Ashmita Sengupta

Water Security, Environment Business Unit

41 Boggo Road, Dutton Park, QLD

ashmita.sengupta@csiro.au

+61 451602069

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**BIOGRAPHY**

I have over 15 years of experience in environment, policy, and governance. My research focuses on adaptive water resource management and ecosystem modeling across the globe. My work examines the impact of climate change and other anthropogenic stressors on natural systems, examines system vulnerabilities, and develops pathways to adapt, restore and protect. I lead the Modelling Water Ecosystem team in the Environment Business Unit at Commonwealth Scientific and Industrial Research Organization.

My work blends emerging remote sensing technologies with on-ground monitoring to develop eco-hydrological models for ecosystem functioning, water, and food security. New methods include developing cloud-based computing for low resource locations, and application of AI/ML to improve modeling predictions. My work has informed policy and governance in the water space in Australia and California. In the past six years at CSIRO, I have secured close to 19M AUD of project funding ($9M as the project lead). I have won several awards including industry awards for research and development and science communication.

I work extensively with stakeholders in government, community, First Nations Peoples, and industry using participatory approaches for engagement facilitating a co-design approach for project outcomes that are relevant, practical, and actionable. Over the years, I have built an extensive network with leaders in science, government, and community in Australia, United States, Europe, and Asia.

**EXPERIENCE**

**Team Leader, Modelling Water Ecosystems team and Senior Research Scientist (2017-Current)**

Commonwealth Scientific and Industrial Research Organisation, Brisbane, Australia

**Research scientist and modeler (2010-2017)**

Southern California Coastal Water Research Project (SCCWRP), Costa Mesa, California

**Water Resources Engineer (2002 – 2003)**

Tokyo Engineering Consultants Inc. Delhi, India

**EDUCATION**

**Ph.D. in Civil and Environmental Engineering (2010)**

University of Massachusetts, Amherst, USA

**M.S. in Civil Engineering (2005)**

University of Massachusetts, Amherst, USA

**AWARDS/FELLOWSHIPS**

* Australian Water Association Research and Development Award 2024 (Industry award)
* Ruby Payne Scott Fellowship 2022-2024
* Growing our science impact award, 2022
* Australian Academy of Sciences AISRF Fellow, 2020-2023
* Creative Communication of Science Award, CSIRO, Land and Water, 2019
* Certificate of Appreciation (awarded on performance excellence), CSIRO, Land and Water, 2019
* Peter Cullen Fellow, Women in water leadership program, 2019
* Member of US Delegation International City/County Management Association (ICMA) to China 2016
* MERIT-visiting scholar award, University of Melbourne, 2015
* INDO-US Forum award 2014
* UMASS Business Plan Challenge Competition, Finalist & Team Leader 2008
* UMASS Technological Challenge Competition, Hon. Mention & Team Leader, 2007
* Shell Centenary Chevening Scholarship to attend Cambridge University, U.K. (Awarded to 2 people from India) *Declined to accept a full scholarship to UMASS, Amherst*.
* National Scholarship for Academic Excellence from Govt. of India

**LEADERSHIP COURSES**

* Micro leadership labs, CSIRO 2024
* Spark Leadership, CSIRO 2023
* CSIRO Media training, 2022
* Science Meets Parliament CSIRO Delegate 2022
* Peter Cullen Trust, Women in water leadership program, 2019
* Miller Heiman strategic selling two-day workshop on developing a deeper understanding of customer’s objectives 2019
* Launch Camp: a CSIRO run two days ON experience to understand the market for research ideas. Developed and pitched a tool to measure evapotranspiration in the floodplains

**SELECTED PROJECTS (last 5 years)**

**Project Lead: Developing a Climate change vulnerability assessment and adaptation roadmap for Murray-Darling Basin Ramsar sites ($3.5M, 2023-2024)**

The primary objective of the project is to assess the vulnerability of the ecological character of the three Murray Darling Basin (Australia) Ramsar sites to climate change. The assessment will serve as the foundation for the development of a climate adaptation roadmap, which will guide future management. A key aspect of the project will be to use a participatory approach for the engagement with First Nations Peoples, stakeholders, and end-users, facilitating a co-design approach that encourages networking, co-sharing, co-learning, and co-ownership across different groups.

