

**Dr. Rahul Marathe Ph.D**

Founder and Director,  
Mitrakida Foundation for Insect Research and Conservation,  
Mitrakida Biosolutions Private Limited  
TEDx speaker, Swayam Talk Speaker

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**Areas of interest and expertise**

Entomology, Parasitology, Environment science, Wildlife conservation

I am a passionate entomologist dedicated to exploring the insect world, have a keen interest in understanding these tiny creatures that inhabit our planet. Through years of fieldwork and research, my expertise lies in entomological consultancy, beneficial insects, insect inspired technology, and taxonomy. I engage in outreach activities, educating the public about the significance of insects and inspiring the next generation of entomologists. My journey as an entomologist embodies curiosity, dedication, and a profound appreciation for the insect world. As I continue to explore the depths of entomology, my work serves as a reminder of the incredible diversity and importance of insects in our ecosystems.

Since 2016, I have been engaged in pioneering research on “**plastic-eating larvae,**” a groundbreaking discovery with immense potential to address the global challenge of plastic pollution. My work has generated essential baseline data, establishing a strong scientific foundation for future advancements in plastic degradation. Beyond this, I have led several **innovative projects** that harness the power of insects for sustainability. Notably, I developed a process to convert **hazardous paint waste and canteen waste** into **fertilizer-grade, non-agricultural manure** using *Black Soldier Flies*—successfully implemented in both the **automotive industry (Bajaj Auto)** and with the **Indian Army**. Another key innovation, ‘**Kidoshouchalay**’, is a **unique insect-inspired toilet system** designed for **high-altitude areas** in collaboration with the **Indian Army and Border Roads Organisation**. The system has been successfully installed and demonstrated under extreme conditions. My work further extends to providing **biosolutions for mitigating bird strikes** at **Indian Naval Aviation, Indian Air Force, Indian Coast Guard, and civil airports across India**, using insect-based ecological strategies. In addition, I am collaborating with the **DRDO, Ministry of Defence**, on several cutting-edge projects that leverage insects for diverse defence-related applications. Driven by a deep passion for **entomology** and a steadfast commitment to **sustainability**, I continue to explore and develop **eco-friendly, insect-**

**based solutions** to some of the most complex environmental and technological challenges of our time.

### Education

- Ph. D in Zoology, University of Pune, India 2009
- M.Sc. (Entomology), University of Pune, India, 1999
- B. Sc (Zoology), University of Pune, India, 1997

### Employment

- **Founder and Director (Dec 2023 till date), Mitrakida Foundation for Insect Research and Conservation, Pune, India**

To create awareness about insects for their conservation, I routinely deliver public lectures for insect popularization to sensitize people. I also write articles on insects in newspapers as well as on social media, conduct insect education programs in schools (urban and rural), courses, workshops, and camps for school kids.

- **Founder and Director (September 2019 till date), Mitrakida Biosolutions Private Limited, Pune, India**

I undertake Entomology related specialized projects from individual to institutional level clients. I am engaged in specific projects with Defence. In addition, I provide entomological investigation services for farms and various types of industries. I also carry out insect surveys and tree risk assessment with reference to insect infestations.

- **Head and Study Director (Jan 2018 – Aug 2019), ROSS Life science Pvt ltd, Pune, India**

As Head and Study Director, I have handled many audits of GLP, NABL, ISO, CIB-RC etc. I have done planning and execution of many entomological projects for both national and international clients. I have conducted many agricultural studies for new product development and on and off shelf product studies for household, medically important, veterinary insecticides/pesticides. I have successfully completed these projects with my team by building network across scientific disciplines in stipulated time frame.

- **Founder and Proprietor (Jan 2016 – Dec 2017) at MITRAKIDA, Pune, India**

With my own rearing facility for beneficial insects, I gave consultancy to the agricultural practitioners and farmers for agriculture pest management. Under the proprietary I have developed technologies for rearing of beneficial insects. I have developed economic ways for *Corcyra* egg production, Tricocard production, mealy bug culture, etc. Apart from routine work, I have delivered

more than 50 public talks introducing the concept of using beneficial insects for farming practices.

- **Head Entomology and Sr. Manager Technical services (June 2013 – Dec 2015), ROSS Life science Pvt ltd, Pune, India**

As Head Entomology and Senior Technical Manager, I was involved in getting certifications and audits for NABL, ISO, CIB-RC etc.

- **Chief Coordinator – Environment Management Division (Sept 2011 – June 2013) KICONS Limited formerly Kirloskar Consultants Limited, Pune, India**

As a Chief coordinator, I led team of 10 environmental scientists and worked for more than 60 different Environment Clearance, Ecology, Restoration projects at State and Central Government and private owned projects. The key aspects of my responsibilities include planning, technical support, and execution on the scientific front for the progress of the project. Some of the important projects are given below.

