INITIATIVE ON Nature-Positive Solutions

CGIAR

IWMI International Water Management Institute

CIRCULAR BIO-ECONOMY INNOVATION CHALLENGE 2024

Final Round and Boot Camp

7th and 8th October 2024

BAIF Development Research Foundation, Pune

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I. INTRODUCTION

BAIF Development Research Foundation, Pune, successfully organized the Circular Bio-Economy Innovation Challenge on the 7th and 8th of October 2024. The event was held under the Circular Bio-Economy Innovation Hub, established through the One CGIAR Nature Positive Solutions initiative.

The Challenge, hosted in collaboration with the International Water Management Institute (IWMI), aimed to encourage young innovators to present their ideas around the concept of circularity and gain exposure to evolving technologies through interactions with global experts at the boot camp. The two-day event comprised two rounds, and five selected participants/teams showcased their innovative solutions and competed for exciting prizes.

The purpose of the Challenge was to promote innovation and creativity in addressing one of the most pressing environmental issues of organic waste management. By involving students in this competition, the event inspired a deeper understanding of circularity principles, where waste is not merely discarded but transformed into valuable resources, thereby creating a closed-loop system.

The event served as a platform for participants to brainstorm, collaborate, and develop novel solutions for effectively managing and repurposing organic waste. Through this process, participants gained practical experience in sustainability practices, enhanced their problem-solving skills, and explored ground breaking approaches that have the potential to be scaled and implemented in real-world scenarios. Ultimately, the initiative contributed to environmental sustainability and cultivated a new generation of environmentally conscious innovators.

2. EVENT OUTLINE

The **Circular Bio-Economy Innovation Challenge** was conducted in two rounds:

- **Round One - Qualifiers (August 5th to September 20th, 2024)**
  Participants were required to register and submit their innovative solutions, including a presentation (up to 15 slides) and a short video (maximum 3 minutes) explaining their innovation. The submissions were evaluated based on the following criteria:

  - 20% - Conceptual Clarity
  - 20% - Technical Depth
  - 20% - Technical & Financial Feasibility
  - 10% - Level of Innovation
  - 10% - Social Impact
  - 10% - Environmental Impact
  - 10% - Presentation

The event received over 40 participant registrations, out of which 15 teams were initially shortlisted based on adherence to the event criteria (list of 15 teams attached as *Annexure 1*). From these 15 shortlisted teams, 5 finalists were selected by the jury for the final round.

- **Round Two - Boot Camp and Grand Finals (October 7th to October 8th, 2024)**
  The selected finalists attended a two-day physical boot camp at Pune, where they received guidance and mentoring from experts. The Grand Finals involved live presentations, where each team had 20 minutes to present their innovative solutions, followed by a 10-minute Q&A session with the jury panel.

	Theme	**Team Members**	**Institute**
1	Increasing Biogas Purity: Making biogas more carbon negative	Sudhanshu Gupta Atharva Musale	Institute of Chemical Technology, Matunga, Mumbai
2	LEAF KRAFT: New materials from free resources	Ria Thapliyal	Indian institute of technology, Delhi
3	F(R)EED - Making of Affordable Pet Culture	Sneha Chopra	TERI School of Advanced Studies
4	GreenMinds: Sustainable and bio-economical Bio-packaged agricultural waste	Kshitiz Sikriwal Nikita Kanishq Kumar Dhangar Khushi Kumari	Central University of Haryana
5	Hai Fame: From Waste to Worth	Ankit kumar Tiwary	Central University of Haryana

3. INTRODUCTION TO JURY

- **Mr. Sameer KulKarni**

- **Ekonnect Knowledge Foundation**

With over five years in impact assessment and decarbonization, he has led waste management initiatives in MMR and currently mentors' eco-entrepreneurs at Ekonnect. A graduate from IIT Bombay and the University of Pune, he is also spearheading a climate hackathon for universities.

- **Dr Manikprabhu Dhanorkar**

- **Professor & Director, Symbiosis Centre for Waste Resource Management, Symbiosis International, Pune**

An expert in solid waste and wastewater management, he is the Professor and Head of the Symbiosis Centre for Waste Resource Management, advising the Government of Maharashtra on Clean India Mission initiatives. He has secured over INR 6.0 Cr for innovative waste valorization projects and received the Federal Assistance Award for a Tech Camp on waste management in Pune.

