

THE ADB CIRCULAR ECONOMY WORKING GROUP WEBINAR SERIES 2023

ADB CEWG WEBINAR SESSION #19

Closing the loop on food waste with insect bioconversion

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FOOD WASTE - WHAT A WASTE!

Only 2% of the nutritional value in our food is recycled

The flow of materials in the food system is overwhelmingly linear



1 Such as fertilisers or pesticides; 2 as per FAOSTAT "Production" definition, i.e. typically reported at the first production level (farm level for crops and animal products; live weight for seafood) 3 Human waste include solid and liquid waste, expressed in wet mass; 4 food wasted in cities includes distribution and consumption stages





Better Solutions



FOOD WASTE - CURRENT RESPONSES



Landfill







Composting



Biogas/fuel

Combustion



Sewer

Food Recovery Hierarchy

SOURCE REDUCTION

FEED HUNGRY PEOPLE

FEED ANIMALS

INDUSTRIAL USES

COMPOSTING

LANDFILL/ INCINERATION

Most prefe

east preferred



INSECT BIOCONVERSION - NATURE'S WAY

Food & Other Organic Waste





Frass (fertiliser)



Livestock & Aquaculture Feed

CASE STUDY - MYANMAR



Local market waste





Education





Chicken Farm Self-sufficiency / income



Maximising utilisation of Natural Capital



Demonstration



Community Capacity Building

Community Engaged Research: PHILIPPINES 2016-2018





Local market waste

Education









Chicken, Tilapia, Vegetables, Rice Self-Sufficiency / Income



Training: Waste Treatment & Insects

Community Capacity Building

From Lab to Garage, to ~\$1.6B Industry





Vietnam, 2013 **\$30M Series B**

Indonesia, 2013 Research Station, \$1M 2023



Netherlands, 2009 \$126M in 6 rounds



France, 2011 **\$625M Series D**



Malaysia, 2020 \$34M in 6 rounds \$20M from Sumitomo, 2022





Finland, 2022, \$1.8M

Beneficial Insects --> Services & Products (Value)



Circular bio-Economy ENABLER.

Recovery of Nutrients & Energy. **Regeneration of SOILS. Reduce METHANE.** Remove CO2.

Natural Services



Protein + fats & oils + fertilizer + chitin **Natural Products**

Livelihood **Green Jobs Resource Security** VS Diseases Wars Weather

SDGs

BENEFITS OF INSECT BIOCONVERSION:

FOOD SECURITY 100 kg WASTE (dm) **10kg PROTEIN + 20 kg FERTILIZER** 2 weeks

47 X LESS GHG vs windrow composting.** **Avoids Methane!**

Direct GHGe: 96 g CO2/kg waste CH4 & N20 = 0.38 kg CO2eq/TON waste*

DISEASE CONTROL -99.9% Reduction of Salmonella & E.coli. **SUPPRESS** HOUSEFLIES

Livestock Higher survival More Meat, Eggs Fish

*Lalander et al 2019, 2022

RENEWABLE ENERGY OPPORTUNITY.

GWP 100kg dried larvae = 6.7 kg CO2eq **{Electricity for drying the** larvae ~70%} **

2.5 to 5x INCREASE Vegetable Yields***

SOIL **REGENERATION CARBON** Drawdown.

**Mertenat et al 2018

***Nugroho et al 2023

SUSTAINABLE DEVELOPMENT GOALS

SDGs **directly** affected by insects for food & feed

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE **B** DECENT WORK AND ECONOMIC GROWTH NO Poverty 12 RESPONSIBLE SUSTAINABLE CITIES AND COMMUNITIES CONSUMPTION AND PRODUCTION **M:***** 5 GENDER Equality **13** CLIMATE ACTION 2 ZERO HUNGER 15 LIFE ON LAND 14 LIFE BELOW WATER

Edible Insects and Sustainable Development Goals https://doi.org/10.3390/insects12060557

17 PARTNERSHIPS FOR THE GOALS





SDGs **indirectly** affected by insects for food & feed



Other



ADB & INSECTS as a NATURE-BASED SOLUTION

	SOLID WASTE MANAGEMENT	CLIMATE ACTION	GREEN ECONOMY	BLUE ECONOMY	ACTIONS
	50 % of MSW diverted from landfills in megacities	Avoided emissions 47x less methane	Livelihood & jobs Create SMEs, Industry	Alternative protein for animal feed (vs fish meal)	Evaluate Safety
	SIDS Saves landfill space on small islands	Carbon sequestration (insect biomass, chitin, +biochar)	Food security & Nutrition.	Reduce Eutrophication (organic fertiliser).	Green Finance
	Sanitation & Health (Vermin, flies, roaches, pathogens	Reduced Air Pollution (e.g. avoid open dumping & burning)	Regeneration of degraded soils & land.	Bioplastics for Fishing Gear	Education
Potential Application	Composting - Mongolia, Pacific Islands - Nauru	Biochar - Thailand, Nepal, etc	Reforestation, Upland Farming Thailand, Laos,	Land based aquaculture - Thailand, Vietnam, Philippines	Market Development

QUESTIONS



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