1. Rapid Environment Impact Assessment (REIA) for collecting, compiling, and assessing environment for Kirloskar Ferrous Industries Ltd, India.
2. Rapid EIA-EMP project for Neyveli Lignite Corporation Ltd, India.
3. CRZ Clearance and Environmental Clearance from Ministry of Environment and Forest for extension of Palm Beach Marg at Ghansoli Node for City and Industrial Development Corporation of Maharashtra Limited (CIDCO), India
4. Environmental Impact Assessment (EIA) Study for Khargone Thermal Power Project, National Thermal Power Corporation, India.
5. EIA Studies for coal-based power project for Videocon Industries LTD, India. Environmental Consultancy services for coal-based power plant for Shree Renuka Energy Limited, Karnataka, India.
6. River development and lake development projects, Comprehensive Transportation Study (CTS) for the Pune Metropolitan region (PMR) under Pune Municipal Corporation, India.

- **Manager – Technical Services (June 2009 - Sept 2011), ROSS Life science Pvt Ltd, Pune, India**

Worked as lab leader for a team of 4 entomologists, for an insectary development project. The key aspects of my responsibilities were creating a state of art insect rearing facility / referral entomological center. I was in-charge of entomological studies with focus on household insecticide studies for national and international clients. I was internal auditor and have handled audits for NABL, ISO/IEC 17025

- **Research Student (Nov 2008 - May 2009), Central Research Station BAIF, Pune, India**  
As a PhD research student at Bharatiya Agro Industries Foundation (BAIF), I completed my Ph. D work which was beneficial for animal husbandry with reference to the domestic animals for ectoparasite management. (Publications in publications section).
- **Principal Scientific Officer (Sept 2007 - Sept 2008) at Naik Environment Research Institute Ltd. NERIL, Pune, India**  
I worked as Head of Research & Development and Head of Environment wing for a team of 12 environmental officers on various Environmental Impact Assessment projects of state Government and central government, as given below.
  1. EIA studies on Yamuna-Rajasthan Interlink canal, India.
  2. Rajasthan-Sabarmati Interlink canal, India.
  3. Bhakra Main Line- Hansi Branch - Butana Branch - Multipurpose Link Channel Project, India
  4. Comprehensive Catchment Area Treatment Plan for Sutlej River Basin in Himachal Pradesh, India.
  5. Comprehensive Catchment Area Treatment Plan for Beas River Basin in Himachal Pradesh, India.
  6. Environmental Evaluation and Monitoring of Jayakwadi Stage I on Godavari (Maharashtra) for Central Water Development Authority
  7. Restoration and Beautification of Pune Rivers and lakes for Pune Municipal Corporation
  8. Participated in Jaldindi, a journey, which starts from Alandi to Pandharpur through river, a 12 days procession of Sant Dynashwar Maharaj through Indrayani and Bhima rivers in small boats and kayaks. Here I for the first time devised new dimension of sensitizing the villagers regarding water quality testing by using microscopic analysis viewed on Television, which was highly appreciated from the locals
- **Lecturer in Zoology (Under Grad) and Biodiversity (Post Grad) (July 2001 - July 2007) at Abasaheb Garware College, Pune, India and at Sinhgad College of Science, Pune, India**
- **Field Biologist and Naturalist (Sept 2001 - July 2003), PUGMARKS, Pune, India**  
As young field biologist and naturalist, I led camps in forests of India to educate campers especially with a focus on entomology.

- **Junior Research Fellow (DST, Govt of India) (July 1999 - Sept 2001) at Dept. of Microbiology, Abasaheb Garware College, Pune, India**

As a young research fellow, I did extensive field work for wildlife health project in Tadoba Andhari Tiger Reserve, Maharashtra, India. The project involved data collection, analysis, and preservation of collected fecal samples and postmortems of domestic and wild animals in the forest areas. (special permission from state government for two years)

### **Other work related to Ecology and Environment**

- Survey of vegetation for the area proposed for mining in Junnagad, Gujarat, India, for Gujarat Ambuja Cements Ltd on behalf of Pugmarks, Pune, India
- Team member for an exclusive Integrated Restoration Project of Gujarat Ambuja Cements Ltd. Limestone Quarries. This project gained second ranking in world under Sustainable Aggregates, UK assessment.2006
- Successful completion of entomology surveys for various agencies like Oxford Golf Club, Pune, Faunal survey of Pandhari, Ukkadgaon forest areas of Barshi, Maharashtra, India under World Wild Fund (WWF) – Pune Division, India.
- Panel judge for “Vasundhara Film festival” “B+ve Green Pune” Conference held in Pune, India.
- Consultant for development of an enclosed Butterfly Garden in Hinjewadi Tech Park, Pune India, and an open butterfly park in a society Rolling Hills, Pune India.

### **Trainings/Conferences**

As a Senior Facilitator in pest management industry, I have advised leading organizations like

- Pest Management Association, Pune, India
- SealedAir, Bengaluru, India
- ITC hotel managers, Gurgaon, India.

I have designed Zoology syllabus for First Year Biotechnology stream under “Two-day workshop on ‘B.Sc. syllabus in Biotechnology’ organized by Department of Biotechnology Modern College, Ganeshkhind, Pune, (Sept 2004).

### **Presented research papers in**

- National Conference on Life Science with special reference to Environmental Biotechnology & Biodiversity UGC & Shivaji University, 2010
- “International conference on Environment and Humanity” at Sri Lanka, 2012.