- **Dr Shilpa Sonawani**

- **Asst. Professor, MIT World Peace University**

With over 25 years of experience in teaching and industry, she holds a Ph.D. from Vishwakarma University and an M.Tech from CDAC, Delhi. A skilled expert in Data Analytics, AI/ML, and Business Intelligence, she has published over 40 research papers and holds 6 patents, focusing on climate change and air pollution monitoring in collaboration with the Bombay Natural History Society.

- **Dr. Mansi Tripathi**

- **National Researcher, International Water Management Institute**

She is associated with NATURE+ initiative, focusing on circular economy, bioeconomy and RRR. Her experience in both government and private sectors has deepened her appreciation for all the stakeholders in the water sector and she aims to align her career with various SDGs while managing multiple projects effectively.

- **Dr Arun Dixit**

- **Vigyan Ashram**

An experienced professional with over 20 years in organic synthesis, he focuses on energy management and greenhouse gas reduction. With a Ph.D. from ICT Mumbai and key roles at SI Group, GE, and Merck, he is a certified Green Belt in Six Sigma and a patent holder, recognized for his contributions to team management and vendor qualification. Committed to eco-friendly sustainable development, he has an extensive publication record in the field.

4. PRESENTATIONS BY FINALISTS

1. Team 1 – Increasing Biogas Purity

- **Sudhanshu Gupta**
- **Atharva Musale**

Institute of Chemical Technology, Matunga, Mumbai

- **Problem Statement:** biogas contains 40-70% methane by volume and around 25-50% CO_2. Biogas when burnt will lead to release of this CO_2 if not treated properly. We aim to increase the yield of methane and reduce the CO_2 content**.** Existing solutions are of high upfront costs for adsorption columns in biogas treatment make it unfeasible for small-scale bio methanation plants.
- **Innovation:** Use an algae-based CO_2 conversion system where algae utilizes CO2 for its growth which could be used as a bio fertilizer, thus increasing the overall methane yield without expensive equipment

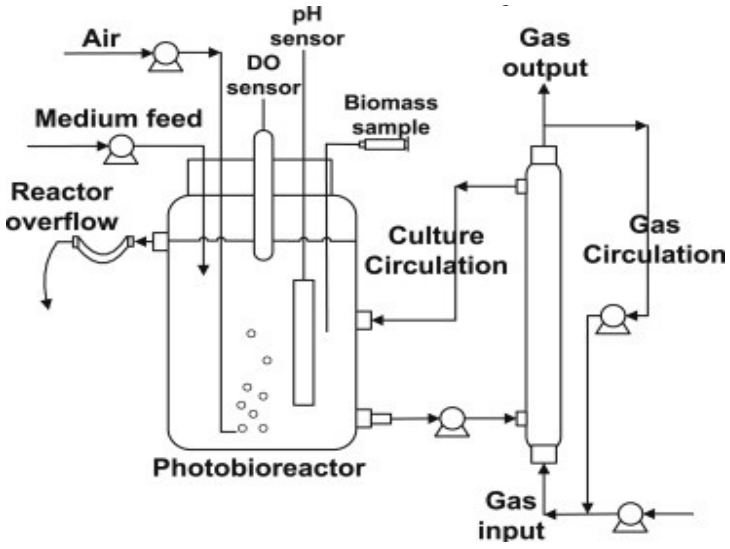

Figure 1: Schematic Diagram

Team II: LEAF KRAFT: New materials from free resources

- **Ria Thapliyal**
  Indian institute of technology, Delhi

- **Problem Statement:** Underutilization of available natural resourcing.

- **Innovation:** Development of Materials from Natural Resources – Focusing on Circular, Bio-Degradable and Decentralized Production

Figure 2: Products created through new resources

Team 3: Hai Fame: From Waste to Worth

- **Ankit kumar Tiwary**

  Central University of Haryana

- **Problem Statement:** India Faces Dual Challenges: Food Waste and Hunger: 40% of food produced in India is wasted annually. Over 190 million people in India remain undernourished. Food waste generated in universities, hostels, PGs, and public events remains unaddressed.
- **Innovation:** A tech-driven platform where individuals, messes, and food businesses can donate surplus food. Real-time tracking of food rescue operations. Incentivizing users with leaderboards and rewards for rescuing food. Connecting donors, volunteers, and the needy through a scalable system.

