

# CURRICULUM VITAE

O. Parthiba Karthikeyan M.Sc., Ph.D (Environmental Sciences)

## PROFILE

I am Keen, Conscientious, Hard Working and Reliable person. I get on well with the people and can work well either on my own or as a part of team. I can adapt to any environment and would like to use my skills to contribute positively to any work situation.

*My favorite quote "Many of the great achievement of the world were accomplished by tired and discouraged men who kept on working"*

## EDUCATION

### Ph.D in Environmental Science (2004 – 2009)

Anna University, Centre for Environmental Studies ,  
Chennai – 600 025

### M.Sc.Environmental Science (2000-2002)

Bharathiar University, Department of Environmental Sciences,  
Coimbatore-600 046.

- 72%

### B.Sc.Microbiology (1997-2000)

Vysya College (University Of Madras),  
Salem-600 103.

- 69 %

## POST RESEARCH EXPERIENCE

### Research Assistant,

### Hong Kong, China

Sino-Forest Applied Research Centre for Pearl River Delta Environment,  
Hong Kong Baptist University, Kowloon Tong, Hong Kong SAR

**Reporting Person: Dr. Jonathan W.C. Wong, Professor**

### Research Associate

### Bangkok, Thailand

School of Environment, Resources and Development,  
Asian Institute of Technology, Bangkok, Thailand.

**Reporting Person: Dr. C. Visvanathan, Professor**

### Nature of job

- Designing and execution of lab and pilot scale simulation studies
- Writing research proposals for funding
- Publishing research articles in national and international conferences and journals
- Supervising, motivating and monitoring Masters and PhD students
- Equipments and chemicals stock maintenance from different projects
- Laboratory analysis of samples and molecular microbial studies
- Compilation, Analysis and Interpretation of data
- Preparation of project reports.



## Academic Experience

Conducted Theory Classes for M.Sc (Environmental Science) and M.Sc (Biotechnology) Distance education, Bharathiar University, Coimbatore.

Conducted Practical Classes for M.E (Environmental Engineering in Centre for Environmental Studies (CES), Anna University, Chennai.

## Current Address

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## CURRICULUM VITAE

### WORK EXPERIENCE

#### Research Interests

- Solid waste management
- Leachate and wastewater treatment
- Advanced oxidation and membrane technologies
- Environmental microbiology, chemistry and toxicology
- Application of Nanotechnology

#### Software and Statistical Skills

- MS Office
- Auto CAD
- Pearson's Correlation

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#### Previous Employer – Anna University Chennai, Tamil Nadu, INDIA

Job title : From Junior Project Assistant to Senior Project Associate  
Work period : January 2003 to December 2008 (Worked in various projects)  
Reporting Person: Dr. Kurian Joseph, Assistant Professor

#### Chronology

- Nov'08 to Dec'08 - Project titled "Status report of Industrial Pollution Control in Tamil Nadu"  
Funding Agency - Tamil Nadu Pollution Control Board (TNPCB), Tamil Nadu  
Designation - Senior Project Associate
- Aug'08 to Oct'08 - Project titled "Environmental Impact Assessment study for new Tamil Nadu Legislative assembly and Modern Library in Chennai"  
Funding Agency - Public Works Department (PWD), Government of Tamil Nadu, Tamil Nadu  
Designation - Senior Project Associate
- Jan'06 to Jun'08 - Project titled "Sustainable solid waste landfill management in Asia"  
Funding Agency - Swedish International Development cooperation Agency (SIDA), Sweden  
Designation - Junior Project Associate
- July'03 to Jan'06 - Project titled "Development of microbiological quality standards for disposal of urban wastewater"  
Funding Agency - Central Pollution Control Board (CPCB), Government of India, New Delhi  
Designation - Project Assistant
- Jan'03 to June'03 - Project titled "Assessment of ecological damages in Noyyal and Amaravathi river basins"  
Funding Agency - Loss of Ecology Authority (LoEA), Government of India, New Delhi  
Designation - Junior Project Assistant