## Awards

1. Times Man of the Year 2018
2. Maharashtra Vruksha Samvardhini, Pune, India 2020
3. Nature walk recognition, 2023
4. Karam foundation, 2024

## Independent Scientific Consultant, Pune, India

- For entomological issues.
- Insect investigation and surveys for pharmaceutical, garment, automobile, spice industries and for farms and gardens.
- Designing butterfly gardens

## Publications:

### Book:

A field guide, "Mammals of Maharashtra" published by NGO "Nature Walk", Pune, India. This was prepared to impart knowledge of mammals amongst education seekers.

### Research Papers:

1. Nilesh Rane, Rahul Marathe and H. V. Ghate, 1999. First record of *Cassida flavoguttata* speath, (coleoptera: chrysomelidae: cassinidae) from Satara, Maharashtra. Journal of Bombay Natural History Society, Vol 96(1), April 1999.
2. Swietojanska Jolanta, Hemant V. Ghate and Rahul Marathe, 2001. *Notosacantha chandrapurensis* n. sp. from India'. (Coleoptera: Chrysomelidae: Cassidinae) 'Genus' Vol. 12(4): 489-492 Wroclaw, 28 XII.
3. H.V. Ghate, Sachin Ranade, Rajpreet Kaur, Rahul Marathe, 2001. First record of *Histiasula bruneriana sassure* (insecta: mantodea) from Pune, Maharashtra. Journal of Bombay Natural History Society, Vol 98 (3).
4. H.V. Ghate, Sachin Ranade, Abhay Soman, Rajpreet Kaur, Rahul Marathe and T.K. Mukherjee, 2001. Rediscription of *Amorphoscalis annulicornis* stal (insecta: mantodea) from Pune, Maharashtra. Journal of Bombay Natural History Society, Vol 98 (3).
5. Rahul R Marathe, Shantanu S Goel, Sachin P Ranade, Maithili M Jog, Milind G Watve, 2002. Patterns in abundance and diversity of faecally dispersed parasites of tiger in Tadoba National Park, central India. Bio Med Central Ecology, 2:6 Article URL <http://www.biomedcentral.com/1472-6785/2/6> ISSN 1472-6785.
6. Maithili M Jog, Rahul R Marathe, Shantanu S Goel, Sachin P Ranade, Krushnamegh K Kunte, and Milind G Watve, 2003. *Sarcocystis* infection in

- chital (*Axis axis*) and dhole (*Cuon alpinus*) in two Indian protected areas. Zoo's Print Journal 18 (10): 1220-1222.
7. Rahul Marathe, 2004. Unusual bonds (Readers' space). Hornbill Jan – Mar 2004, pg. 18 (Short - communication)
  8. Maithili M Jog, Rahul R Marathe, Shantanu S Goel, Sachin P Ranade, Krushnamegh K Kunte, and Milind G Watve, 2005. *Sarcocystosis* of chital (*Axis axis*) and dhole (*Cuon alpinus*): Ecology of a mammalian prey-predator-parasite system in Peninsular India. Journal of Tropical Ecology 21 (4), pp. 479-482.
  9. Marathe R.R, Jadhav M.D, Gore Suneeti, Joshi Sonali, Thatte Vidya and Rathod L. R, 2011. Utilization of *Drynaria quercifolia* (L.) J. Smith as a Mosquito repellent. Science Research Reporter 1(3): 159-163, ISSN: 2249-7846 (Online)
  10. Marathe R.R., Patil V.C., Muley S.M, Singh Krishna Kumar, Gokhale Suresh, 2011. Study the Effect of Plant Extract on Endoparasite, International Journal of Pharmaceutical Applications. Vol 2, Issue 4, 2011, pp 253-257. ISSN 0976-2639
  11. M.D. Jadhav, R.R. Marathe, L.R. Rathod and S.M. Muley, (2012). Siddha tel (fatty oil preparation) the novel source of tick repellent, Bionano Frontier, special issue – 9, pp-287-290. ISSN 0974-0678
  12. R.R. Marathe, M.D. Jadhav and L.R. Rathod, 2012. Eco friendly Activity of *Drynaria quercifolia* against Bacterial and fungal species. BIONANO FRONTIER, special issue – 9, pp-200-201. ISSN 0974-0678
  13. Rahul Marathe, 2013. IPM-Cockroach Control. PMA Conference, Igatpuri, India.
  14. Das B.P., Deobhankar K., Pohekar K.N., Marathe R., Husain S.A., and Jambulingam P, 2016. Laboratory bioassay of *Chilodonella uncinata*, an entomopathogenic protozoan, against mosquito larvae, Journal of Mosquito Research, 6(10): 1-10 (doi: 10.5376/jmr.2016.06.0010)
  15. Taxonomical contribution in discovering a new species of insect *Chiridopsis nigropunctata*. n.sp. 'Genus' Vol. 10 (1): 103-108 Wroclaw, 31 III (1999)

#### Popular Science articles:

1. Nisargayan magazine (NatureWalk publishers), October 2006. 'ताडोबातील आठवणी'.
2. Chhatra Prabodhan, 2009. 'निसर्ग पहा फिरून'
3. Chhatra Prabodhan, April 2009. 'वन वणवा'
4. Chhatra Prabodhan, 2011. 'काटेझरीचा शिवा'
5. Chaitreya Vasantik magazine, April 2013. 'अरण्ययात्रा, एक अनुभव'

