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Reducing Postharvest Food Waste by Upcycling into Innovative Food Products

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Empowering people to reduce food losses...

WORLD HUNGER

QUICK FACTS



people worldwide go to bed hungry every night.



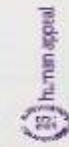
of all deaths among children under the age of 5 are caused by malnutrition.

125 million people

are currently affected by humanitarian crises that strongly impairs their ability to find food.



people worldwide are severely malnourished.



The Food Waste Iceberg

Bill at producer price: \$750 000 000 000
Bill at retail price: \$1000 000 000 000

what we see

Eroded Land

GHG Emissions

Cleared Forests

Increase in Food Prices

Increased Water Scarcity

Bill from nature: \$700 000 000 000

what we don't see

Loss of Wetlands

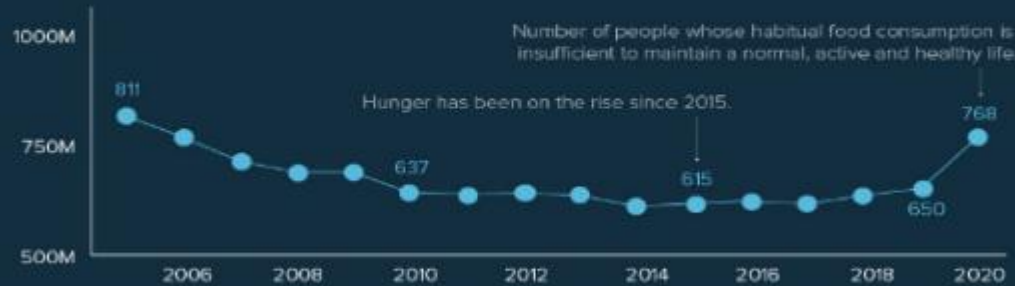
Loss of Biodiversity

Climate Change Damages



Chronically Hungry

768 million people were chronically hungry in 2020.



Source: WFP



Global food losses and waste per year

around **1/3** of the world's food is squandered, that is

1.3 billion tons of wasted food at

1 approx. trillion USD costs

IFCO

- 45%** of all fruit and vegetables
- 35%** of all fish and seafood
- 30%** of all cereals
- 20%** of all dairy products
- 20%** of all meat and poultry

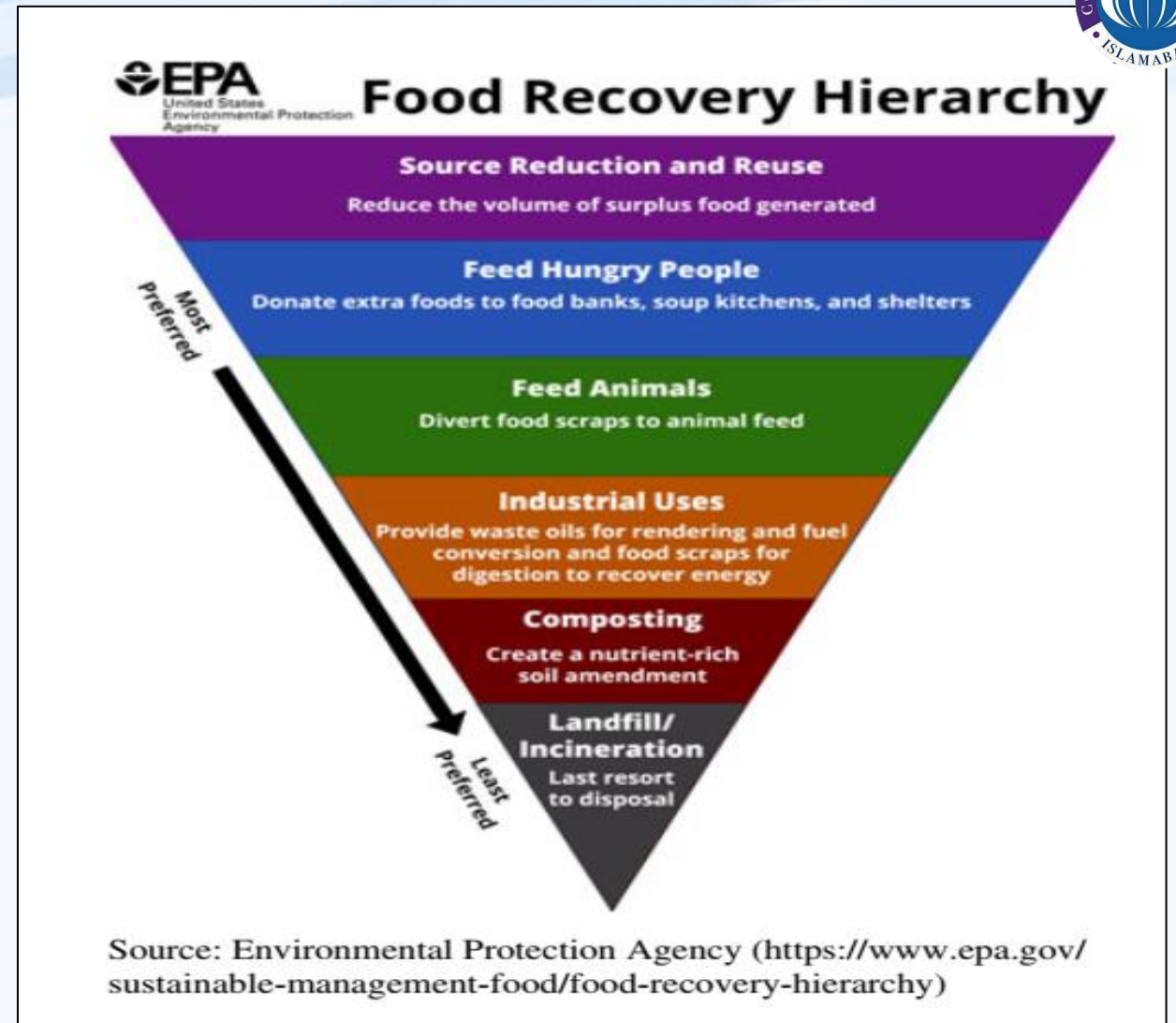
Source | www.fao.org/save-food/resources/infographic/en/