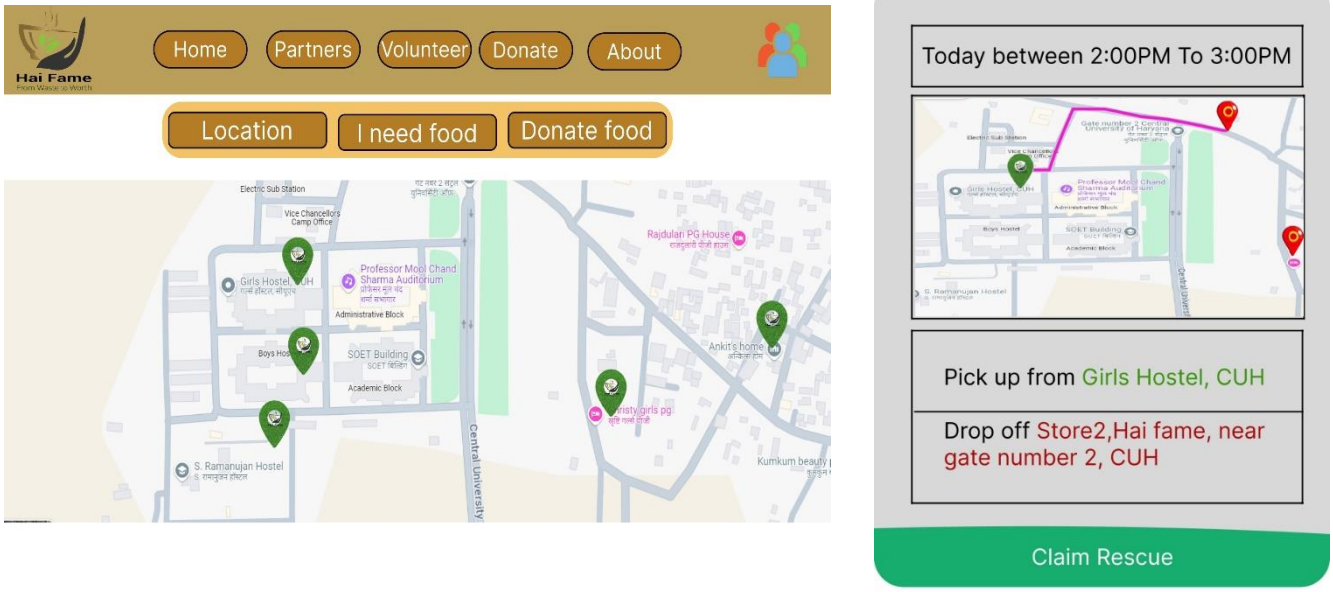

Figure 3: Online Platform of Hai Fame

Team 4: GreenMinds: Circular Growth, Sustainable Tomorrow

- **Nikita Mittal**
- **Kshitiz Sikriwal**
- **Kanishq Kumar Dhangar**
- **Khushi Kumari**

Central University of Haryana

- **Problem Statement:** While the crop residue like stubble, straw and other agricultural waste is repurposed, most of the waste is burnt by the farmers. It leads to several harmful impacts to the environment as well as livelihood
- **Innovation:** GreenMind revolutionizes waste management at the farm level through cutting-edge technology. Using a mobile app, farmers are empowered to track and manage their agricultural waste more efficiently. The app integrates AI-driven precision agriculture tools with IoT sensors placed throughout the fields. These sensors continuously monitor crop growth, waste production, and soil conditions.

Figure 4: Online Platform of GreenMinds

Team 5: F(R)EED - Making of Affordable Pet Culture

- **Sneha Chopra**

  TERI School of Advanced Studies

- **Problem Statement:** Improper Management of Organic Waste leading to approx. 8% GHG emission, Use of chemical preservatives in animal feed (like BHA and Ethoxyquin), increased cost of animal feed costing around 60-70% of livestock production.
- **Innovation**: A fish feed produced from organic waste, guaranteeing the meal is fully chemical-free F(R)EED provides fish with a nutrient-dense diet derived entirely from organic kitchen waste We harvest organic treasures from garbage cans that are completely protein rich

