

## Dr BIJI KURUP

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### SUMMARY

A purposeful academic and an environmental engineer with several years' experience working as principal engineer with expertise in sustainability in delivering and contributing to innovative solutions for education, teaching, and research.

### EDUCATION

- Doctor of Philosophy (Environmental Engineering), 2008, Curtin University, Australia.
- Master of Engineering (Sanitary Engineering), 1998, UNESCO-IHE, Delft, The Netherlands.
- Master of Philosophy (Futures Studies & Anticipatory Management), 1996, University of Kerala, India.
- Bachelor of Engineering (Civil Engineering), 1992, College of Engineering, University of Kerala, India.

### PROFESSIONAL EXPERIENCE

#### **Murdoch University**

**Feb 2023-current**

##### ***Senior Lecturer, Engineering and Energy***

- Coordinated, prepared unit teaching materials, arranged guest presentations and lectured Industrial Ecology/Symbiosis unit
- Assisted coordination and lectured Integrated Waste Management and Resource Recovery
- Coordinated, Hydrology and Water Cycle Management and Water Treatment Unit Operations for the new Master of Professional Engineering
- Taught, tutored, and marked assignments and exams. Organized and conducted site visits to industries.
- Assisted in conducting site visits for undergraduate unit ENG341.
- Examined two undergraduate theses of Environmental Engineering.
- Supervised PhD students in their research areas Industrial Symbiosis and Circular Economy, Life Cycle Analysis and Sustainability.
- Co-authored and published international journal papers.
- Served in service duties for Women in Engineering and STEM, mentored junior staff and students.

#### **Murdoch University**

**October 2022-2023**

##### ***Senior Research Officer, Harry Butler Institute***

As a senior research officer of Harry Butler Institute, I was responsible for

- Preparing and submitting the research grant application for Sub-project 7: Industry By-product Hub, Development of by-product regulatory framework.
- Contributed to the research progress and quarterly milestones as an individual and as leader of a team.
- Interview EU/UK experts
- Prepare report and develop webinars.

##### ***1. Sub- Project 7: Industry By-Product Hubs***

In this project, I brought national and international expertise to the table. This learning will help Australian decision-makers develop a regulatory framework for the state and the country, and it will also help international counterparts once completed. I plan to present the unique experience gained

from overseas and Australia to the global audience through webinars. Australia produced around 49% of the World's Lithium in 2020, and the exports could increase to 3.9 tonnes in 2025-26. Through its latest Critical Minerals Strategy 2030, the Australian Government is trying to form a framework to grow its critical mineral sector; the abovementioned project will enlighten residue utilization and management with sustainable solutions.

## 2. *Feasibility Study for Suvo Kwinana Geopolymer*

Another example where I produced high-quality research is for developing 'the feasibility study on the SUV Kwinana Geopolymer pilot project'. I supervised the project team along with A/Prof Martin Anda. With my research and industry experience, I developed industrial symbiosis networks between many businesses in Kwinana Industrial Area so they could develop a business case for geopolymer concrete; we were able to receive funding from DevelopmentWA and the industries in my contact, such as Tianqi Lithium Australia.

### **Consultancy, EN-WIS**

**Nov 2020-current**

#### ***Director***

- For Carbon Reduction Kwinana Industrial Area (CRKIA) phase 1 and some of phase 2 project: I prepared baseline emission and evaluation for recommendation of mitigation measures, prepared report for Kwinana Industries Council. I developed cumulative emission reduction report of KIC members collective for the last 5 years since the implementation of Safeguard Mechanism in 2016.
- Assisted in developing and conducting survey and prepared Project report for Kwinana Industries Council for the Symbiosis Project (KISP) with students at Murdoch University. Developed mapping of products and by-products from the collected data from the Kwinana Industrial Area (KIA).
- Prepared Third party Review report of Life Cycle Analysis for Air Bridge, Australia
- Prepared Third Party Review for EPD work for several products for The Evah Institute, Australia.
- Prepared Lifecycle Impact and Benefit Assessment for Carbon Capture and Utilisation and Storage project and produced report for the client

