

EUROPEAN MARITIME DAY 2019

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Making better use of Marine Biomass: Data Needs and Gaps

Messages from EUMOFA Studies on Blue Growth

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Based on contributions to EU contract MARE/2014/14

DATA NEEDS/GAPS IN THE BLUE BIOECONOMY

- **DEFINITIONS**
- **MAPPING BIOMASS SOURCES**
- **COMPLEXITY OF THE PROCESSING CHAIN**
- **DATA SOURCES**
- **STATISTICS**
- **NEEDS**
- **POINTS FOR DISCUSSION**

DEFINITIONS – MAPPING BIOMASS SOURCES

Biomass sources

- Aquaculture and [Capture] Fisheries
- Wild-harvesting

Aquaculture – i.e. deliberately farmed

- Finfish (bony)
- Molluscs (bivalves)
- Crustacea (shrimp, prawn)
- Seaweeds (brown, red, green; harvested, ...)
- Microalgae (e.g. *Dunaliella*, *Spirulina*, *Haematococcus*)

Fisheries – i.e. wild-caught, marine & freshwater

- Finfish (bony and cartilaginous)
- Molluscs (bivalves) and gastropods (e.g. whelks)
- Crustacea (lobster, shrimp, prawn, *Nephrops*, crabs)
- Cephalopods (lobster, squid, cuttlefish)
- Seaweeds (brown, red, green; harvested, ...)
- Others (invertebrates, mammals, aquatic plants)

Wild-harvested – typically seaweeds

Others - nuisance beached seaweed, microalgal overgrowth, non-seaweed plants

MAPPING BIOMASS – PRODUCTION AND PROCESSING

Industrial classification (ISIC rev 4 2008)

Primary biomass – Class A (agriculture, forestry and fishing)

- Fisheries 031 (0311 marine, 0312 freshwater)
- Aquaculture 032 (0321 marine, 0322 freshwater)
- ?microalgae?

Primary processing – Class C (Manufacturing; Div 10, food and feed)

- Fish, crustacea, molluscs 1020
- ?seaweeds?
- ?microalgae?

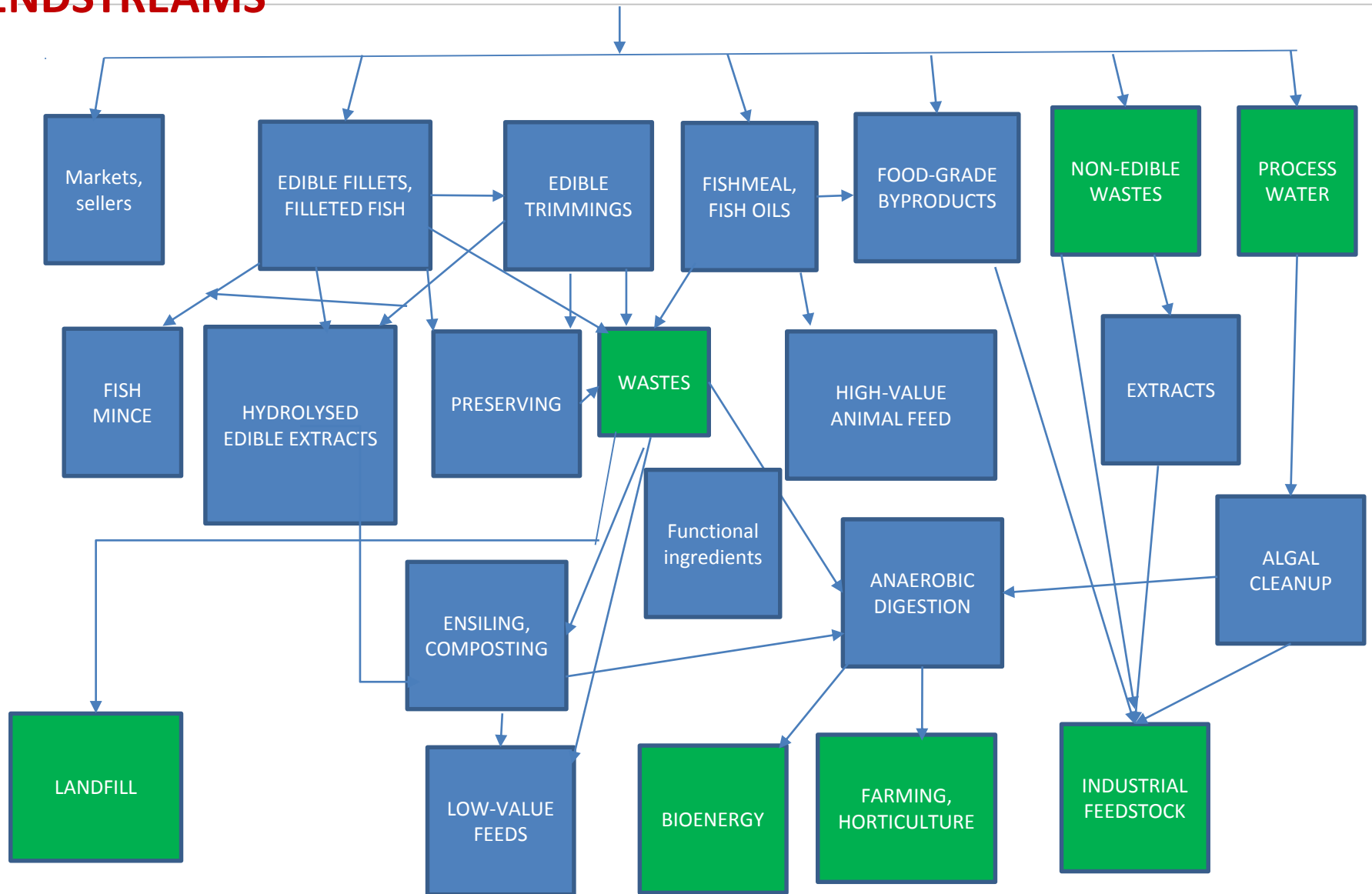
Other possibly-relevant classifications:

