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# Aquaculture

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ARE 311 Dr. Thurman

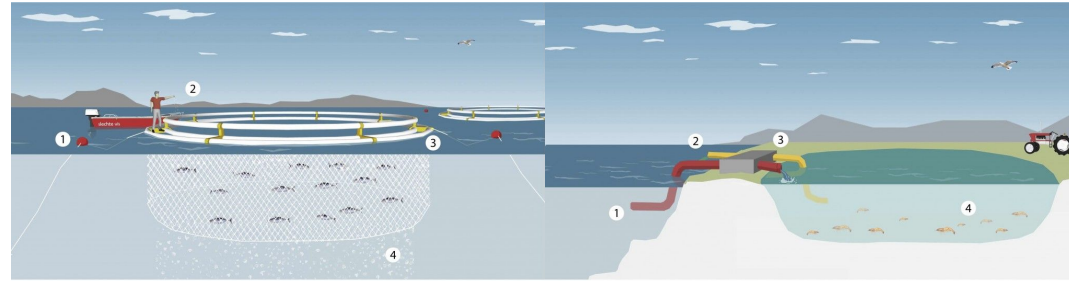
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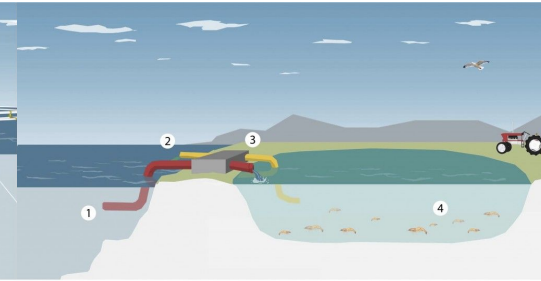
# Aquaculture Defined

Culturing aquatic animals and plants in a controlled setting for the purpose of mass production.

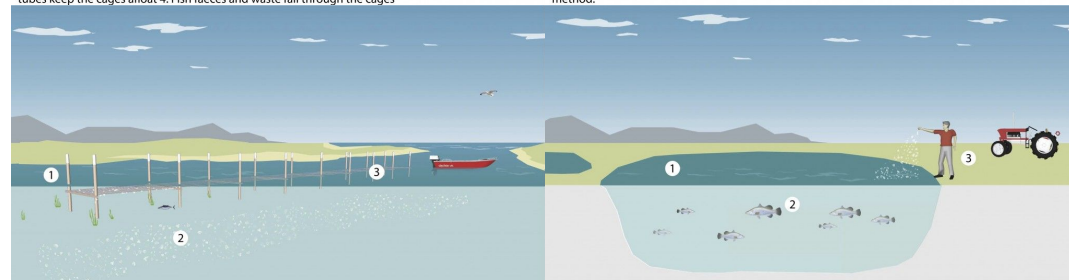
- Types of systems:
  - Open Systems
  - Semi-closed Systems
  - Closed Systems
- Aquaponics



1. The cage is moored to the ocean floor 2. Fishmeal based feeds are added to the cages 3. Buoyant tubes keep the cages afloat 4. Fish faeces and waste fall through the cages



1. Inlet for ocean water 2. Outlet for waste water 3. Pump 4. Prawns are often cultivated using this method.

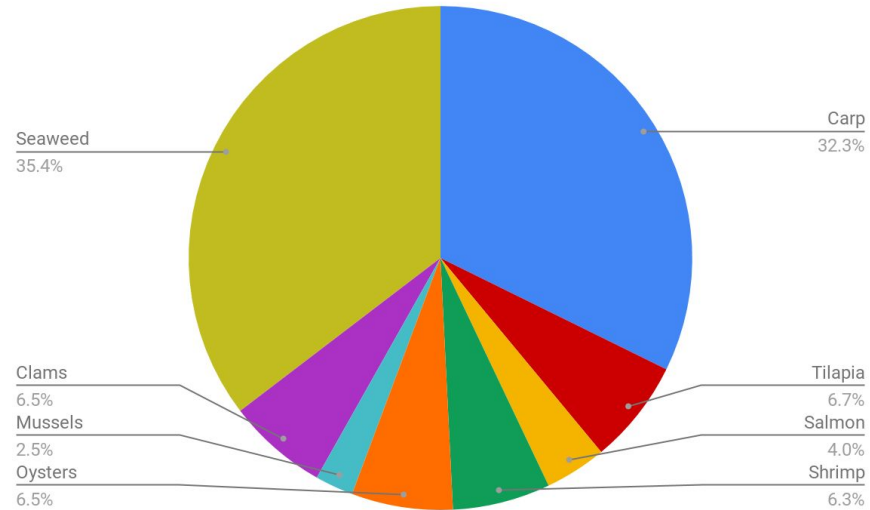
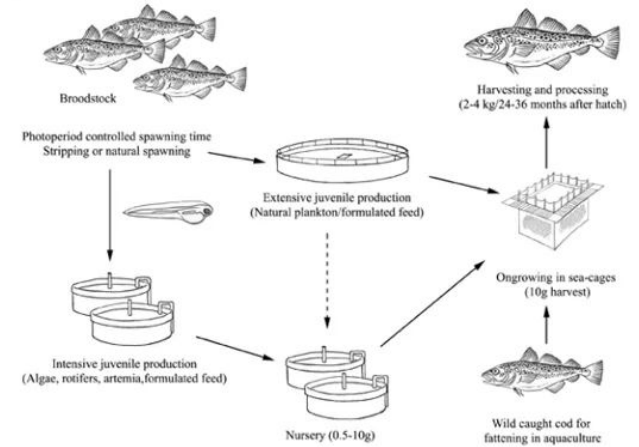