### **Murdoch University**

**November 2019-Nov 2022**

#### ***Senior Lecturer (Adjunct)***

- Tutored ENG459/ENG602 undergraduate/postgraduate students on the Unit Water Sensitive Urban Design and Decentralized Industrial Wastewater Treatment
- Organised and mentored undergraduate students' visit to India as part of Department of Foreign Affairs (DFAT)'s New Colombo Program (NCP).
- Served as committee member and industry representative for the international wastewater conference held at Murdoch University, December 2019 by International Water Association (IWA).
- Organised Roundtable for Homeland Indigenous communities for developing Co-Design for Water and Sanitation Program.
- Took the responsibility of organising one day workshop for indigenous group and industrial site visit to Kwinana Industrial Area as part of the Renewable Energy conference held at Murdoch in December 2022.
- Supervised postgraduate students of Environmental Engineering in their Industry Practicum training.
- Supervised PhD students in Industrial Symbiosis and Circular Economy and Sustainability.

### **Asian Development Bank (ADB)**

**April-September 2019**

#### ***Process Specialist (International)***

- Reviewed the existing data and information in the feasibility study conducted in

2015/16 and conducted further survey as required for developing the process design for 30 and 60 MLD wastewater treatment plants,

- Prepared the process design and operational cost models for these plants,
- Finalized the conceptual design and outputs criteria required for Design Build (DB).
- Prepared detailed project reports for ADB (including scoping, concept design, cost estimate, timeframe),
- Assisted in preparation of DB bid documents, initial environmental examination, environmental impact assessment (EIA) and resettlement plan as appropriate,
- Assisted in bidding process (invitations, evaluation & award), and in preparing all the processing documents for Board approval.

**Environmental Engineers International Pty Ltd (EEI)**

**Dec 2010-April 2017**  
**July 2008-June 2009**  
**April 2001-March 2004**

***Senior & Principal Consultant,***

- Team leader and business development manager for the sustainability group.
- Reviewed and developed sustainability policies and approaches.
- Developed models and methodologies to assess sustainability for various projects.
- Analysed existing and/or proposed infrastructure assets to evaluate engineering and economic effectiveness to present viable recommendations.

**Water Corporation**

**May 2017-April 2018**  
**July 2009-Dec 2010**

***Senior Design Manager/Senior Planning Engineer***

- Coordinated complex investigations, conceptual planning and financial analysis for assessment, development, and remedial works of allocated infrastructure assets for Perth and South-west region.
- Managed design for assigned projects and reviewed outputs and performance for conformity to agreed requirements, standards, time, and cost.
- Managed the preparation of complex tender documents, undertook tender analysis and recommendations were made.
- Prepared briefs for engaging consultants; evaluated consultant proposals and made recommendations.
- Provided advice to external suppliers, liaised with internal customers, service agencies, consultants, industry regulators and agencies.

**RELEVANT PROJECTS**

**Sub-project 7: Industry By-product Hubs**

In this project, I brought the national and international expertise to the table. This learning will help not only Australian decision makers to develop a regulatory framework for the state and the country, but it will also help international counter parts once completed. For this, I am planning to present the unique experience gained from overseas and Australia to the international audience through a webinar. Australia produced around 49% of World's Lithium in 2020 and the exports are tipped to increase to 3.9 tonnes in 2025-26. According to Australian Government, the latest Critical Minerals Strategy 2030 is becoming a framework to grow its critical mineral sector, this project will enlighten the residue utilization and management with sustainable solutions.

**Feasibility study for Suvo Kwinana Geopolymer**

Another example that I produced high quality research is for developing 'the feasibility study for Suvo Kwinana Geopolymer pilot project'. I supervised the project team along with Assoc Prof Martin Anda. With my research and industry experience, I developed industrial symbiosis networks between many businesses in Kwinana Industrial Area so they could develop a business case for geopolymer concrete.

