

# Basic Sciences for (Artisanal) Fisheries

Continuing ideas for exploring the environment through International Years  
- in 2022, the IY Basic Sciences for Sustainable Development and of Fisheries.  
By Jeanie Clark

Let me introduce the theme of this article with a photo and a riddle: Two fathers and two sons went fishing. They fished all day and caught three fish.



They went home with one fish each. How is this possible? (Answer later!)



Previous articles in this series in *Otherways* this year have explored the 2022 International Year of Basic Sciences for Sustainable Development and of Glass.

Did you guess that 2022 is also an International Year (IY) linked to fish? It's called the IY of Artisanal Fisheries and Aquaculture. (IYAFA).



This article will provide some learning resources for exploring it, from a basic science point of view and then looking for local producers of our fisheries. (Note that numbers in square brackets have weblinks at the end of the article.)

## Some basic science

This IYAFA comes under the United Nations Sustainable Development Goals: number 14, 'to conserve and sustainably use the oceans, seas and marine resources' [1]. To be able to achieve such aims, one first needs to know about the resource (fish), why we need it and how it is being used.

**What is a fish?** (What do your learners say or draw?) Do you see fins, a tail, and a water habitat? The Australian Museum's answer might be a surprise then. It's the breathing through gills and having a backbone that fish all have in common [2]. There are many diagrams for the parts of a fish on the web. For young learners, *Liveworksheets* has an interactive one for labelling body parts which can then be printed [3].

**What is the life cycle of a fish?** Again, what do your learners already know? Are they able to draw a diagram beginning with eggs and moving through larvae, fry, and juveniles to larger stages? *Twinkl* has a b/w labelled diagram for colouring [4]. The *National Institute of Water and Atmospheric Research* website has one for a Snapper, that includes sizes and ages and the habitat snapper prefer at each stage [5].

**What is a fish food chain like?** If you have a goldfish tank at home, your learners might think they can draw a food chain simply - until they come to what is in the food that their fish are eating! (Does the container tell you? And don't forget the sun is at the start of all food chains, even water ones.)

Each water species has its own food chain, but the basic levels are similar to a land food chain: from the sun to plants (e.g. phytoplankton) to herbivores (e.g. zooplankton) to carnivores (e.g. a fish) and so on up to top predators (e.g. a penguin) [6]. The *University of*



Waikato's Science Learning Hub has more advanced descriptions: a pyramid diagram topped by a dolphin; a weighted-size diagram showing all living things in a food chain for a 100g tuna, which go to the top predator - a human - in a sandwich [7].

The food chains of all creatures in an area make up a complex food web. *Project Oceanography* has a detailed and well-labelled food web diagram as part of its lesson on Fish Food [8]. To be able to manage fisheries sustainably, food webs and habitat need to be understood. This point is made for the Great Barrier Reef and its fish in its food web diagram [9].

Fish habitats vary a lot horizontally and vertically. Older learners may like to explore the many fish habitats through web research for specific species. These may have specific terms to name these habitats. *Project Oceanography's Lesson 1* has both blank and labelled diagrams of the different parts of the water column to help with these terms [10].

### Health

Fish oil is used by many as a health supplement. So what is it that fish have that is so good? It is the Omega 3 fatty acids. But it doesn't end there. Protein, selenium, zinc, iodine, and some vitamins, as well as carbohydrates for energy are found in fish [11]. *Healthline* lists eleven health benefits from eating fish, which include heart and mental health, brain and eye function, and lowering diabetes risk and asthma [12]. *Worldfish's* video (and transcript) covers much of this easily for younger learners [13].

### Artisanal fisheries?

Like other IY's, the IYAFA's first aim is to raise awareness of it! What does 'artisanal fisheries' suggest to your learners? (It was a new term to me.) Is 'aquaculture' another term that your learners may not know? (A good time for a dictionary exercise!)

In fact, the IYAFA says that there is no clear definition of these terms! But they involve fishing enterprises, based on a family unit, maybe with a few employees, selling most of the catch in local markets [14]. Most of these fisheries are in developing countries using low-impact technologies [15]. This includes traditional/first nation fishers, but not sport/recreational ones.

