering for more than 10 years at University of Melbourne, supervised more than 15 PhDs and over 40 Masters and honours research projects).
* Consultancy in hydroclimatology, hydrological modelling, water resources assessment, climate change impact and adaptation, and urban stormwater.
* Science leadership and research and people management (led 30-40 scientists and project staff in CSIRO in the past ten years in various research management roles).
* Project initiation and management (managed over AUD$30 million of research activities in the past 10 years). Led climate and hydrological modelling activities in large multi-disciplinary and multi-organisation projects like eWater CRC Climate Variability Program, Murray-Darling Basin Sustainable Yields and South Eastern Australian Climate Initiative, and projects and consultancies in South Asia, China and South America.

Professional Contributions

1. Published more than 250 refereed research papers (more than 150 journal papers and scholarly book chapters). Google Scholar h-index of 53 (first author of one third of the papers that contribute to the h-index) and over 10,000 total citations. ISI Web of Knowledge h-index of 40, more than 4,700 total citations, and average of 35 citations per paper. 40% of papers involve external collaboration (outside CSIRO) and 20% of papers involve international collaboration.
2. Delivered more than 100 technical presentations in seminars, conferences and expert workshops – more than 30 invited and paid overseas visits (including UNESCO/WMO, EU and IPCC expert workshops on drought, hydrological modelling, global water modelling, climate impact on water, and hydroclimate trend detection).
3. Lead Author of IPCC Fifth Assessment Report (2000–2014), and IPCC Sixth Assessment Report (2018–2022).
4. Associate Editor of Hydrological Sciences Journal (1999–2004), and Academic Editor of Water (2017+).
5. Professional roles include CSIRO OCE (Office of Chief Executive) Science Leader (2006–2012) and Deputy Director of Cooperative Research Centre for Catchment Hydrology (2004–2005).
6. Australian Research Council Reader/Assessor.
7. Reviewed numerous papers and books for leading scientific journals and examined numerous higher degree theses.
8. Convened numerous special sessions in technical workshops and conferences, and member of international scientific committees and expert hydrological, industry and governmental panels.
9. Science leadership in CSIRO and Australia, and regular advisor on climate and water to the Australian government and water and related industries.
10. Developed and championed key hydrological modelling products for the Australian water industry.

#### Selected Publications

[Google Scholar: <http://scholar.google.com.au/citations?user=oP-jgdkAAAAJ&hl=en>]

[Research ID: A-9743-2011, <http://www.researcherid.com/rid/A-9743-2011>]

**Chiew FHS**, Teng J, Vaze J, Post DA, Perraud J-M, Kirono DGC and Viney NR (2009) Estimating climate change impact on runoff across south-east Australia: method, results and implications of modelling method. *Water Resources Research*, 45, W10414, <http://dx.doi.org/10.1029/2008WR007338>. [200 citations]

*This paper describes an extensive modelling study of the impact of climate change on runoff across south-eastern Australia. The method uses information from multiple global climate models to construct future climate scenarios to drive hydrological models. The method was used for the CSIRO sustainable yield and water resources assessment studies across key regions of Australia and the results were used to guide water planning and adaptation across Australia.*

**Chiew FHS**, Piechota TC, Dracup JA and McMahon TA (1998) El Niño/Southern Oscillation and Australian rainfall, streamflow and drought: links and potential for forecasting. *Journal of Hydrology*, 204, 138–149, <http://dx.doi.org/10.1016/S0022-1694(97)00121-2>. [390 citations]

*This is one of the first comprehensive papers that explored the teleconnection between ENSO and Australian streamflow and the potential for forecasting. The paper laid the foundation for the now very active area of seasonal streamflow forecasting in Australia including the operational Bureau of Meteorology seasonal streamflow forecasting water information product.*

**Chiew FHS** and McMahon TA (2002) Global ENSO-streamflow teleconnection, streamflow forecasting and inter-annual variability. *Hydrological Sciences Journal*, 47, 505–522, <http://dx.doi.org/10.1080/02626660209492950>. [140 citations]

*This paper used streamflow data from 1000 river basins across the world to describe the ENSO-streamflow teleconnection, potential for forecasting and inter-annual streamflow variability in different regions of the world. The paper was awarded the 2004 Tison Medal for the best paper published by the International Association of Hydrological Sciences.*