Figure 5: Trails at household level

5. INSIGTS FROM JURY

- **Mr. Sameer Kulkarni**: He emphasized the importance of hackathons and toolkit development in supporting students and early-stage entrepreneurs. He explained how these initiatives guide participants through each step of the entrepreneurial process, from identifying and defining a problem statement to conducting thorough analyses, building and refining a business model, and adapting successful ideas from established models.
- **Dr. Shilpa Sonawani**: She commended the participants for their efforts and expressed that her institute has the technology to assist emerging entrepreneurs. However, she highlighted the need for practical applications to work on, inviting the young talents present to collaborate and contribute their innovative ideas in the field of technology.
- **Dr. Arun Dixit:** He provided valuable insights into the concept of the circular economy, discussing essential practices such as biogas production and composting. He stressed the importance of considering these approaches for sustainable development and encouraged participants to think critically about their potential impact.
- **Dr. Manikprabhu Dhanorkar:** He praised the imaginative capabilities of the youth and emphasized the responsibility of his generation to nurture and support this talent. He believes that guiding young innovators is crucial for transforming their ideas into tangible realities.
- **Dr. Mansi Tripathi:** She enlightened both participants and the audience about the concept of an innovation hub and the various ways one can contribute to its success. She explained how participants channel their creativity, while organizations like IWMI provide resources, and BAIF facilitates networking. This collaboration demonstrates how different pillars can come together to create a cohesive support system for innovation.

6. FACILITATION OF FINALISTS

1st Prize - Increasing Biogas Purity

Rs 50,000/-

Sudhanshu Gupta

Atharva Musale

Institute of Chemical Technology, Matunga, Mumbai

2nd Prize – Leaf Kraft

Rs 30,000/-

Ria Thapliyal

Indian institute of technology, Delhi

3rd Prize – Hai Fame: From Waste to Worth

Rs 10,000/-

Ankit kumar Tiwary

Central University of Haryana

4th Prize – GreenMinds: Circular Growth, Sustainable Tomorrow

Rs 10,000/-

Nikita Mittal
Kshitiz Sikriwal
Kanishq Kumar Dhangar
Khushi Kumari
Central University of Haryana

5th Prize – F(R)EED - Making of Affordable Pet Culture

Rs 10,000/-

Sneha Chopra

TERI School of Advanced Studies

7. BOOT CAMP AND EXPOSURE VISIT

As part of the Circular Bio-Economy Innovation Hub initiative, a boot camp and exposure visit were organized for participants to deepen their understanding of circular economy models and innovation ecosystems. The event featuring visits to the BAIF Central Research Station (CRS) at Urulikanchan and the Venture Center, established under the National Chemical Laboratory (NCL).

- **Visit to BAIF Central Research Station (CRS), Urulikanchan**

  The visit to BAIF's Central Research Station at Urulikanchan was designed to showcase the organization's pioneering work in livestock management, climate-smart agriculture, and the development of circularity models. Participants were introduced to various research initiatives and practical demonstrations that emphasized the role of sustainability and circular economy principles in agriculture and allied sectors.

- **Circularity Models Showcased**

  The primary focus of the visit was on BAIF's circular economy innovations. Participants had the opportunity to explore several models developed by BAIF, which demonstrate practical applications of circularity in the agri-livestock sector:

  1. **Biochar Processing Unit**
     The biochar processing unit demonstrated how agricultural waste is converted into biochar, a valuable soil amendment that enhances soil fertility and sequesters carbon. The model highlighted the potential of biochar in creating sustainable farming practices.

  2. **IRESA Cow Dung-based Household Biogas Unit**
     Participants were introduced to the IRESA biogas unit, which utilizes cow dung to produce biogas at a household level. This technology not only offers a clean cooking solution but also contributes to waste reduction and energy self-sufficiency.

  3. **Bio PROM Processing Unit**
     The Bio PROM (Phosphate Rich Organic Matter) unit showcased the process of converting organic waste into nutrient-rich compost, promoting soil health while addressing the challenge of organic waste management.

  4. **Food and Agri-waste-based Biogas Unit**
     The food and agricultural waste-based biogas unit provided insights into how waste

generated from food production can be converted into clean energy, reducing the environmental burden while generating renewable energy.

5. **Large-scale Biogas Unit Based on Cow Dung**
   Participants witnessed the large-scale biogas unit, which processes cow dung to generate biogas on a commercial scale. This model underscored the scalability of biogas technology for rural energy needs.

6. **Vermicomposting**
   The vermicomposting unit demonstrated the process of converting organic waste into high-quality compost through the use of earthworms. This sustainable waste management practice promotes circularity by recycling nutrients back into the soil.

7. **Azolla Preparation from Wastewater**
   Participants observed the production of Azolla, an aquatic fern used as livestock feed, which is grown using wastewater. This model highlighted resource efficiency by repurposing wastewater for productive use.

8. **Vegan Leather Preparation from Cactus**
   A unique innovation presented during the visit was the preparation of sustainable leather from cactus, offering an eco-friendly alternative to animal leather while promoting biodiversity conservation.

