



**Aquaculture biomass:
a rich source of nutritional supplements to promote fitness and health**

Lesson 1. Aquaculture biomass. Part I: FISHING

Teacher resources

This lesson is based on the following resources, which are accessible at:

<https://www.aquabioprofit.eu>

Before teaching this lesson, teachers can get more information

Module 1 Unit 1

1.1 Volumes and qualities of fish side stream biomasses in Europe

Module 1 Unit 2

1.2 Fish proteins and protein hydrolysates - products and applications

Module 1 Unit 3

1.3. Fish collagen and marine oil-based supplements - products and applications

Lesson plan

Aims

To present fisheries as a source of fish biomass, with a focus on marine fishing and aquaculture

Materials

Editable PowerPoint presentation (Presentation1-Part1-Fishing.pptx); worksheet (can be used in class or as a homework assignment); answer key

Terminology

This lesson uses some terminology that your students may or may not be familiar with. If your students are not familiar with some of this terminology, plan some time to explain it at relevant points throughout the lesson.

Specialized vocabulary used in this lesson: *pelagic fishing, marine fishing, fish farming, fish hatchery, aquaculture, by-product, side-stream biomass*

Competences

Your students will be aware of the fishing industry as a source of fish biomass and side-stream biomass and will be able to talk about the basics of marine fisheries and aquaculture as a rich source of value-added by-products.

1. Warm-up: Slides 1 and 2

Aim: To introduce the topic of the lesson and bring attention to the benefits that we get from the sea (and the ocean)

Slide 1 (Title): Tell students that this lesson will focus on biomass from the fishing industry. The industrial production of fish for food generates a lot of “left over” biomass. Until not long ago this “left over” biomass used to be discarded as waste but now we know how to use it to produce added-value by-products.

Slide 2 (Warm-up activity): Ask students: *What do we get from the sea?* Quickly brainstorm ideas (Fishing, leisure, tourism, watersports and so on).

Highlight the role of oceans and seas as habitats for marine life.

Highlight the role of marine phytoplankton for oxygen production.

2. Presentation

- **Introduction: Slides 3 and 4**

Aim: To draw attention to the topic of fishing

Slide 3 (Focus on fishing): Tell students that now you are going to focus on fishing. Highlight that fish is a popular food all over the world and there is more and more demand for fish.

Slide 4 (Types of fishing): Tell students to look at the pictures and ask: *What types of fishing can you think of?* Quickly brainstorm ideas, then reveal the text.

- **Marine fisheries and aquaculture: Slides 5–13**

Aim: To present the basics of marine fisheries and aquaculture as a source of fish biomass and raise basic awareness of the value-added by-products that can be produced from the large amount of side-stream biomass

Slides 5–10 (Worksheets Part 1 Activity 1) Students complete the activity item by item as you go or after you finish Slide 10. Alternatively, the activity could be assigned for homework.

Slide 5 (Pelagic fishing): Make sure that students understand the meaning of the term *pelagic* /pəˈlædʒɪk/. If your students are not familiar with it, encourage them to deduce the meaning from the pictures. Then reveal the text.

Slide 6 (Marine fishing): Give the definition and highlight that marine fishing is an important industry in many countries

Slide 7 (Aquaculture): Give the definition and explain the significance of role of aquaculture in the production of seafood

Slide 8 (Fish farming): Draw attention to the pictures and give the definition. Ask students if anyone has seen or visited a fish farm.

Slide 9 (Fish species in fish farming): Freshwater species (carp, tilapia, catfish) and saltwater species (salmon /ˈsæmən/, cod) [Your students might be surprised by the silent ‘l’ sound in *salmon*]

Slide 10 (Fish hatchery): Ask students to try and guess what *fish hatchery* is, then reveal the definition.

Slide 11: Remind students that fish is a popular food all over the world. Then ask: *But do we use fish effectively?* Then reveal the text.

Slide 12: Ask: *What goes to waste?* Elicit what students think, then reveal the text. Students look at the words and items in the picture. Check understanding of *viscera* /ˈvɪsərə/.

Slide 13: Ask: *What can we do with the biomass that is not used directly for food?* Students look at the pictures and give suggestions. Reveal the text and elicit the meaning of *side-stream biomass*.

3. Ending the lesson: Slides 14 and 15

Aim: To underline the importance of fish side-stream biomass as a source of healthy by-products and link to the next lesson.

Slide 14: Explain that we now know that side-stream biomass of marine origin is an important value-added resource. If necessary, elicit the meaning of *by-products*. The next lesson will look into by-products from fish in greater detail.

Slide 15: *The end sign*

4. Extra activity (Time filler): Slides 16–18

Aim: If you have extra time left, the last three slides present the concept of the *Tragedy of the commons* from the perspective of fish stocks management.

Slide 16 (Food for thought): Tell students that the next couple of slides will provide some food for thought.

Slide 17 (Dangers of overfishing): It is important to manage the fishing industry cleverly.

Slide 18 (Video¹): The *Tragedy of the commons*

Tell students that they are going to watch a video that illustrates the importance of clever management of fish stocks.

Play the video (2:53 min). After watching, check understanding of the concept of the *Tragedy of the commons*. What does your country do to control fish stocks (laws, regulations)?

Ask: Which points in today's lesson could partly help solve the overfishing problem? (Possible answers: aquaculture, fish farms, fish hatcheries; making use of side-stream biomass and not discarding it).

We can apply the concept of the *Tragedy of the commons* to other common (open access) resources, too. Can you think of any? (Possible answers: fossil fuels, e.g. petroleum, natural gas, coal; wood (forests), drinking water, clean air, grazing land, hunting, medicinal plants (herbs) and so on.)

Slide 19: Final credits, project-related hyperlinks

¹ The video is cropped version of a longer video available on a Conservation Strategy Fund Youtube channel: <https://www.youtube.com/watch?v=Z4AXnZQsrK8>. The cropped video in this presentation runs at a slightly reduced playback speed to facilitate comprehension by non-native speakers of English.

Answer key**Activity 1.**

1. **Pelagic fishing** is catching wild fish that live in the water column of oceans, seas and lakes (neither near the bottom, nor near the shore).
2. **Marine fishing** is fishing in the sea/the ocean.
3. Fish farming and fish hatchery are forms of **aquaculture**.
4. **Fish farming** means growing fish commercially in tanks, fish ponds or ocean enclosures, usually for food.
5. **Fish hatcheries** grow and release young fish into the wild.