6. Sakal Today, 3 November 2016. 'किड्यांशी मैत्री' माणसांच्या मदतीला
7. Vanarai magazine, December 2017. 'A1 की A2? निर्णय तुमचा!
8. Vanarai magazine, 2018. "'शोध'वाटा", प्लास्टिक खाणारी अळी"
9. The Bridge Chronicle, 10 June 2019. "Timely intervention needed to protect fireflies in Maharashtra"  
[http://www.sakaltimes.com/pune/timely-intervention-needed-protect-fireflies-maharashtra'C2%A0-36360](http://www.sakaltimes.com/pune/timely-intervention-needed-protect-fireflies-maharashtra%C2%A0-36360)
10. Nisargasevak magazine, April 2022. 'उपद्रवी कीटक'
11. Maharashtra Times, 23 July 2023 – 'पतंगांयन'
12. Maharashtra Times, 9 October 2023 – 'भुंगेच्यांचे मनोरंजक विश्व'
13. Maharashtra Times, 24 January 2024 – 'किड्यांचे अपरिचित विश्व' पूर्वार्ध
14. Maharashtra Times, 25 January 2024 – 'टोळधाडीचा आश्चर्यकारक प्रवास' उत्तरार्ध
15. Maharashtra Times, 12 February 2024 – 'पंख नसलेले कीटक' पूर्वार्ध
16. Lokmat, 20 February 2024 – 'डासांच्या मनोऱ्यांचे रहस्य नेमके काय आहे?'
17. Maharashtra Times, 6 March 2024 - 'कीटकांचे अनोखे विश्व' उत्तरार्ध
18. Maharashtra Times, 21 March 2024 - 'गुणगुणणाऱ्या गुणकारी माशा'
19. Maharashtra Times, 29 May 2024 – 'डंख मारणारे कीटक'
20. Maharashtra Times, 24 June 2024 - 'काजवे एक जैविक किमया'
21. Maharashtra Times, 24 June 2024 – 'विश्व पतंगांचे'
22. Maharashtra Times, 25 July 2024 – 'कीटक डंखाचे वेदनामापन'
23. Anandtarang magazine - कीटक विश्वातील दिवाळी
24. "नदी आणि कीटक": प्रवास सहअस्तिवाचा, शाश्वत नद्या : वनराई वार्षिक विशेषांक २०२४
25. Maharashtra Times, 06 Jan 2025 – 'परकीय उपद्रवी कीटक'
26. Maharashtra Times, 21 May 2025 – 'दूत मृगनक्षत्राचे'
27. " प्लास्टिकची समस्या - काल, आज आणि उद्या": वनराई मासिक अंक: जून २०२५
28. Vipulashree Magazine, Oct-Nov 2025 - Interview about the work of Mitrakida Foundation for Insect Research and Conservation

#### Work covered by leading newspapers:

1. Hindustan Times, 4 Dec 2017. 'Good bugs bred to keep plants; crops pest free.'
2. Pune Mirror, 22 May 2017. 'Can this insect eat the city's plastic away?'
3. The Better India, 30 August 2018. 'Pune Man May Have Found Solution to Trash Troubles: Caterpillars That Munch Plastic!'  
<https://www.thebetterindia.com/157657/pune-man-dr-rahul-marathe-plastic-solution-caterpillars/>

4. The Indian Express, 6 January 2020. 'Insects that eat plastic, secrete manure and kill pests — solutions to manmade problems, says entomologist'  
<https://indianexpress.com/article/cities/pune/pesticide-free-environments-and-plastic-eating-insects-rahul-marathe-workshop-6201508/>
5. The Bridge Chronicle, 29 January 2020. 'Don't shun insects while composting'.  
<https://www.sakaltimes.com/pune/%E2%80%98don%E2%80%99t-shun-insects-while-composting%E2%80%99-45763>
6. Business Icon: [https://businessicon-in.translate.google.com/dr-rahul-marathe-mitrakida-biosolutions-pvt-ltd/?x\\_tr\\_sl=en&x\\_tr\\_tl=mr&x\\_tr\\_hl=mr&x\\_tr\\_pto=tc](https://businessicon-in.translate.google.com/dr-rahul-marathe-mitrakida-biosolutions-pvt-ltd/?x_tr_sl=en&x_tr_tl=mr&x_tr_hl=mr&x_tr_pto=tc)
7. <https://www.loksatta.com/pune/mitrakida-foundation-insect-research-dr-rahul-marathe-environment-interview-pest-control-beneficial-pune-print-news-ocd-94-5488781/>
8. <https://www.youtube.com/watch?v=xNMAALVpN-k>

### **Insect popularization talks to spread awareness about insects.**

I have delivered more than 100 open forum Lectures on topics like Insects, Mammals, Ecology, Wildlife, Global Warming and Renewable Energy sources. Some of them are listed below.