+ Develop project vision with leadership at DCCEEW and CSIRO

+ Manage teams (16 scientists)

+ Stakeholder engagement at 3 Ramsar sites

**Project Lead: Investing in new knowledge to evaluate and adapt the 2012 Murray-Darling Basin Plan ($4M, 2019-2023)**

A collaborative project between CSIRO and the Murray Darling Basin Authority, the Ecosystem Functions project addressed key ecosystem functions knowledge gaps at basin-scale to inform improved management and delivery of water for the environment in the Murray-Darling Basin. This project delivered multiple innovations in terms of datasets generated for the Basin and models are improving the science in the Basin Plan (2012) and Basin Environmental Watering Strategy. The project outcomes have informed the National Water Policy Reform response, and it several high impact awards for research and innovation (see award section). It has also published several high-profile research papers (including Nature Portfolio).

+ Developed research proposal and worked through funding process

+ Developed and managed OKRs across 4 functional teams (24 scientists)

+ Managed stakeholder engagements, including 3 user workshops and two special international sessions

**Theme lead: River Flows and Connectivity, Commonwealth Environmental Water Office’s (CEWO) on-ground Monitoring, Evaluation and Research program: Flow-MER (Total project: $9M, 2022-2027)**

This project evaluates the outcomes and impact of the environmental water portfolio in the Murray-Darling Basin. Currently we are updating the science and methods leading to the next 5-year evaluation cycle as identified in the previous 5-year cycle of the project (listed below).

+ Part of the tender bid team

+ Part of the current leadership team

+ Lead two separate working groups and stakeholders to reimagine the science and methodology

**Theme lead: Hydrology, Commonwealth Environmental Water Office’s (CEWO) on-ground Monitoring, Evaluation and Research program: Flow-MER (Total project: $7M, 2019-2023)**

This project evaluated the impact of Commonwealth environmental flows in supporting, restoring, and improving the flows in the Murray-Darling Basin. This work is critical to CEWO’s hydrological evaluations and environmental water delivery decision making.

+ Part of the leadership team

+ Lead the hydrology team and all associated reporting

+ Presented outcomes in various leadership meetings and workshops

**Australian Flood Analytics, Digital Water Landscape, CSIRO (Total project $1.M, 2022-2024)**

This project was funded in a competitive CSIRO grant cycle under the future Digital Water Landscapes initiative. As a team we are exploring the ability to apply new data analytics and machine learning algorithms to improve flood predictions and associated in-channel hydraulics.

+ Developed research proposal

+ Developed innovative ideas around improvement of datasets required to develop ML models

+ Developing customer engagement strategies

**Basin Futures (Initial investment $1M, 2024-)**

Basin Futures is a cloud-based platform designed to bring together global and local datasets to empower decision-makers to understand their opportunities and constraints in managing their water resources. I am currently leading various collaborations and engagements for broader market application of the platform.
+ Developed collaboration with IHE Delft and Stockholm International Water Institute to improve the platform

+ Running engagements with Agriculture and Food Business Unit at CSIRO

+ Developed and implemented the ecological component in the original Basin Futures Platform

**MEDIA**

* https://www.csiro.au/en/news/all/articles/2022/july/csiro-engineer-ashmita-sengupta
* <https://ecos.csiro.au/murray-darling-basin/>
* New York Times, “https://www.nytimes.com/2017/06/08/world/asia/india-heat-deaths-climate.html
* <https://www.aljazeera.com/news/2017/06/india-rising-temperatures-deadly-study-shows-170608115237696.html>