We were able to receive funding from DevelopmentWA and the industries in my contact such as Tianqi Lithium Australia.

### **Carbon Reduction Kwinana Industrial Area**

Prepared reports for Carbon Reduction Kwinana Industrial Area (CRKIA) phase 1 and some of phase 2 project using baseline emission and evaluation for recommendation of mitigation measures for Kwinana Industries Council. also developed cumulative emission reduction report of KIC members collective for the last 5 years since the implementation of Safeguard Mechanism in 2016. This project will align members of KIC with the Paris Agreement for Carbon Reduction and Net Zero by 2050.

### **Promoting smart drinking water management in South Asian Cities**

As an international wastewater process specialist, I completed process design for 30 and 60 MLD wastewater treatment plants for Khulna, one of the third largest cities of Bangladesh. I reviewed the existing data and information in the feasibility master- plan study. I conducted further geotechnical and topographical surveys as required. I considered the wastewater data, identified the design outputs-based treatment system required. I assisted the consultants in the preparation of IEE, Environmental Impact Assessment (EIA), Initial Environmental Examination (IEE), and resettlement plan as appropriate.

I developed the treatment process/mechanism with all the components. I prepared the draft and final detailed project reports (including scoping, engineering design, cost estimate, timeframe). I finalised the documents required for the Design Build (DB) package and assisted in the preparation of DB bid documents.

### **Treated wastewater reuse scheme upgrade, Carnarvon**

I reviewed and assessed preliminary engineering design reports and tender documents prepared earlier for this project. I evaluated the tenders received and selected the best Design & Contract (D&C) bid.

I reviewed risk management register, organised stakeholder meetings for evaluating contractor's progress. I conducted Operability, Construcability, Safety in Design (SID), and HAZOP workshops involving internal and external consultants. I organised preparation of drawings to be secured as As Constructed (ASCON) in the Document Management System of the Corporation.

### **Derby Wastewater treatment plant upgrade**

The project scope was to upgrade the plant to cater for the treatment of future inflows using an anaerobic pond and hence an area for sludge drying bed. I analysed existing data available to conduct geotechnical investigation and topographical surveys. I conducted a site visit to assess the situation.

I incorporated inflow measurement into design, including a new septage receival facility on the north-east edge of a new anaerobic pond which replaced the existing facility at the north-east corner of Primary Pond. I designed anaerobic ponds and sludge drying beds. I design managed the work from internal stakeholders of process, hydraulic, civil, structural, electrical, and SCADA. I completed Engineering Summary Report, Safety in Design, and a Project Cost Estimate for input into the Approval to Deliver (ATD) Business Case.

### **Mt. Barker WWTP- Planning for long term**

This project involved investigation and planning of the wastewater treatment plant up to 2040 for the upgrade of the treatment plant and reuse of treated wastewater.

I identified critical issues by visiting the site. I prepared the work plan, the flow projections and water balance for up to a 30-year projected period. I Investigated the treatment capacity and alternative TWWM options. I prepared and presented the details for stakeholder's approval. I investigated critical issues in detail for the approved options and engaged with the community for selecting the best option. I developed cost estimates, undertaken sustainability assessment for each option and prepared and presented the options for evaluation by the internal stakeholders. Finally, I conducted an invest review meeting after the analysis of staging of preferred options.

## **SDOOL Modelling and Planning for duplication**

SDOOL is a 24km pipeline discharging treated wastewater from the main wastewater treatment plants in south of Perth such as Woodman Point WWTP, Point Peron WWTP, Kwinana WWTP, Future Rockingham WWTP and Kwinana Water Reclamation Plant to the ocean 4.1km away. I planned future duplication of SDOOL using the results of hydraulic modeling of the pipeline prepared by the team.

## **Woodman Point WWTP Upgrade Review 2040 – Strategic project**

I reviewed odour buffer recommendations prepared initially by an external consultant. I calculated capital costs for reduction of odour buffer strategies to the eastern side of Lake Coogee for each of the upgrade options recommended by external consultant. I reviewed sustainability guidelines and updated according to the needs of Woodman Point Upgrade.