### RESEARCH PROJECT

Research thesis titled "**Solubilization of Ammonical Nitrogen in Landfills under Tropical Environment, its Effect on Waste Stabilization and Struvite Recovery**", carried out with the guidance of Dr. Kurian Joseph, Assistant Professor, Centre for Environmental Studies, Anna University, Chennai. (Abstract of the thesis is given in Annexure 1)

Master thesis titled "**Biological liquefaction and biomethanisation of chicken Intestinal waste**", carried out under the guidance of Dr. S. Rajamani, Central Leather Research Institute, Chennai and Dr. P. Lakshmanaperumal Swamy, Professor, Department of Environmental Sciences, Bharathiyar University, Coimbatore.

## JOURNAL PUBLICATIONS

**Achievements**

Received travel grant from Department of Science and Technology, Govt. of India under young scientist cadre during the year 2007

Environmentalists Association awarded the title of Eco-Ambassador for the year 2000

**Organization skills**

Led the team for exhibiting models in Science Festival, Chennai during 2008

Supporting team member in organizing International conference and workshops

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**Obuli. P. Karthikeyan**, Su Yun Xu, Ammaiyappan Selvam and Jonathan W.C.Wong, "Characterization of microbial community distribution and extracellular enzyme activities in leach bed reactor treating simulated food waste: effect of leachate recirculation", *Bioresource Technology* (under process).

Swati M., **Obuli P. Karthikeyan**, Kurian Joseph, C.Visvanathan and Nagendran R, "Leachate and Biogas Quality in Tropical Weather- Lysimeter Studies on Controlled Dump and Bioreactor Landfill with Municipal Solid Waste from a Developing Country", *Practice periodicals of Hazardous, Toxic and Radio active waste management, ASCE (Accepted for publication - doi:10.1061/(ASCE)HZ.1944-8376.0000081)*.

Su Yun Xu, Hoi Pui Lam, **O. Parthiba Karthikeyan**, Jonathan WC. Wong (2011) "Optimization of food waste hydrolysis in leach bed coupled with methanogenic reactor: effect of pH and bulking agent", *Bioresource Technology*, Vol. 102 (4), 3702-3708

Jidapa Nithikul, **Obuli. P. Karthikeyan** and C. Visvanathan. (2011) "Reject management from a Mechanical Biological Treatment Plant in Bangkok, Thailand". *Resources, Conservation and Recycling*, Vol. 55 (4), 417-422.

C. Visvanathan, **Obuli P. Karthikeyan** and K.H. Park (2011), "Sustainable landfilling in tropical conditions: Comparison between Open and Closed cell approach", *Waste Management and Research*, Vol. 29 (4), 386-396.

C. Visvanathan, Nang Htay Yin and **Obuli. P. Karthikeyan** (2010), "Co-disposal of Electronic Waste with Municipal Solid Waste in Bioreactor Landfills", *Waste Management*, 30 (12), 2608-2614.

Ganesh G, **Karthikeyan O.P.** and Kurian Joseph, (2010) "Enhancing the hydrolysis step in anaerobic digestion of municipal solid waste using rumen fluid", *International Journal of Environmental Technology and Management*, Vol 13 (3/4), 311-321.

Sri Salini, **Obuli. P. Karthikeyan** and Kurian Joseph (2010) "Biological stability of Municipal solid waste from simulated landfills under tropical environment", *Bioresource Technology*, Vol. 101, No. 3, Pp. 845-852.

**Obuli. P. Karthikeyan**, S. Murugesan, Kurian Joseph and R. Nagendran, (2008) "Leaching of Inorganic Pollutants from fresh and mined waste – A lysimeter study under tropical conditions", *International Journal of Environment and Waste Management*, Vol. 2, No 1/2, Pp. 49-64.

Esakku. S, **Obuli P. Karthikeyan**, Nagendran. R, and Kurian Joseph, (2008), "Heavy metal fractionation and leachability studies on fresh and partially decomposed municipal solid waste" *Practice periodicals of Hazardous, Toxic and Radio active waste management, ASCE*, Vol. 12, No. 2, Pp. 127-132.