- 1) 'Insect-plant interaction', Aranyawak, Pune, India. 2007.
- 2) 'Invasive Insects', Vanbhavan, Pune, India. 6 October 2016.
- 3) 'Culturing of useful insects', S.P. College, Pune, India. 20 January 2017.
- 4) 'Wonderful world of Insects, Rotary club SNDDT, 05 Sept 2018
- 5) 'Learning From Insects', TEDx talk, Hinduja college, Mumbai. 30 January 2019.  
[https://www.ted.com/talks/dr\\_rahul\\_marathe\\_learning\\_through\\_insects\\_daily?utm\\_campaign=tedspread&utm\\_medium=referral&utm\\_source=tedcomshare](https://www.ted.com/talks/dr_rahul_marathe_learning_through_insects_daily?utm_campaign=tedspread&utm_medium=referral&utm_source=tedcomshare)
- 6) 'Entomology: Shaping the Future', Poornam Ecovision Foundation. 23 December 2020.
- 7) Dr Milind Watve's group meeting, Pune, India. 19 August 2020
- 8) 'Insects: Unexplored Gems of Biodiversity', IISER-Pune science activity center, Pune, India. 15<sup>th</sup> Oct 2023  
<https://www.youtube.com/watch?v=Kzj9cTXhT0c>
- 9) 'World of Insects', Sane guruji vidyamandir, Jaitapur, India. 11 July 2023
- 10) 'World of Insects', Vision school, Pune, India. 23 August 2023
- 11) 'World of Insects', Tukaram Pundalik Shetye Junior College, Lanja, India. 29 August 2023
- 12) 'World of Insects', Nutan Vidyamandir, Oni, India. 29 August 2023
- 13) 'World of Insects', Philipsian's Coffee Katta, Pune, India. 19 November 2023
- 14) 'Master Builders of the Insect World: Exploring the Nesting Abilities of Social Insects', ISOLA Maharashtra chapter, Pune, India. 25 November 2023

- 15) 'Insects of Maharashtra', S.K.S.V. Arts, Commerce and Science College, Lanja, India. 29 January 2024
- 16) 'Insects of Maharashtra', ASP Science College, Devrukh, India. 29 January 2024 (2 talks)
- 17) Insect Power: A Sustainable and Innovative Approach to Swachh Bharat Abhiyan, Arnala Village, 02 March 2024
- 18) "Incredible world of insects" at ARAI, Kothrud, Pune August 2024
- 19) Jungle Belles Webinar, Pune, India. 28 September 2024
- 20) Swayam talks, Pune, India. 06 October 2024
- 21) 'Wonderful world of Insects', SPM English Medium School, Parshuram, 21 Jan 2025
- 22) Rotary Club of Midtown, Pune Sevasadan, 'Discover the Power of Insects', 05 Feb 2025
- 23) Akashvani, Sad Sanwad. Pune, India. 24 Feb 2025
- 24) Tulajabhawani Kshishan Mandal, Islampur, India. 8 March 2025
- 25) Rotary Club of Pune Tilak Road, Sevasadan 'Kitakanchoya Jagat', 13 March 2025
- 26) "Honeybee Hive Conservation", Avantee Kirloskar Office, 21 April 2025
- 27) 'Unfolding the Moth World', Moth lecture at Vidnyanashram, Pabal, India. 21 July 2025
- 28) मुख्य अथाति, ज्ञानगंगा बहुविकलांग संस्था व रिसबूड परिवार, रोहा, २१ ऑगस्ट २०२५, 'कीटकांचे महत्व'
- 29) "Kitakancho Vishwa", Parivartan talk series, Baramati, 20 Sept 2025
- 30) World of insects, Chitpawan Katta Kothrud, 8 Nov 2025
- 31) Kisan – Student Connect webinar by IBB department University of Pune 4 Dec 2025
- 32) "Wonderful world of insects", Patwardhan High School, Ratnagiri, 13 Jan 2026
- 33) "कीटकशास्त्र: काल, आज आणि उदया" Late Bavdekar memorial lecture series Gogate Joglekar College, 14 Jan 2026
- 34) Screening of 'Insectales' documentary and lecture in Shirke High school Ratnagiri, 14 Jan 2026.

### Training Programs for Naturalists:

Lectures on 'Insects of the Sahyadri' conducted at the Green Trail Naturalists Training program by Shillim Institute, Maval, Pune, India. 22-23 November 2025.

## “Insectales” – Public talks on insects, Pune, India

*‘Insect Tales’ is a talk series specially designed for creating awareness about the importance of insects in nature. These well-researched and scientifically sound lectures are created to introduce common people to the wonderful world of these tiny creatures.*