**PUBLICATIONS/BOOK CHAPTERS (SELECTED)**

1. **Sengupta A**, McInerney P, O'Brien M, Mokany K, Nicol S, Teng J, Ticehurst C, Penton D, Freebairn A, Dawes W, Peel W, Ponce RR, McGinness H, Lloyd-Jones L, Stratford D, Marvanek S, Joehnk K, Karim F, Zampatti B, Giling D, Doody T, Gao S, Foster S, Pollino C (2023) *MDBA/CSIRO Ecosystem Functions Project: Synthesis report*, CSIRO, Australia <https://doi.org/1025919/m3an-ge89>
2. **Sengupta, A**; Teng, J; Ticehurst, C; Penton, D; Freebairn, A; Dawes, W; Marvanek, S. ​MDBA/CSIRO Ecosystem Functions Project. ​Hydrological Connectivity Theme Report. Canberra: CSIRO; 2023. csiro: EP2023-2274. <https://doi.org/10.25919/khjz-tw66>
3. Teng, J., Croke, B., Tan, D., Iwanaga, T., Jakeman, A.J., Pollino, C., Stratford, D., Vaze, J., Dawes, W., Bridgeman, P. and **Sengupta, A.,** 2023. Development of a computationally efficient floodplain ecological response model for large-scale, data-sparse riparian environments. *Ecological Informatics*, *77*, p.102252.
4. Penton, D.J., Teng, J., Ticehurst, C., Marvanek, S., Freebairn, A., Mateo, C., Vaze, J., Yang, A., Khanam, F., **Sengupta, A**. and Pollino, C., 2023. The floodplain inundation history of the Murray-Darling Basin through two-monthly maximum water depth maps. *Scientific Data*, *10*(1), p.652.
5. McInerney, P.J., Giling, D.P., Wolfenden, B. and Sengupta, A., 2023. A synthesis of floodplain aquatic ecosystem metabolism and carbon flux using causal criteria analysis. *Limnology and Oceanography*, *68*(1), pp.97-109.
6. Teng, J., Penton, D.J., Ticehurst, C., **Sengupta, A.,** Freebairn, A., Marvanek, S., Vaze, J., Gibbs, M., Streeton, N., Karim, F. and Morton, S., 2022. A Comprehensive Assessment of Floodwater Depth Estimation Models in Semiarid Regions. *Water Resources Research*, *58*(11), p.e2022WR032031.
7. Stein, E.D., McClain, M.E., **Sengupta, A.**, Grantham, T.E., Zimmerman, J.K. and Yarnell, S.M., 2022. Allocations and environmental flows. (Book chapter)
8. Ticehurst, C., Teng, J. and **Sengupta, A.,** 2022. Development of a Multi-Index Method Based on Landsat Reflectance Data to Map Open Water in a Complex Environment. *Remote Sensing*, *14*(5), p.1158.
9. Sutula, M., Ho, M., **Sengupta, A.**, Kessouri, F., McLaughlin, K., McCune, K., & Bianchi, D. (2021). Dataset of Terrestrial Fluxes of Freshwater, Nutrients, Carbon, and Iron to the Southern California Bight, USA. *Data in Brief*, 106802.
10. Joehnk, K. D., Graham, K., **Sengupta, A.**, Chen, Y., Aryal, S. K., Merrin, L., & Durr, P. A. (2020). The Role of Water Temperature Modelling in the Development of a Release Strategy for Cyprinid Herpesvirus 3 (CyHV-3) for Common Carp Control in Southeastern Australia. *Water*, *12*(11), 3217.
11. Durr, P.A., Davis, S., Joehnk, K., Graham, K., Hopf, J., Arakala, A., McColl., K.A, Taylor., S, Chen., Y, **Sengupta., A**, Merrin., L, Stratford., D, Santosh Aryal van Klinken R.D, Brown P, Gilligan D., (2020) Development of hydrological, ecological and epidemiological modelling to inform a CyHV3 release strategy for the biocontrol of carp in the Murray Darling Basin: Part A. Integrated ecological and epidemiological modelling, **ISBN: 978-1-925983-18-02019**
12. O'Sullivan., J, Pollino., C, Taylor., P, **Sengupta., A**, Amit Parashar A. (2020) An integrative framework for stakeholder engagement using the Basin Futures platform, ***Water: Water Resources Management, Policy and Governance***, accepted with revisions.