**Chiew FHS** (2006) Estimation of rainfall elasticity of streamflow in Australia. *Hydrological Sciences Journal*, 51, 613–625, <http://dx.doi.org/10.1623/hysj.51.4.613>. [210 citations]

*This paper uses several methods to estimate the hydrologic sensitivity to rainfall and potential evaporation (modelling methods and nonparametric data analysis) for 300 catchments across Australia. It provides a simple rule of thumb for estimating the impact of a change in climate on runoff (change in mean annual rainfall generally amplified as a 2–3 times bigger percent change in mean annual runoff), which is now used to inform climate change adaptation in many sectors across Australia.*

**Chiew FHS**, Potter NJ, Vaze J, Petheram C, Zhang L, Teng J and Post DA (2014) Observed hydrologic non-stationarity in far south-eastern Australia: implications and future modelling predictions. *Stochastic Environmental Research and Risk Assessment*, 28, 3–15, <http://dx.doi.org/10.1007/s00477-013-0755-5>. [40 citations]

*This paper presents the different types of hydroclimate non-stationarity (changing climate-runoff relationship, ecohydrological processes in a warmer and enhanced CO2 climate, hydrologic connectivity in long droughts) and the implications on hydrologic prediction into the future.*

Zhang L, Hickel K, Dawes WR, **Chiew FHS**, Western AW and Briggs PR (2004) A rational function approach for estimating mean annual evapotranspiration. *Water Resources Research*, 40, W02502, <http://dx.doi.org/10.1029/2003WR002710>. [360 citations]

*This paper uses a top-down approach that builds on the Budyko curve to characterise the annual water and energy balance (rainfall, evaporation and runoff) using data from more than 250 catchments across Australia. The paper presents the rainfall-evaporation-runoff relationship as a function of the dryness index that differentiates between grassed and forested catchments.*

Zhang YQ, **Chiew FHS**, Zhang L and Li HX (2009) Use of remotely sensed actual evapotranspiration to improve rainfall-runoff modelling in southeast Australia. *Journal of Hydrometeorology*, 10, 969–980, <http://dx.doi.org/10.1175/2009JHM1061.1>. [50 citations]

*This is the first paper that directly explores the use of remotely-sensed vegetation and evaporation to constrain the calibration and parameterisation of daily hydrological models to improve runoff prediction in ungauged catchments..*

**Chiew FHS**, Peel MC and Western AW (2002) Application and testing of the simple rainfall-runoff model SIMHYD. In: Mathematical Models of Small Watershed Hydrology and Applications (Editors: VP Singh and DK Frevert), Water Resources Publication, Littleton, Colorado, (ISBN 1-887201-35-1), pp. 335–367. [250 citations]

*This book chapter describes the lumped conceptual daily rainfall-runoff model SIMHYD, one of the most commonly used rainfall-runoff model for many applications by many different research groups in Australia and overseas.*

Wang QJ, Robertson DE and **Chiew FHS** (2009) A Bayesian joint probability modeling approach for seasonal forecasting of streamflows at multiple sites. *Water Resources Research*, 45. W05407, <http://dx.doi.org/10.1029/2008WR007355>.  
[120 citations]

*Subsequent development of this Bayesian joint probability modelling approach for seasonal streamflow forecasting is now underpinning the operational seasonal streamflow forecasting product delivered by the Australian Bureau of Meteorology. The approach opens up a range of applications beyond just seasonal streamflow forecasting, including the formal treatment of uncertainty.*

Hatfield-Dodds S, Schandl H, Adams PD, Baynes TM, Brinsmead TS, Bryan BA, **Chiew FHS**, Graham PW, Grundy M, Harwood T, McCallum R, McCrea R, McKellar LE, Newth D, Nolan M, Prosser I and Wonhas A (2015) Australia is ‘free to choose’ economic growth and falling environmental pressures. *Nature*, 527, 49–53, <http://dx.doi.org/10.1038/nature16065>. [50 citations]

*This Nature paper presents a national outlook for Australia based on a comprehensive modelling study that considers the key sectors and drivers. The study shows that, by making the right choices and decisions as a society, sustainability and economic growth can be partners not competitors.*