What if fish waste became a great source of value?

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Fish Waste to Value

Within Reach | **Transitional** | Visionary

Advanced technologies and biotechnology turn fish waste collected during capture, processing and consumption, into valuable bio-based products such as fertiliser and wound-healing and cosmetic agents, enhancing efficiency in these industries and supporting sustainable fishing practices.

UNCERTAINTIES

Nature, Systems

MEGATREND (Most significant)

Evolving Ecosystems

TRENDS

Bioeconomy
Blue Economy
Food–Water–Energy Nexus
Sustainable Waste Management

TECHNOLOGIES

Advanced Manufacturing
Biotechnology
Internet of Things (IoT)

SECTORS IMPACTED

Agriculture & Food
Chemicals & Petrochemicals
Consumer Goods, Services & Retail
Energy, Oil & Gas, & Renewables
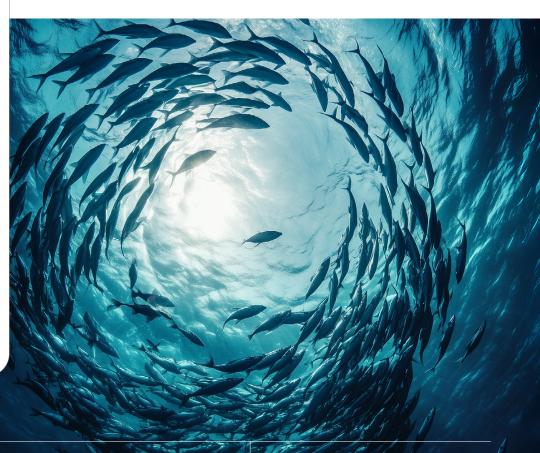Health & Healthcare
Manufacturing
Materials & Biotechnology

KEYWORDS

Advanced Manufacturing
Biomass
Biotechnology
Circular Economy
Food Waste

Aquatic food, a vital source of protein for

3.3 billion

people, faces significant losses during capture, processing and consumption, **highlighting the need for improved handling and infrastructure.**

WHY IT MATTERS TODAY

Agri-food systems are responsible for approximately one-third of global greenhouse gas emissions, making them a central aspect of climate change.[784] Agri-food systems include goods that originate from agriculture, forestry and fisheries. Their emissions primarily stem from crop and livestock production, on-farm energy consumption, land use and land-use changes, domestic food transportation, and food waste disposal.[785]

A significant source of protein for 3.3 billion people around the world,[786] aquatic food makes up nearly one-third of global protein production, 158 million tonnes annually,[787] which is expected to increase by 15%, to 181 million tonnes, by 2030.[788] While the data are varied, significant losses – just over 75% – occur during capture, processing and consumption, driven by discards, spoilage, poor handling, and infrastructure gaps.[789]

There is substantial projected growth for bio-based products, with the global market for bio-based food, products and energy expected to reach $12.8 trillion by 2030.[790] The consumption of bio-based food and feed alone is anticipated to grow at an annual rate of 3.3%, reaching $5 trillion by 2030.[791] Bio-based food includes food produced from renewable sources using fermentation, recycling, and regenerative agriculture.[792]

THE OPPORTUNITY

Advanced manufacturing, advanced machine intelligence, and biotechnology enable innovative extraction and processing of fish waste as part of broader government policies and efforts to support sustainable fishing practices.[793] While better data collection improves tracking of fish capture, production and waste processing, enabling more efficient fish waste management,[794] these technologies efficiently transform fish waste into valuable bio-based products for agriculture (e.g. fertilisers),[795] cosmetics (e.g. collagen)[796] and healthcare (e.g. wound healing).[797]

Advanced extraction methods, such as supercritical fluid extraction and pulsed electric fields, provide sustainable, efficient solutions for extracting high-value components – including proteins, fatty acids and pigments – from fish waste.[798] These extraction methods, when combined with biotechnology such as fermentation, enhance the conversion efficiency.[799]

BENEFITS

Less fish waste in landfill; improved resource efficiency; improvements to the circular economy; support for the Sustainable Development Goals 9 and 12; facilitation of technological advances in biomass processing more generally.

RISKS

Promotion of overfishing because of economic gains further down the supply chain; limited efforts to reduce waste across the supply chain.

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