## **Wastewater 2060**

Wastewater 2060 is a strategic planning project. It involved outlining of the direction/context for wastewater scheme and issue planning, which did underpin the development of the wastewater systems in Perth and Mandurah.

I developed the planning recommendations up to value management study. I prepared some sections of the project such as wastewater flow projections, recycling potential, energy intensity, discharges, total footprint, clearing requirements and the net economic cost for each scenario mentioned below.

- Scenario 1 – Recycling for Scheme Water and Big WWTPs
- Scenario 2 – Capped WWTPs
- Scenario 3 – Small WWTPs
- Scenario 4 – Non-scheme recycling

## **PERSONAL ATTRIBUTES**

- Advanced communications, interpersonal and negotiation skills.
- Well-developed conceptual and analytical skills.
- Working with professional integrity and ethics.
- Ability to build and maintain constructive internal and external working relationships to support delivery of identified business outcomes.
- Demonstrated the values and behaviours that contribute to a constructive, high-performance culture.
- Demonstrated good computing skills, able to use Microsoft suite of systems, various software.

## **PROFESSIONAL MEMBERSHIP**

- ✓ Chartered Professional Member, CPEng, NER, APEC, Engineers Australia.
- ✓ Member, and committee representative, Sustainable Engineering Society, WA.
- ✓ Member, Committee member of International Society for Industrial Ecology, USA.
- ✓ Member, Australian Water Association, and International Water Association.
- ✓ Board member, Lithium Valley Association
- ✓ Member, and an Assessor, Professional Australia

## **PROFESSIONAL TRAINING**

- ✓ Circular Economy, United Nation System Staff College
- ✓ Intermediate, OpenLCA, GreenDelta, GmbH.
- ✓ Business and Climate Change: Towards Net Zero Emissions, University of Cambridge.
- ✓ Nature-Based Solutions for Disaster and Climate Resilience, United Nations Environment Programme.
- ✓ Sustainability in Practice, Engineers Canada.

- ✓ Research Commercialisation in Practice, Curtin University
- ✓ Safety in Design, Engineers Education Australia.
- ✓ Risk in Engineering, Engineering Education Australia

## AWARDS/ACHIEVEMENTS

- ✓ **Recipient** of Aspire Award as a Brightest Minds WA 2024 and funding for attending an international conference of choice.
- ✓ **Invitee as panel member** for the Future Battery Industries Recovered Materials Framework and AVEVA, Kwinana Connect 2024
- ✓ **Invite as a panel member** of Recovered Materials Framework Group, Future Battery Industries CRC, 2024
- ✓ **Recipient** of Project Robinhood funding, for facilitating sustainable initiatives in schools, a community project for supporting the local communities, Melville Council, 2019.
- ✓ **Recipient** of travel scholarship (Government of WA) for International Society for Industrial Ecology (ISIE)-Asia- Pacific Conference on Industrial Ecology held at Academy of Sciences, Qingdao, Peoples Republic of China, 2018.

## COMPUTER KNOWLEDGE & SOFTWARE

LCA SimaPro, OpenLCA, GHG Protocol, Catia Magic, ModFlow, Tuflow.