- 1) ‘Beetles’, Indradhanushya environment and citizenship center, 14 September 2023
- 2) ‘Grasshoppers and Crickets’, Indradhanushya environment and citizenship center, 26 October 2023
- 3) ‘Beyond the Buzz: The Lesser-known Insects’, Sevasadan English medium school, 25 November 2023
- 4) ‘The Busy World of Flies’, Sevasadan English medium school, 23 December 2023
- 5) ‘The Sting Operation: Ants, Bees and Wasps’, Sevasadan English medium school, 20 January 2024
- 6) ‘Chirps, Saps and Hops: From Cicadas to planthoppers’, Sevasadan English medium school, 24 February 2024
- 7) ‘The Lice Business’, Sevasadan English medium school, 23 March 2024
- 8) ‘Ephemeral Elegance: Mayflies and more’, Sevasadan English medium school, 20 April 2024
- 9) ‘Fireflies: The Twilight Saga’, Sevasadan English medium school, 25 May 2024
- 10) ‘Flight and Finesse: Predatory Insects in the Air’, Sevasadan English medium school, 22 June 2024
- 11) ‘Predators and Pretenders: Mantis and Phasmids’, Sevasadan English medium school, 13 July 2024
- 12) ‘Rainbow on Wings: Butterflies’, Sevasadan English medium school, 10 August 2024
- 13) ‘The Termite Truth’, Sevasadan English medium school, 23 November 2024
- 14) ‘Ant Tales’, Sevasadan English medium school, 21 December 2024
- 15) ‘Pest Logic: Why Bugs Love Your Home?’, Sevasadan English medium school, 4 January 2025
- 16) ‘Pest Logic: Why Bugs Love Your garden’, Sevasadan English medium school, 1 February 2025
- 17) ‘Master Architects of the Insect World’, Sevasadan English medium school, 1 March 2025
- 18) ‘Taxonomy with a Twist: The Stories Behind Insect Names’, Sevasadan English medium school, 5 April 2025
- 19) ‘Extreme Habitats, Extraordinary Insects’, Sevasadan English medium school, 3 May 2025
- 20) ‘Lanterns of the wild: secret life of fireflies’, Sevasadan English medium school, 31 May 2025

- 21) 'Landmark experiments on insects', Sevasadan English medium school, 7 June 2025
- 22) 'Moths: The nocturnal marvels', Sevasadan English medium school, 5 July 2025
- 23) 'Honey, Let's talk bees', Sevasadan English medium school, 2 August 2025
- 24) 'Arthropoda: Life beyond six legs', Sevasadan English medium school, 13 September 2025
- 25) 'Bonds beyond bugs', Sevasadan English medium school, 4 October 2025
- 26) Insect documentary screening – 'Insectales' produced by Mitrakida Foundation. Sevasadan English medium school, Pune, India. 1 November 2025

**Fireflies Awareness lectures:**

- 1) 'Celebrating the Science and Wonder of Fireflies', visit to Pabe ghat, Pune, India. 11 June 2023
- 2) 'Fireflies: The Twilight Saga', Sevasadan English medium school, 25 May 2024
- 3) 'Lanterns of the wild: The secret lives of fireflies', Sevasadan English medium school, 31 May 2025

**National Moth Week lectures and moth awareness camps:**

- 1) 'Unfolding the Moth World', Indradhanushya environment and citizenship center, Pune, India. 27 July 2023
- 2) 'पतंगंच्या विश्वात' (Into the World of Moths), Savali agro-tourism, Oni, India. 29 August 2023
- 3) 'Unfolding the Moth World', Gappangan agro-tourism center, Pune, India. 2-3 September 2023
- 4) 'Unfolding the Moth World', Sevasadan English medium school, 20 July 2024
- 5) 'Unfolding the Moth World', Dept of Zoology, Gogate Jogalekar College, Ratnagiri, India. 25 July 2024
- 6) 'Unfolding the Moth World', Remand Home, Ratnagiri. Organized by Sky and Earth, India. 25 July 2024
- 7) 'Unfolding the Moth World', Moth camp at Vidnyanashram, Pabal, India. 21 July 2025

**Wildlife week lectures:**

- 1) 'Insects – Unexplored Gems of Biodiversity', Indradhanushya environment and citizenship center, Pune, India. 5 October 2023
- 2) Insect Documentary Screening – "Jave Kitakanchya Desha", produce by Mitrakida Foundation, Sevasadan English medium school, Pune, India. 5 October 2024
- 3) Insect Documentary Screening – "Jave Kitakanchya Desha", produce by Mitrakida Foundation, Ferguson College, Pune, India. 8 October 2024

**Scientific course on insects for school children:**

- 1) Six-month introductory course – ‘World of Insects’ conducted at Millennium National School, Pune, India. Age group - 6th – 10th standard students. September 2022-March 2023
- 2) Three-months online introductory course – ‘Insect Insights’ for 6th standard student. December 2023-February 2024

**Insect walks:**

- 1) Conducted at Empress Botanical Garden, Pune, India. Organized by Rupa Rahul Bajaj Centre for Environment and Art, Pune, India. 16 July 2023
- 2) Conducted at ARAI hill, Pune, India. Organized by Mid Earth Wildlife & Adventure Holidays, Mumbai, India. 30 July 2023
- 3) Conducted at Mhatoba hill, Pune, India. Organized by Mitrakida Foundation, Pune, India. 30 June 2024
- 4) Conducted at Empress Botanical Garden, Pune, India. Organized by Rupa Rahul Bajaj Centre for Environment and Art, Pune, India. 29 September 2024
- 5) Conducted at Bhamburda Vana Vihar, Pune, India. Organized by Institute of Bioinformatics and Biotechnology, Savitribai Phule Pune University. 20 Oct 2024
- 6) Conducted at Bhamburda Vanvihar, Pune, India. Organized by Koham Learning Centre, Pune, India. 11 December 2024
- 7) Conducted at Bhamburda Vanvihar, Pune, India. Organized by Institute of Bioinformatics and Biotechnology, Savitribai Phule Pune University, Pune, India. 12 October 2025
- 8) Conducted at Mhatoba hill, Pune, India. Organized by Mitrakida Foundation, Pune, India. 17 Jan 2026