**Obuli. P. Karthikeyan** and Kurian Joseph, (2008) "Chemical precipitation of Ammonia-N as Struvite (MAP) from landfill leachate – Effect of molar ratio upon recovery" *International Journal of Solid Waste Technology and Management*, Vol. 34, No. 1, Pp. 20-26.

**Obuli P. Karthikeyan**, Swati M., Kurian Joseph and Nagendran R, (2007) "Performance of bioreactor landfill with waste mined from dumpsite", *Journal of Environmental Monitoring and Assessment*, Vol. 135, No. 1-3, Pp. 141-151.

Swati M., **Obuli P. Karthikeyan**, Kurian Joseph, and Nagendran R. (2007) "Landfill bioreactor – a biotechnological solution for waste management", *Journal of Scientific and Industrial Research*, Vol. 66, No. 8, Pp. 589-674.

## CONFERENCE PUBLICATIONS

**Invited Talks**

“Environmental Research: A focus on pollution abatement” given in seminar on Trends in Microbial Research conducted by Association of Microbiologists of India (Chennai Unit) during the month of February, 2009

“Monitoring and modeling of emissions from municipal solid waste dumpsites” given in national workshop on Policies and Strategies for Fine Particulates in Ambient Air at IIT Madras during the month of November, 2007

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**Obuli. P. Karthikeyan\***, Su-Yun Xu, Ammaiappan Selvam, Jonathan W.C. Wong (2011), “Food waste hydrolysis in SLS-CSTR under low organic loading rate: effect of pH upon metabolite distribution”, International Conference on Solid Waste 2011 – Moving towards sustainableresource management (ICSWHK 2011), Hong Kong, P.R.China, May 2-6, 2011.

Su-Yun Xu, **Obuli P. Karthikeyan**, A. Selvam, Jonathan W.C. Wong (2011), “Effect of inoculum to substrate ratio on the hydrolysis and acidification of food waste in leach bed reactor”, International Conference on Solid Waste 2011 – Moving towards sustainableresource management (ICSWHK 2011), Hong Kong, P.R.China, May 2-6, 2011.

Jonathan W.C.Wong, A. Selvam, Z. Zhao, **Obuli.P. Karthikeyan**, S.M. Yu (2011), “In-Vessel Co-composting of Horse Stable Bedding and Abattoir Blood Meal at Different C/N ratios: Process Efficiency”, International Conference on Solid Waste 2011 – Moving towards sustainableresource management (ICSWHK 2011), Hong Kong, P.R.China, May 2-6, 2011.

Binod Kumar, **Obuli. P. Karthikeyan** and C. Visvanathan (2009), “Dry thermophilic anaerobic digestion of municipal solid waste for energy recovery – a decentralized approach”, International Conference on Solid Waste Management (IconSWM), Kolkata, India, November 4-9, 2009.

**Obuli. P. Karthikeyan** and Kurian Joseph (2007), “Municipal solid waste treatment in simulated bioreactor landfills operated with high Ammonia-n concentration”, Presented in International conference on sustainable solid waste management, Chennai, India, September 5-7, 2007.

**Obuli P. Karthikeyan**, Kurian Joseph and R. Nagendran (2007), “Leachate recirculation to reduce the pollution potential of waste mined from open dumpsite – a lysimeter study” Presented in SARDINIA 2007, Caligari, Italy, October 1-5, 2007.

S. Esakku, **Obuli. P. Karthikeyan**, R.Nagendran, Kurian Joseph and K.Palanivelu (2007), “Seasonal variations in leachate characteristics from municipal solid waste dumpsite”, Presented in International conference on sustainable solid waste management, Chennai, India, September 5-7, 2007

S. Esakku, A. Swaminathan, **Obuli. P. Karthikeyan**, Kurian Joseph and K. Palanivelu (2007), “Municipal solid waste management in Chennai city, India”, Presented in SARDINIA 2007, Caligari, Italy, October 1-5, 2007.

**Obuli P. Karthikeyan** and Kurian Joseph (2007), “Bioreactor landfill for sustainable solid waste management”, Presented in National Conference on Sustainable Energy and Waste Management, Coimbatore, India, April 27 – 28 2007.