A better supply chain serves us all. **Let's eat.**



Causes of Food Waste:

- Serving oversized proportions
- Legalities for donating foods
- Confusing food expiry labels
- Retailers' cosmetic standards for produce



Upcycling vs. Recycling



UPCYCLING

reusing discarded material to create a product of a higher quality



RECYCLING

to process in order to regain material for human use

SOURCE: Merriam-Webster

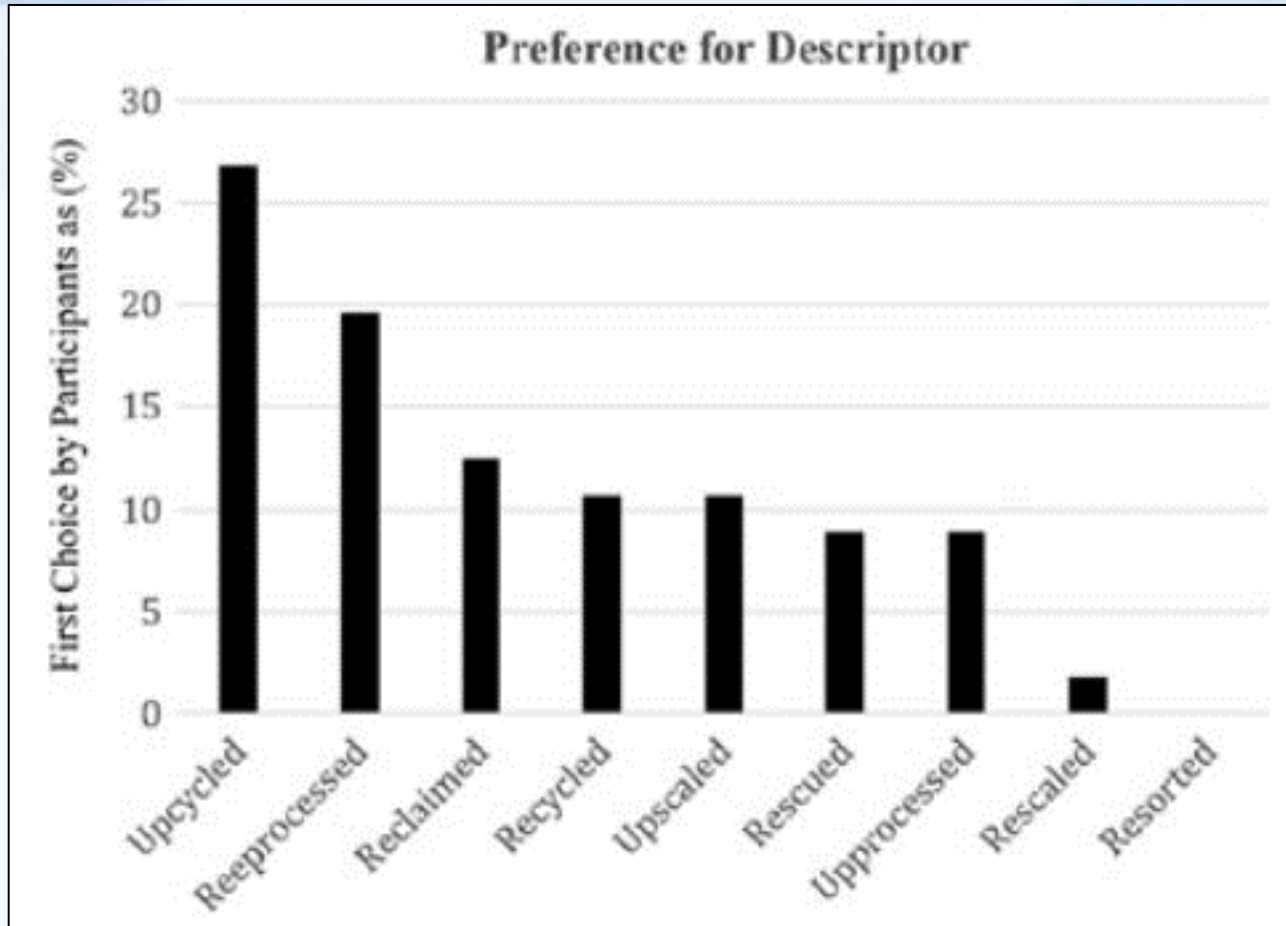


Upcycled food

- Upcycling is way to avoid waste entirely, when a product is totally **redesigned and reused to create new, different products of higher quality.**
- Definition: Upcycled foods use **ingredients that otherwise would not have gone to human consumption**, are procured and produced using **verifiable supply chains**, and have a **positive impact on the environment.**



Upcycled food



- Definition developed by team of experts from Harvard Law School, Drexel University, World Wildlife Fund, Natural Resources Defense Council, ReFED, and others.
- A market study showed **‘Upcycled’** was most preferred term.

Bhatt et al., 2017



Upcycled food



Food Scrap Broth

Whole Red Onion,
Peels Included

Celery Stalks
with Leaves

Chicken Carcass

That old can of
veggies laying around



Images source: <https://u.osu.edu/knowfoodwaste/>



Upcycled food





INFLUENCE ON LEVEL OF LYCOPENE, ANTIOXIDANTS AND OTHER NUTRITIONAL CHANGES ON FORTIFICATION OF LYCOPENE POWDER IN TOMATO SOUP

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Enrichment of Tomato Paste with 6% Tomato Peel Increases Lycopene and β -Carotene Bioavailability in Men¹

Emmanuelle Reboul,* Patrick Borel,* Céline Mikail,[†] Lydia Abou,[†] Monique Charbonnier,* Catherine Caris-Veyrat,** Pascale Goupy,** Henri Portugal,[†] Denis Lairon,* and Marie-Josèphe Amiot*²

Food Science and Technology

ISSN 0101-2061

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Bioactive compounds and acceptance of cookies made with Guava peel flour

Silvana Maria Michelin BERTAGNOLLI¹*, Márcia Liliane Rippel SILVEIRA², Aline de Oliveira FOGAÇA¹, Liziane UMANN¹, Neidi Garcia PENNA²



LWT - Food Science and Technology
Volume 41, Issue 10, December 2008, Pages 1987-1994



Production of antioxidant high dietary fiber powder from carrot peels

Prawta Chentaro, Sakamon Deveheatin, Napheporn Chiewchan 

Department of Food Engineering, Faculty of Engineering, King Mongkut's University of