Back to the riddle, the answer is that the group is made up of a father, his son and grandson.



Are they artisanal or not? If they are fishing to feed their family and sell extra (a poor catch that day!) then it is artisanal fishing. If, like my son photo left, they are out for the fun of fishing for an occasional meal, (enough caught), then it's sport/recreational fishing.

Who are the artisanal fishers? What does IYAFA's logo earlier suggest to your learners? Do they recognise in this logo a small scale fisher (either sex), living in a water place, and living off fish? [16].

### Local fishers

Given that fish are an important food, could your learners next explore if there are small scale fishers and workers supplying your local area? Is there a butcher close by that also supplies fresh fish? If so, could your learners ask about the source of them?

Some of you might have bought some delicious fish and chips (photo right) from a van in a beach carpark at Frankston. If so, did you ask where the fish was caught? This van is part of a family fishing enterprise [17]. (Health note, fried fish is not a healthy way to eat fish - a healthier choice is grilled [18].)



The history of the Cripps Family shows that they began as artisanal fishers 150 years ago around Wilson's Prom and continue today, having added a fish farm (aquaculture) to their sustainable production [19].

Across Port Phillip Bay there is another fishery. *White Fisheries* is a wholesaler and family based fishing company based in Geelong [20]. What sort of shops do your learners think they might supply? How far from Geelong? Are they also artisanal? The answers can be found on their website. Their 'Stockists' webpage has lists which could be mapped to show where their fish is sold, from the company address at the top of the page [21]. The business history, and the way this fish business operates, including the role of the *Melbourne Seafood Centre* as a supplier, are detailed on the 'About' page [22].

More Melbourne fisher folk stories can be found in short interviews under the 'Our tenants' tab on the *Melbourne Seafood Centre* webpage [23]. Likewise, some of the seafood stall holders at the *Queen Victoria Market (QVM)* have fisheries linked information [24]. There are more for *South Melbourne Market* [25]. These could be read by your learners to get an idea of the histories of these fish workers and (their love of) their industry.

### Global fisher folk

What are other fisher folk and their businesses like? As a contrast to the Victorian stories so far, the photo below shows Samoan fishers carrying nets out onto their reef to fish. The IYAFA website has eight stories of fishers and their fisheries under the *My Story* tab.





They come from: Australia (the Coorong / Ngarrindjeri country), Colombia, Fiji, Guyana, Ivory Coast, Morocco, Norway and Portugal [26]. How different/similar are these artisanal fishers and their businesses to those above in Victoria?

### Field trips

Where could you take your learners to discover more about the fisheries and their folk of Victoria? The Melbourne Seafood Centre is open to the public for guided tours. Be prepared to get up early! Book on the web [27].

Prefer a visit later in the morning? What about the aforementioned family based seafood traders at the QVM and South Melbourne Market? If you contact one of these, you might be able to arrange a visit and interview. But it's still amazing to visit to see all the different types of fish available at such markets (e.g. photo right).

### Sustainability

The 2022 IYFAFA aims to 'focus world attention on the role that small-scale fishers, fish farmers and fish workers play in food security and nutrition, poverty eradication and sustainable natural resource use.' [28]. Its one-minute video 'Small in scale; big in impact' sums up these ideas [29].

I hope these explorations have sparked interest in fish and local fisheries for your learners. With a good science background, they can go on to explore sustainability issues and maybe actions that they can take. Issues really apply not just to artisanal fisheries - but to anyone fishing.



IYBSSD & IYFAFA logos used with permission from IYBSSD & IYFAFA.  
(C) Photos and text by J. Clark, Warracknabeal, 2022.