- Manufacturing – Class C Divs 20, chemicals, & 21, pharmaceuticals
- Waste management, remediation – Class E Divs 38 energy from waste & 39 remediation

Processing for non-food purposes introduces problems of capturing data

- Vertical integration eg microalgae for biofuels
- Horizontal integration eg biomass biorefinery
- Where is the most 'value-added' activity in the activity

MATERIALS WEB – SECONDARY PROCESSING, SIDESTREAMS, ENDSTREAMS



MAPPING BIOMASS – DATA SOURCES

Major source for aquaculture and fisheries – FAO aggregated data

- Reports based on 2-year-old data (latest 2016)
- Aquaculture 80 Mt
- Farmed seaweeds 30 Mt
- Capture fisheries 91 Mt
- Harvested seaweeds 1 Mt
- Not 100% coverage of all available biomass

Major source for processing – FAO aggregated data for 2016

- Data for fisheries and aquaculture, not seaweeds
- Of total 171 Mt, 151 Mt used for human consumption
- Uses of 20 Mt ‘for other purposes’ – 75% c. 15 Mt for fishmeal and fish oils; remaining c. 5 Mt not identified & quantified
- Other estimates suggest 15% of total, c. 25 Mt, underused and available.

Detailed-enough data for mapping the circular/blue bioeconomy?

- **NO**

MAPPING BIOMASS – STATISTICS

Biomass available from harvesting

- FAO aggregated data includes fish, crustacea, cephalopods only, **often data not split**
- Estimates for **discards and by-catch in capture fisheries vary: 27Mt/yr (1994); 7.3Mt/yr (2005); <10Mt/yr (2014)**
 - c. 93% of total from large-scale industrial fishing vessels, 60% from Pacific fishing by Russia of Alaska pollock for roe only
 - Globally, discards in decline
- **Bony fish bycatch in crustacea fisheries** may be as high as 80%-90% of catch, with <50% retained
- **Morts (deaths) in aquaculture** c. 6%-8%, higher if disease outbreak, and available for non-food use

Biomass available for non-food uses from post-harvesting & processing stages

- Estimated at 25% overall but can be as high as 75% wastage

Rest Raw Materials RRM 27%-32% by weight overall

- Heads; frames (skeletons); viscera (5%-8% of weight); skin; primary trimmings (fins, tails, claws); secondary trimmings (scraps from fillets, reclaimed flesh from shells, etc)

MAIN DESTINATIONS of fish and processed material not used directly for human food

- **At-sea discards** (e.g. pollock by Russian fisheries)
- **Fishmeal and fish oil** for animal feed
- **Fishmeal extracts** for protein and oils for human nutrition
- **AD** for biogas and fertiliser/soil improver
- **Composting** for fertiliser/soil improver
- **Ensiling** for protein concentrates and hydrolysates for animal and human nutrition
- **Landfill** (less so in Europe and other developed states)
- **Processed fish oils** for industrial uses
- **Chopping/mincing/freezing** for direct baits, animal and fish feeds
- **Higher-value elements**: collagen, gelatin, minerals, chitin, carotenoids, enzymes, amino-acids, peptones

DATA NEEDS/GAPS IN THE BLUE BIOECONOMY

POINTS FOR DISCUSSION

- Do SICs need adapting to reflect the data needs of Industrial Biotechnology and the Blue Bioeconomy?
- How would it be possible to achieve this, if feasible?
- Improving data capture for fisheries wrt by-catch and discards – how to build on or replace existing systems?
- How can we understand and assess the industry and the size, scale, dynamics of those companies making use of marine biomass?
- Do we need to improve reporting by processors on the amounts and destinations of their non-food output and side-materials?
- Do we need to improve reporting by end-users on the origin of their input materials?
- How do we fully-record and keep abreast of the numbers of start-ups, SMEs and investment organisations in blue biotech?
- How can we use Big Data and AI processing to enhance Blue Bioeconomy activities, including mapping of biomass availability and its extractable value?

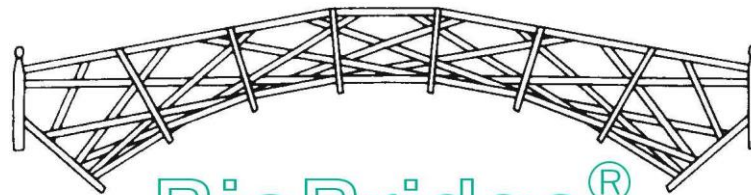
THANK YOU

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