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UPCYCLING AND VALORISATION OF FOOD WASTE

Mohamed A. Gedi, Vincenzo di Bari, Roger Ibbett, Randa Darwish, Ogueri Nwaiwu, Zainudin Umar, Deepa Agarwal, Richard Worrall, David Gray and Tim Foster



Defining Upcycled Food Products

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DOI: 10.1002/cb.1689

WILEY

SPECIAL ISSUE ARTICLE

From food waste to value-added surplus products (VASP): Consumer acceptance of a novel food product category

Siddharth Bhatt¹  | Jeonggyu Lee¹ | Jonathan Deutsch² | Hasan Ayaz³ |



Food Quality and Preference

Volume 84, September 2020, 103951



Consumer preferences for upcycled ingredients: A case study with biscuits

Simona Grasso ^a   | Daniele Asioli ^b



Food Quality and Preference
Volume 91, July 2021, 104194



Short Communication

Do consumers value food products containing upcycled ingredients? The effect of nutritional and environmental information

Daniele Asioli ^a   , Simona Grasso ^b

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^b Institute of Food, Nutrition and Health, University of Reading, Reading, United Kingdom

Upcycled food – Consumer attitude

Bhatt et al., 2020

- Consumers are **willing to pay less** for upcycled foods
- Appropriate **advertising** can increase willingness to pay
- **Rational messaging > Emotional messaging**
- **Logos** have effect on consumer perception
- R&D required to make these foods more acceptable

INGREDIENTS & PRODUCTS

MINIMAL CONTENT

Vertical

Horizontal

Less Than PUI



Certified ingredients (not consumer facing) and products (consumer facing) may use either Mark format.

Less Than products shall only use this one format.



UPCYCLE



UPCYCLE



Upcycle!
Go green!



Upcycled food - Strategy

- **Defining standards** – % ingredients, SOPs for handling raw material, auditing supply chain
- **Identify possible sources** - farm surplus, 'ugly' produce, processing by-products
- **Develop protocols for new products** – to meet the standards developed
- **Labelling and logo** – nutrition data, rational message, ingredient source to change perception
- **Develop certification process** – enhance consumer confidence
- **Branding and marketing** – sustainability, health promotion, food safety, product awareness
- **Consumer attitude studies** – collect feedback and improve acceptability



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Thank You!!!