## PUBLICATIONS

### *Journal/conference papers*

- Lhachey, Ugyen., Anda, Martin., **Kurup. Biji.**, Lawrance. Naomi (2023), Environmental Performance of Recycled Concrete Aggregates using Life Cycle Assessment: Comparing Business as Usual with 115 Hamilton Hill, Western Australia. The 11th Australian Conference on LCA – Responding to the climate emergency: metrics and tools for rational action –Coolangatta, 19-20 July 2023, accepted for publication in the *journal of Sustainable Consumption and Production*.
- Oughton, C., Anda, M., **Kurup, B.**, Hamadi, M., & Ho, G. (2023c). KIC4: A Four-Dimensional Model for Industrial Symbiosis: Validation with Key Stakeholders. *American Journal of Industrial and Business Management*, 13 (12), 1456-1485. DOI:[10.4236/ajibm.2023.1312079](https://doi.org/10.4236/ajibm.2023.1312079)
- Oughton, C., **Kurup, B.**, Anda, M., & Ho, G. (2023b). Industrial Symbiosis - Recommendations on a business framework conducive for successful Industrial Symbiosis at the Kwinana industrial area. *Renew. Energy Environ. Sustain.*, 8, 18. [10.1051/rees/2023020](https://doi.org/10.1051/rees/2023020)
- Oughton, C., **Kurup, B.**, Anda, M., & Ho, G. (2023a). Collective transitioning of a heavy industrial area towards 'Net Zero Carbon': the critical role of Governance in delivering Enterprise action. *Renew. Energy Environ. Sustain.*, 8, 16. <https://doi.org/10.1051/rees/2023011>
- C. Oughton, **B. Kurup**, M. Anda, and G. Ho (2022), Industrial symbiosis to Circular Economy – what does the literature reveal for a successful complex industrial area? *Journal of Circular Economy and Sustainability*, <https://doi.org/10.1007/s43615-022-00153-1/>
- Oughton, C., Anda, M., **Kurup, B.**, & Ho, G. (2021). Water Circular Economy at the Kwinana Industrial Area, Western Australia—the Dimensions and Value of Industrial Symbiosis. *Journal of Circular Economy and Sustainability*, <https://doi.org/10.1007/s43615-021-00076-3/>
- **Kurup, B.** & Stehlik, D. 2009, 'Towards a model to assess the sustainability implications of industrial symbiosis in eco-industrial parks', *Progress in Industrial Ecology-An International Journal*, Vol 6, No 2. <https://doi.org/10.1504/PIE.2009.029077>
- Raj Kurup and **Biji Kurup** (2009), Engineering Sustainability Concepts in Industrial Pollution Abatement Projects, *The Environmental Engineer*, Vol 9 (4) and 10(1), 10 – 13. [https://www.academia.edu/26201438/Engineering\\_Sustainability\\_Concepts\\_in\\_Industrial\\_Pollution\\_Abatement\\_Projects](https://www.academia.edu/26201438/Engineering_Sustainability_Concepts_in_Industrial_Pollution_Abatement_Projects).
- Steve Harris, Rene van Berkel & **Biji Kurup** 2008, Fostering industrial symbiosis for regional sustainable development outcomes, Conference paper.
- **Kurup, Biji R.** 2007, Methodology for capturing environmental, social, and economic implications of industrial symbiosis in heavy industrial areas. PhD thesis, Curtin University of Technology, Division of Science and Engineering, Perth, Australia. [https://espace.curtin.edu.au/bitstream/handle/20.500.11937/1775/128365\\_Kurup2007.pdf/](https://espace.curtin.edu.au/bitstream/handle/20.500.11937/1775/128365_Kurup2007.pdf/)

- **Kurup, B.** & Stehlik, D. 2006, 'Stakeholder participation in evaluating social benefits of industrial symbiosis', in 5th Australian Conference on Life Cycle Assessment: Achieving business benefits from managing life cycle benefits. Australian Life Cycle Assessment Society, Melbourne, November (peer reviewed).
- **Kurup, B.**, Altham, W. & van Berkel, R. 2005, 'Triple bottom line accounting applied for industrial symbiosis', in 4th Australian Conference on Life Cycle Assessment, eds. KL James & T Grant. Australian Life Cycle Assessment Society, Sydney, February (peer reviewed).
- **Biji Kurup**, Rajendra Kurup, Kuruvilla Mathew and Goen Ho (2001), Co-treatment of septage in a Municipal Sewage Treatment Pond System, *Water Science Technology*, IWA, 46(9).