**Parthiba Karthikeyan O.**, and Kurian Jospeh (2007), “Chemical precipitation of Ammonia-N as Struvite (MAP) from landfill leachate – Effect of molar ratio upon recovery”, Presented in 22<sup>nd</sup> International Conference on Solid Waste Technology and Management, Philadelphia, U.S.A, March, 18 – 22, 2007, Pp. 358.

Vivek B., **Obuli P. Karthikeyan** and Kurian Joseph (2007), “Incineration in Disguise Refuse Derived Fuel (RDF) / Waste To Energy” Clean India 2007, Hyderabad, AP, India, February 23 – 24, 2007.

**Obuli P. Karthikeyan** and Kurian Joseph (2007), “Anaerobic Ammonium Oxidation (ANAMMOX) process for nitrogen removal – A review”, Presented in Biological methods of waste treatment and management in South India symposium, Chennai, TN, India, February 15, 2007.

Kurian Joseph, Nagendran R., and **Obuli P. Karthikeyan** (2006), “Stabilization of wastes from dumpsite in leachate recirculation and flushing bioreactors”, Presented in 4th Asian-Pacific landfill symposium, organized by APLAS, Shangai, China, November 2-4, Pp. 312 – 320.

### CONFERENCE PUBLICATIONS (CONTD...)

**Obuli P. Karthikeyan** and Kurian Joseph (2006), "Anammox A novel process for nitrogen management in bioreactor landfills – A review", Presented in National seminar on Integrated Municipal Solid Waste Management, Periyar Maniammai College of Technology for Women Thanjavur, Tamil Nadu.

Swati M., **Obuli P. Karthikeyan**, Kurian Joseph, and Nagendran R. (2005), "Landfill bioreactor – a biotechnological solution for waste management", Presented in National conference on Path to Health – Biotechnology Revolution in India, Anna University, Chennai, Tamil Nadu, India.

**Parthiba Karthikeyan O.**, Nithia Priya P.M., and Lakshmanaperumalsamy P. (2001), "Characteristics of wetland ecosystems in and around Coimbatore" presented in the Association of Microbiologists of India (AMI) -National conference held in , Gulbarga University, Karnataka.India

### LABORATORY TECHNIQUES

Molecular Techniques:  
qPCR, DGGE, Vector Cloning, Sequence analysis for the environmental samples.

Instruments handled:  
GC, Elemental analyzer, TOC, AAS, PCR, microplate reader, Gel documentation unit and PCR units

Well versed with the other physic-chemical analysis of environmental samples

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### PERSONAL INFORMATION

Father Name	:	Mr. Obulisamy Janakiraman
Mother Name	:	Ms. Vasanthi Obulisamy
Age	:	29
Marital Status	:	Single
Sex	:	Male
Nationality	:	Indian
Country visited	:	US (Philadelphia and New York); Thailand (Bangkok)
Languages Known	:	Tamil, English and Kannada
Interest	:	Music and Traveling
Sports	:	Swimming and Tennis

### REFERENCES

#### Dr. Kurian Joseph

Assistant Professor, Centre for Environmental Studies (CES), Anna University Chennai, Tamil Nadu, India - 600 025. E.mail: kuttiani@vsnl.com

#### Dr. C. Visvanathan

Professor, Environmental Engineering and Management, SERD, Asian Institute of Technology (AIT), Pathumthani, Bangkok, Thailand, 12120. E.mail: visu@ait.ac.th

#### Dr. Jonathan W.C. Wong

Professor, Department of Biology, Hong Kong Baptist University, Hong Kong, P.R.China  
E.mail: jwcvong@hkbu.edu.hk

### Annexure - 1

Municipal Solid Waste (MSW) contains about 4% protein, a major source of Nitrogen (N), which solubilizes as Ammonia-N in leachate over a long period of time. Ammonia-N can inhibit the anaerobic degradation process particularly at higher concentration (>1,500 mg/L). Regardless of the importance of nitrogenous emissions and factors that affect its stabilization, landfill studies have largely focused on carbon stabilization and soluble organic compounds in leachate. This study is an investigation of the N solubilization pattern, its effects on waste stabilization and a suitable treatment system for its recovery.