13. Sultana, R., Mroczek, M., **Sengupta, A.,** Dallman, S., and Stein, E. D. (2020) Improving Effective Impervious Estimates to Inform Stormwater Management. ***Water Resources Management***, 1-16.
14. **Sengupta A**., Adams S.K., Brian P Bledsoe B.P., Stein E.D., McCune K.S, Mazor R.D, and Christopher Konrad C. (2018) Tools for managing hydrologic alteration on a regional scale I: Estimating changes in flow characteristics at ungauged sites. ***Freshwater Biology***, DOI:10.1111/fwb.13074
15. Mazor, R.D., May, J.T., **Sengupta, A.**, McCune, K.S., Bledsoe, B.P., and Stein, E.D. (2018) Tools for managing hydrologic alteration on a regional scale II: Setting targets to protect stream health. ***Freshwater Biology***, DOI:10.1111/fwb.13062
16. **Sengupta, A.**, Hawley,R.J., and Stein, E.D., (2017) Predicting Hydromodification in Streams using Non-Linear Memory Based Algorithms: A Southern California case study. ***Journal of Water Resources Planning and Management***, DOI:10.1061/(ASCE)WR.1943-5452.0000853
17. Mazdiyasni, O., AghaKouchak. A., Davis, S.J., Madadgar, S., Mehran, A., Ragno, E., Sadegh, M., **Sengupta, A.,** Ghosh, S., Dhanya, C.T., and Niknejad, M., (2017) Increasing heatwaves and related mortality in India due to climate change. ***Science Advances,*** DOI:10.1126/sciadv.1700066
18. Stein, E.D., **Sengupta, A.,** Mazor R., and McCune, K., (2017) Application of regional flow ecology relationships to inform management decisions in the San Diego River watershed. ***Ecohydrology***, article ID: ECO1869, article DOI: 10.1002/eco.1869
19. *The Water Sustainable City: Science, Policy, Practice*. Authors: Feldman, D.L., Grant, S.B., **Sengupta, A**., Stuvick, L, Bijoor, N., Sahimi, M, Arora, M., Pettigrove, V., Burry, K. Publisher: Edward Elgar Ltd., Cheltenham, UK. January 2017. ISBN: 978 1 78347 855 2
20. Maruya, K. A., Dodder, N. G., **Sengupta, A**., Smith, D. J., Lyons, J. M., Heil, A. T., and Drewes, J. E., (2016) Multi‐media screening of contaminants of emerging concern (CECs) in coastal urban watersheds in Southern California (USA). ***Environmental Toxicology and Chemistry***35(8):1986-94
21. Feldman, D. L., **Sengupta, A**., Stuvick, L., Stein, E., Pettigrove, V., and Arora, M., (2015) Governance issues in developing and implementing offsets for water management benefits: Can preliminary evaluation guide implementation effectiveness? ***Wiley Interdisciplinary Reviews: Water***, *2*(2), 121-130
22. Fetscher, E., Sutula, M., **Sengupta, A**., and Detenbeck, N.E., (2014) Linking nutrients to alterations in aquatic life in California wadeable streams. ***U.S. Environmental Protection Agency***, Washington, DC (NTIS EPA/600/R-14/043)
23. Howard, M.D., Sutula, M., Caron, D.A., Chao, Y., Farrara, J.D., Frenzel, H., Jones, B., Robertson, G., McLaughlin, K. and **Sengupta, A**., (2014) Anthropogenic nutrient sources rival natural sources on small scales in the coastal waters of the Southern California Bight. ***Limnology and Oceanography****,* 59 (1), 285-297
24. **Sengupta, A**., Lyons, J.M., Smith, D.J., Drewes, J.E., Snyder, S.A., Heil, A. and Maruya, K.A., (2014) The occurrence and fate of chemicals of emerging concern in coastal urban rivers receiving discharge of treated municipal wastewater effluent. ***Environmental Toxicology and Chemistry***, *33*(2), 350-358
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26. Adams, R., Ahlfeld, D. and **Sengupta, A**., (2007) Investigating the potential for ongoing pollution from an abandoned pyrite mine. ***Mine Water and the Environment***, *26*(1), 2-13