### Conference presentations

- **Dr Biji Kurup**, Delwyn Jones, 2023: Quantifying Biodiversity Climate Security Benefits of Water and Carbon Capture, *Transitions in a world in Turmoil, 11th International Conference on Industrial Ecology (ISIE2023)*, 2-5 July 2023 Leiden, The Netherlands.
- **Dr Biji Kurup**, 2023: Quantifying Biodiversity Climate Security Benefits of Water and Carbon Capture, *Transforming Consumption-Production Systems Toward Just and Sustainable Futures, a joint 5th SCORAI, 21st ERSCP, 5-8 July 2023, Wageningen University, The Netherlands.*
- Lhachey. Ugyen, Anda. Martin, **Kurup. Biji**, Lawrance. Naomi (2023), Environmental Performance of Recycled Concrete Aggregates using Life Cycle Assessment: Comparing Business as Usual with 115 Hamilton Hill, Western Australia, *the 11th Australian Conference on LCA – Responding to the climate emergency: metrics and tools for rational action –Coolangatta*, 19-20 July 2023.
- **Dr Biji Kurup**, Mr Chris Oughton, 2021, Update on Industrial Symbiosis Project based on KIC4 Model, Kwinana, Western Australia, Industrial Ecology Day, Online presentation, ISIE, June 21, 2021.
- **Biji Kurup**, Humbulani V. Tshiguvho, Dr Wahidul Biswas, 2014, Sustainability assessment of recycled water for direct and indirect potable reuse in Western Australia, paper presented at Joint 11th Socio-Economic Metabolism & 4th Asia-Pacific Conference: Industrial Ecology in the Asia-Pacific Century: Interdisciplinary science for building sustainable industrial systems and human settlement, 17-19 November 2014, Melbourne, Australia.
- **Biji Kurup** & Chris Oughton, 2014, Enabling Mechanisms of Industrial Symbiosis in Kwinana, paper presented at 5th Australasian Industrial Ecology Conference – Beyond Recycling: Closing the loop on Business Waste, 17-19 November 2014, Melbourne, Australia.
- **Biji Kurup**, 2013, Capturing implications of industrial symbiosis by Six Capitals Model, paper presented at the 7th International Society for Industrial Ecology (ISIE) Conference held on 25-28 June 2013 at University of Ulsan, Ulsan, South Korea.
- **Biji Kurup**, William Altham, & Rene van Berkel. 2005, "IS: What makes it happen", paper presented in the 3rd International Society for Industrial Ecology Conference held on 12-15 of June, Stockholm, Sweden

### Reports

- **Dr Biji Kurup**, Mr. Chris Oughton, (2021), Carbon Reduction Kwinana Industrial Area, report prepared for Kwinana Industries Council, Kwinana, Australia, [https://kic.org.au/wp-content/uploads/2022/06/CRKIA-Phase-One-Adopted-Report\\_RS\\_June-2021.pdf](https://kic.org.au/wp-content/uploads/2022/06/CRKIA-Phase-One-Adopted-Report_RS_June-2021.pdf)
- **Dr Biji Kurup** (2020), Kwinana Industrial Symbiosis Project, Report prepared for Kwinana Industries Council, Kwinana, Australia, <https://kic.org.au/industry/synergies>
- **Biji Kurup**, 2019: Detailed Project Report, Khulna Sewerage Systems Development Project, Promoting Smart Drinking Water Management in South Asian Cities, Asian Development Bank.
- **Biji Kurup**, 2018, Engineering Summary Report: Design and management of Derby wastewater treatment plant (WWTP) Upgrade, Water Corporation, Australia.
- **Biji Kurup**, 2018, Carnarvon WWTP shire reuse scheme, Water Corporation, Australia.
- **Biji Kurup**, 2018, Design report Kojonup WWTP Upgrade, Water Corporation, Australia
- Raj Kurup & **Biji Kurup**, 2014, Effluent Management Plan for The Proposed Wilderness Retreat & Short Stay Tourist Accommodation Broome Turf Club, Lot 1848 Gantheaume Point Road (Broome Racecourse Site), Broome.
- Raj Kurup & **Biji Kurup**, 2013 Report prepared for the strategic waste initiative scheme (SWIS) for waste management workforce training and development.