Assessment of N solubilization, stabilization and transformation mechanisms within different landfill operating conditions was done using lysimeter studies. Young and old landfill conditions were simulated using fresh MSW and partially stabilized MSW, mined from open dumpsite. For each substrate, one lysimeter was operated as controlled landfill (R1 and R3) without any leachate recirculation and another as bioreactor landfill (R2 and R4) with leachate recirculation. Lysimeters were operated over a period of 1000 days under tropical climatic condition and monitored for waste stability parameters such as substrate settlement, nitrogenous compounds in the leachate, biogas yield and Specific Oxygen Uptake Rate (SOUR) of the stabilized waste. The Ammonia-N toxicity effect upon waste stabilization was assessed using Anaerobic Toxicity Assay (ATA) and landfill columns study. Ammonium Chloride was used to attain the defined concentrations of 500, 1,500, 3,000 and 5,000 mg/L of Ammonia-N in both the experiments. Recovery of Ammonia-N as struvite (i.e., Magnesium Ammonium Phosphate) was studied at eight different molar ratios using combinations of  $MgCl_2 \cdot 6H_2O + Na_2HPO_4$  (Test 1) and  $MgO + H_3PO_4$  (Test 2), respectively.

Though the organic content of the fresh and partially stabilized waste (mined waste) varied in the range of 32 - 36 % and 16 - 18 % of total solids respectively, their N content were in between 0.8 and 1.2 %. The carbon stabilization was faster, than nitrogen in all the landfill operating conditions. Ammonification and solubilization were observed to be the major transformation mechanism experienced by the bioreactor landfills (R2 and R4) under tropical condition. The concentration of Ammonia-N in leachate from R1, R2, R3 and R4 varied widely in the range of 115 – 1,792 mg/L; 103 - 1,932 mg/L; 31 - 1,450 mg/L and 10 - 1,187 mg/L, respectively. In bioreactor landfills, Ammonia-N was observed to accumulate contributing to around 80 % of the total nitrogenous compound in the leachate. Nitrogen transformation by biological uptake was less within the different landfill operating conditions. Rain water infiltration in land fills provided micro-aerobic condition for the oxidation of N species into nitrate and nitrite. The absence of ANAMMOX bacterium in the leachate indicated the least possibility for anaerobic ammonium oxidation process within tropical landfills.

Addition of Ammonium chloride as Ammonia-N source enhanced waste degradation rate and biogas yield. The reactor with 3,000 ppm of Ammonia-N (ATA-3) concentration showed the highest biogas yield of 2.16 mL/gVS/day. Landfill columns operated with varying Ammonium chloride concentrations produced 20 – 30% more volume of leachate when compared to that of control implying higher rate of hydrolysis. Ammonia-N was getting transformed within the landfill during the acid production stage, while it accumulated during the methanogenesis stage of anaerobic degradation. Ammonium chloride addition with continuous leachate recirculation practices was found to enhance the leaching of organics and solids contents from the MSW in landfill bioreactors.

Chemical precipitation of Ammonia-N in the leachate as struvite was efficient with the addition of either  $MgCl_2 \cdot 6H_2O + Na_2HPO_4$  or  $MgO + H_3PO_4$ . Among the eight different molar ratios (Mg:N:P) studied, the maximum Ammonia-N removal of  $76 \pm 0.5\%$  and  $78 \pm 1\%$  was achieved at 2:1:1.5 and 1.5:1:2, respectively with the addition of  $MgCl_2 \cdot 6H_2O + Na_2HPO_4$ . While, the maximum Ammonia-N removal of  $76 \pm 0.8\%$  was achieved at 2:1:1.5 and 2:1:2 (Mg:N:P) molar ratios with the combination of  $MgO + H_3PO_4$ . The struvite precipitates were light yellow in color and crystalline in nature. Finally, the study results clearly proved that the addition of excess Mg or P source provided the efficient recovery of Ammonia-N from landfill leachate.