- **Visit to Venture Center, National Chemical Laboratory (NCL)**

  Following the visit to CRS, participants visited the Venture Center, a leading incubator established under the National Chemical Laboratory. The objective of this visit was to expose participants to the entrepreneurial ecosystem and the various facilities available for innovators and budding entrepreneurs.

  The visit began with an informative introduction by Dr. Mugda Lele, who explained the mission of the Venture Centre and how it supports emerging entrepreneurs through various programs and resources.

  Following the introduction, Ms. Niruta Killedar led a guided tour of the campus. The group explored several laboratories housing different startups that are currently being incubated. The atmosphere was vibrant, and the participants were highly enthusiastic about the visit. They engaged actively with the exhibits and asked numerous insightful questions during our interactions.

  This visit provided a unique glimpse into the innovative ecosystem at the Venture Centre and inspired participants to reflect on their own entrepreneurial aspirations.

- **Facilities at Venture Center**

1. **Incubation Support**
   Participants were introduced to the incubation support services provided by Venture Center, which include mentoring, business planning, and access to networks of investors and industry experts. This exposure aimed to encourage participants to pursue innovative solutions in the bio-economy space.

2. **Prototyping and Testing Facilities**
   Venture Center offers state-of-the-art facilities for prototyping and testing, providing innovators with the tools necessary to develop and refine their products. The participants toured these facilities and interacted with experts on the technical aspects of innovation development.

3. **Workshops and Knowledge Resources**
   The Venture Center also hosts workshops and provides access to knowledge resources, fostering an environment of continuous learning and skill development. Participants learned about upcoming opportunities to enhance their entrepreneurial capabilities through these programs.

Figure 6: Glimpse from the exposure visit

ANNEXURES

ANNEXURE 1: List of shortlisted teams

Teams	Title	Member	Institute
Team 1	Reducing Solid Waste Generation and Promoting Reuse of Solid Waste	Aditi Deodhar	Gokhale Institute of Politics and Economics
		Soomrit	
		Yakabal	
		Utkarsh	
		Vivekananda	
Team 2	Human Waste into Renewable Energy	Subodh Kumar Jha	North Eastern Hill University,Shillong (A Central University)
		Ankita Das	
Team 3	SURPLUS Food waste	Ankit kumar Tiwary	central university of haryana
Team 4	F(R)EED - Making of Affordable Pet Culture	Sneha Chopra	TERI School of Advanced Studies
Team 5	Turning Organic Waste into Warmth	Shirsha Arya	MIT- World Peace University
		Reshmi Kotha	
		Twisha Dwivedi	
Team 6	DOMESTIC PURPOSE COMPOSTING TUMBLER	Ayush M. barapatre	Acharya Shrimannarayan Polytechnic Pipri Meghe
		Rukhmini K Sable	
		Bhuvanesh S Sapate	
		Suyash S Misal	
Team 7	‘Waste to Wonder’ - Driving India's Path to Sustainability	Aastha Konde	MIT World Peace University
		Diya Parikh	
		Neel Karnavat	
		Mainak Bhagat	
Team 8	Organic Waste	Mayuri Choudhari	Vidya Pratishthan's School of Biotechnology Baramati
Team 9	Increasing Biogas Purity	Sudhanshu Gupta	Institute of Chemical Technology, Matunga, Mumbai
		Atharva Musale	
Team 10	Sustainable and bio-economical Bio-	Kshitiz Sikriwal	CUH Mahendergarh
		Nikita	

	packaged agricultural waste	Kanishq Kumar Dhangar	
		Khushi Kumari	
Team 11	New materials from free resources	Ria Thapliyal	Indian institute of technology, delhi
Team 12	Green Skills	Shahid	THDC-IHET
Team 13	Vermiwash Alchemy: Turning Waste into Wellness	Dnyaneshwar Devendra More	Dr.Annasaheb Shinde College Of Agricultural Engineering and Technology, MPKV, Rahuri
		Komal Gangaram Rokade	
		Mrunal Pradip Sawant	
		Rahulsingh Sanjaysingh Rajput	
Team 14	Black Soldier Fly (BSF) based poultry feed formulation	Mr. Mahesh Shivaji Shinde	Vigyan Ashram
Team 15	Banana Stem Pulp Sanitary Pads	Chetana Nitin Deore	Loknete Shamrao Peje Government College Of Engineering, Ratnagiri

ANNEXURE 2: Presentations by Finalist (shared separately)