**Insect Workshops for students:**

- 1) ‘Decoding the Bugs’ A two-day workshop to explore the world of insects, Pune, India.  
Batch 1 - 18-19 April 2023  
Batch 2 - 16-17 May 2023  
Batch 3 - 10-11 June 2023

**Documentaries produced by Mitrakida Foundation:**

- 1) ‘Jave Keetakanchyaa Desha/Let’s go to the land of insects’ – October 2024
- 2) ‘Insectales’ – October 2025

चौकटी बाहेरची माणसे

डॉ. राहुल मराठे हे कीटकतज्ञ असून मित्रकिडा बायोसोलुशन्स आणि मित्रकिडा फाँडेशन या संस्थेचे संस्थापक आहेत. गेली ३० वर्षे ते कीटकांचा अभ्यास करत आहेत. निसर्गामध्ये असणाऱ्या कीटकांमधील सुप्त गुणांचा वापर करून आपल्यापुढील अनेक समस्या त्यांनी सोडवल्या आहेत. ते कीटकांविषयी शास्त्रीय सल्ले देतात तसेच त्यांनी आतापर्यंत अनेक व्याखाने, कीटक माहिती शिबिरे घेतली आहेत आणि या विषयावर अनेक लेख लिहिले आहेत. आपल्या निसर्गामध्ये अतिशय महत्वाची भूमिका असणाऱ्या कीटकांची माहिती लोकांपर्यंत पोचवणे आणि कीटकांचे संरक्षण आणि संवर्धन करणे यासाठी ते प्रयत्नशील आहेत .

स्फोटके शोधणारी झुरळे - माझ्या संशोधनात मी झुरळांचा वापर या कामासाठी केला. झुरळांच्या जनुकांमध्ये पुनरावृत्ती करणारे घटक असतात. ती खूप लवकर नवीन गोष्टी शिकतात. त्यांच्याकडे घ्राणेंद्रिये आहेत, जी इतर कीटकांपेक्षा दुप्पट आहेत. त्यांच्याकडे गंधकण शोधणाऱ्या ग्रंथी आहेत, ज्या कडू पदार्थही शोधू शकतात. यावरून स्पष्ट होते की झुरळे अतिशय बुद्धिमान आहेत. या प्रयोगासाठी तीन ते चार झुरळांचे गट तयार केले. प्रत्येक गटाला त्या-त्या स्फोटकाचे प्रशिक्षण देण्यात आले. काही दिवसांतच ही झुरळे त्यांना शिकवलेली स्फोटके शोधू लागली. या झुरळांसाठी एक विशेष उपकरण तयार करण्यात आले. त्यामुळे झुरळांना कुठेही मोकळे सोडण्याची गरज नाही. ती एका जागी बसून आपले काम अचूकपणे पार पाडू शकतात.

दारुगोळ्याचे विघटन - माझ्या प्रयोगशाळेत मी वॅक्स मॉथ (wax moth) नावाच्या पतंगवर्गीय कीटकांच्या अळ्यांचा वापर केला. त्यांनी अतिशय सहजपणे त्या टणक इंधनातून विशिष्ट घटक खाऊन टाकले आणि ते इंधन निरुपयोगी केले. या अळ्यांपासून प्रेरणा घेऊन मी एक यंत्र विकसित केले. या यंत्राद्वारे टणक प्रोपेलंटचे विघटन केले जाते. आजपर्यंत या यंत्राद्वारे मी सुमारे हजारो किलो प्रोपेलंटचे विघटन केले आहे, ज्यात तीन ब्रह्मोस रॉकेटचाही समावेश आहे. कीटकांच्या वापरामुळे अनेक फायदे होतात - प्रोपेलंट हाताळताना होणारे अपघात टाळता येतात, नैसर्गिक पद्धतीने विघटन होत असल्याने पर्यावरणीय धोका कमी होतो, आणि विघटन जलद होत असल्याने वेळेची व त्यानुसार पैशांचीही बचत होते.

विमान वाचवणारे मित्रकीटक - विमानांना पक्ष्यांमुळे होणारे अपघात ही एक गंभीर समस्या आहे. पक्षी विमानतळावरील गवतात आढळणाऱ्या कीटकांना खाण्यासाठी येतात. पक्षी अनपेक्षितपणे विमानासमोर आल्यास होणारे परिणाम भीषण असू शकतात. पक्षी विमानांना धडकू नयेत यासाठी अनेक उपाययोजना केल्या जातात या उपायांवर लाखो रुपये खर्च होतात, तरीही पक्षी धडकण्याचे प्रमाण कमी होत नाही. हे सर्व यांत्रिक उपाय असल्याने पक्ष्यांना त्याची कालांतराने सवय होते. या समस्येवर मार्ग काढण्यासाठी मी ट्रायकोग्रामा या मित्रकीटकाचा वापर केला. एक मिलिमीटरपेक्षा