### Direct links to webpages in this article

- [1] Food and Agriculture Organisation of the United Nations, *Sustainable development goals- 14 Life below the water* at <https://www.fao.org/sustainable-development-goals/goals/goal-14/en/>
- [2] Australian Museum *What is a fish?* (2022) at <https://australian.museum/learn/animals/fishes/what-is-a-fish/IYFAFA>
- [3] Liveworksheets *Interactive worksheets-Fish diagram* at <https://www.liveworksheets.com/gf2044398nj>
- [4] Twinkl *Life cycle of a fish colouring page* at <https://www.twinkl.com.au/resource/life-cycle-of-a-fish-colouring-page-roi-t-20162964>
- [5] National Institute of Water and Atmospheric Research *Snapper life cycle* (2022) at <https://niwa.co.nz/fisheries/ecosystem-influences-on-snapper/life-cycle>
- [6] National Geographic *Marine Food Chain* (2022) at <https://education.nationalgeographic.org/resource/marine-food-chain>
- [7] Science Learning Hub *Marine Food Webs* (2014) at <https://www.sciencelearn.org.nz/resources/143-marine-food-webs>
- [8] Project Oceanography *Unit 2. Fish Ecology. Lesson 3—Fish Food* (1999) at <https://www.marine.usf.edu/pjocan/packets/f99/f99u2le3.pdf>
- [9] Great Barrier Reef, *Great Barrier Reef Food Web- Who eats what on the reef? Find out here* at <https://greatbarrierreef.com.au/information/great-barrier-reef-food-web/>
- [10] Project Oceanography *Unit 2. Fish Ecology. Lesson 1—What is a fish?* (1999) at <https://www.marine.usf.edu/pjocan/packets/f99/f99u2le1.pdf>
- [11] Better Health Channel *Healthy eating: Fish* (2021) at <https://www.betterhealth.vic.gov.au/health/healthyliving/fish>
- [12] Healthline Media, *Nutrition: 11 Evidence-based health benefits of eating fish* (2019) at <https://www.healthline.com/nutrition/salmon-nutrition-and-health-benefits#19>
- [13] Worldfish, *Fish: a nutritional powerhouse* (2019) at <https://www.youtube.com/watch?v=rjna3xQblio>
- [14] *What is 'artisanal' and 'small scale'?* (2022) at <https://www.fao.org/artisanal-fisheries-aquaculture-2022/about/en/>
- [15] Save our seas Foundation *Project news- What exactly are artisanal fisheries?* (2017) at <https://saveourseas.com/update/what-exactly-are-artisanal-fisheries/>
- [16] IYFAFA *1.2 Design' page 5 in Visual identity guidelines* (2021) at <https://www.fao.org/3/cb9284en/cb9284en.pdf>
- [17] The Cripps Family Seafood *Fish n chip van* (2022) at <https://www.crippsfamilyfishfarm.com.au/fishnchip-van/>
- [18] *Eating Expired, What's the healthiest way to cook fish?* (2022) at <https://eatingexpired.com/whats-the-healthiest-way-to-cook-fish/>
- [19] The Cripps Family Seafood *Home* (2022) at <https://www.crippsfamilyfishfarm.com.au/>
- [20] White Fisheries *Home* at <https://www.whitefisheries.com.au/>
- [21] White Fisheries *Stocklists* at <https://www.whitefisheries.com.au/stocklists/>
- [22] White Fisheries *About* at <https://www.whitefisheries.com.au/about/>
- [23] Melbourne Seafood Centre *Home* at <https://melbourneseafoodcentre.com.au/>
- [24] Queen Victoria Market, *Seafood* at <https://qvm.com.au/shops-and-stalls/seafood/>
- [25] South Melbourne Market *Our Traders* at <https://www.southmelbournemarket.com.au/traders?categories=meat-poultry-seafood>
- [26] Food and Agriculture Organisation of the United Nations, *IYFAFA - my story* at <https://www.fao.org/artisanal-fisheries-aquaculture-2022/my-story/en/>
- [27] Melbourne Seafood Centre *Our market; Your visit* at <https://melbourneseafoodcentre.com.au/your-visit>
- [28] IYFAFA *Objective of the International Year* (2022) at <https://www.fao.org/artisanal-fisheries-aquaculture-2022/about/en/>
- [29] Food and Agricultural Organisation *Small in scale, big in value* (2021) at [https://www.youtube.com/watch?v=0s6N\\_89xXIU](https://www.youtube.com/watch?v=0s6N_89xXIU)