लहान असलेल्या या माशीची मादी इतर कीटकांच्या अंड्यांमध्ये स्वतःची अंडी घालते. यामुळे अळीवर्गीय कीटकांची संख्या कमी होते आणि खाद्याअभावी पक्ष्यांचे येणेही कमी होते. मी ही पद्धत अशा प्रकारे विकसित केली की स्थानिक परिसंस्था अजिबात विस्कळीत होत नाही आणि विमानेही सुरक्षित राहतात. हा यशस्वी प्रयोग आता अनेक विमानतळांवर नियमितपणे वापरला जातो. मी हे मित्रकीटक भारतीय वायुदल, भारतीय नौदल, भारतीय तटरक्षक दल आणि नागरी विमानतळांवर नियमितपणे पाठवतो आणि पक्षी नियंत्रणात आणतो.

प्लास्टिक खाणाऱ्या अळ्या - जगभरात प्लास्टिकचे व्यवस्थापन आणि विघटन या समस्येवर संशोधन सुरु आहे. एक साधी कॅरी बॅग नैसर्गिकरित्या विघटित होण्यासाठी हजारो वर्षे लागतात, ही चिंताजनक बाब आहे. प्लास्टिकचे विविध प्रकार असतात, त्यापैकी सर्वात मोठी समस्या म्हणजे २० मायक्रॉनपेक्षा कमी जाडीचे प्लास्टिक - उदाहरणार्थ आपण दैनंदिन वापरात आणणाऱ्या कॅरी बॅग. मी विविध प्रजातींच्या अळ्यांचा अभ्यास केला आणि शोधून काढले की वॅक्स मॉथ या पतंगाच्या अळ्या प्लास्टिक खाऊन पचवू शकतात. या अळ्या विशेषतः कमी जाडीच्या प्लास्टिकचे विघटन करू शकतात आणि त्या इतर पदार्थही खाऊ शकतात. प्लास्टिकव्यतिरिक्त थर्माकोल, लॉकडाउन काळातील पीपीई किट्स, फोम शीट अशा अनेक पदार्थांचे विघटन या कीटकांकडून होऊ शकते.

अन्नाचे जलद विघटन करणारे कीटक - पुण्यातील बॉम्बे सॅपर्स या सैन्य तुकडीमध्ये माझ्या मार्गदर्शनाखाली एक नाविन्यपूर्ण प्रकल्प सुरु आहे. या प्रकल्पात ब्लॅक सोल्जर फ्लाय (मराठीत 'काळा शिपाई') या माशीच्या अळ्यांच्या मदतीने दररोज २०० किलो ओल्या कचऱ्याचे विघटन केले जाते. कचरा विघटन झाल्यानंतर या अळ्यांचा वापर मासे आणि कुक्कुटपालन व्यवसायात खाद्य म्हणून केला जातो. अशा प्रकारे एक चक्रीय अर्थव्यवस्था (circular economy) तिथे विकसित झाली आहे. याच ब्लॅक सोल्जर फ्लायचा वापर करून मी भारतीय सैन्यासाठी सियाचीनसारख्या दुर्गम प्रदेशांमध्येही प्रयोग करत आहे. तिथे या माशीच्या साहाय्याने अन्नाचे विघटन यशस्वीरित्या करण्यात आले आहे. आता विविध ठिकाणी हे युनिट स्थापित करण्याचे काम सुरु आहे.

सियाचीनमध्ये किडोशौचालय - सियाचीनसारख्या अतिशय थंड प्रदेशात, जिथे आपले सैन्य तैनात आहे, तेथे मलविघटन ही एक मोठी समस्या आहे. अत्यंत कमी तापमानात हे विघटन कसे शक्य होईल याचा विचार करून मी बर्फात जगणाऱ्या कीटकांचा अभ्यास केला आणि त्यातून एक नवीन किडोशौचालय विकसित केले.

कीटकांपासून प्रेरणा घेऊन तयार केलेले हे शौचालय उणे ४० अंश सेल्सिअस तापमानातही कार्यक्षम राहू शकते. कोणतीही महागडी साधने न वापरता, कमी वेळात उभारल्या जाणार्या या शौचालयांना

विजेची आवश्यकता नाही आणि सर्वात महत्वाचे म्हणजे यात बर्फ जमत नाही. मला सांगताना अतिशय आनंद होतो की सध्या सियाचीन बेस कॅम्पमध्ये आपले सैनिक हे शौचालय वापरत आहेत आणि अल्प कालावधीत मलविघटन होत आहे. आता आणखी एक किडोशौचालय आपल्या सैन्याच्या अशा एका चौकीवर बसवले जाणार आहे जिथे तापमान नेहमीच शून्याखाली असते. पहिल्यांदाच असा अभिनव प्रयोग सैन्यदलात होत आहे.

काळाप्रमाणे गरजा बदलत जातात. या बदलत्या गरजा ओळखून नव्या प्रकारच्या क्षेत्रात संशोधन करून समाजपयोगी कार्य करणाऱ्या या 'चौकटीबाहेरच्या माणसा'चं मनापासून कौतुक!