1. Mussels or oysters are grown on racks or in cages 2. Nutrients are taken from the water 3. Passive systems occur in estuaries as well as open ocean

1. The pond or tank exists in a closed system 2. Species including barramundi are grown using this system 3. Feed is added

# Aquaculture Broken Down

- Bivalves
  - Oysters
  - Clams
  - Mussels
- Seaweed
- Fish
  - Carp
  - Salmon
  - Tilapia
- Shrimp
- Meat
- Chemicals
- Beauty products
- Alternative medicine
- Feeds (Fishmeal)



# Important Actors in Global Market

- Number one country in production:

China

- 63.7 million tonnes

- Top importer: Europe

- \$60.6 billion

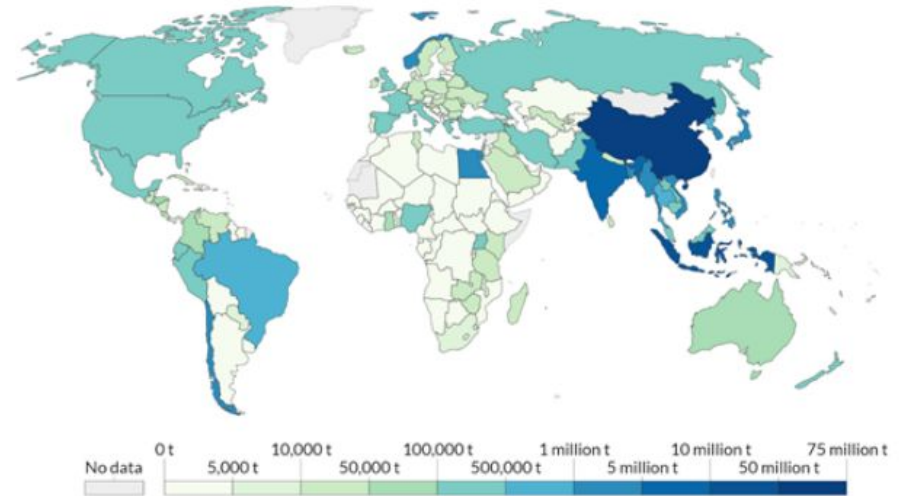
- Top exporter: Europe

- \$38.1 billion

- Vendors in the global futures

markets include:

- Blue Ridge Aquaculture, Cooke Aquaculture, and Mitsubishi Corp.

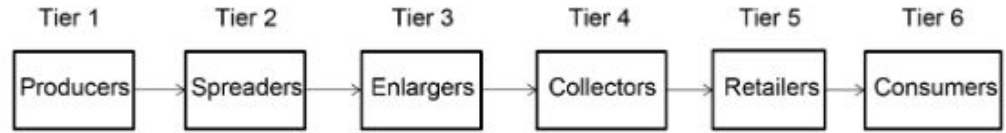


Source: UN Food and Agriculture Organization

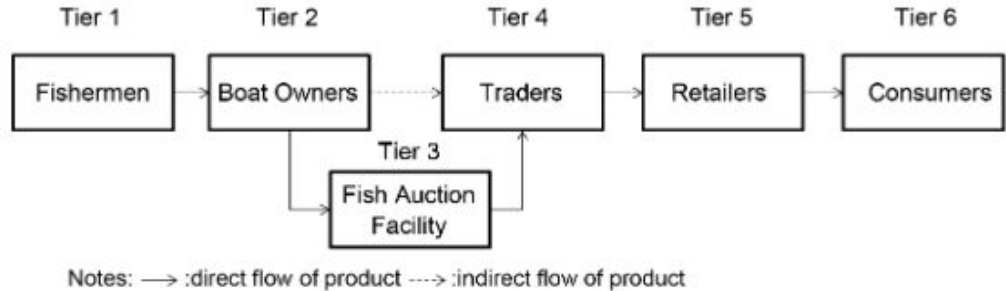
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# Supply Chain

- Modern Aquaculture is a fairly new process.
- Demand has generally outpaced production until recently.
- With increase in seafood supply from aquaculture, oversight is stricter in line with other food industries.
- The supply chain is only as strong as the number and scale of producers, and the roles and responsibilities of brokers.



**Figure 2.** Supply chain of aquaculture fish.



**Figure 3.** Supply chain of sea catchment fish.

# Price Movements

Country, ISSCAAP division Pays, division de la CSITAPA País, división de la CEIUAPA	2008 t	2009 t	2010 t	2011 t	2012 t	2013 t	2014 t	2015 t	2016 t	2017 t
<b>World total</b>	<b>70 177 048</b>	<b>73 813 374</b>	<b>77 917 522</b>	<b>81 559 825</b>	<b>88 144 318</b>	<b>94 943 694</b>	<b>99 554 109</b>	<b>103 835 587</b>	<b>108 075 720</b>	<b>111 944 451</b>
Freshwater fishes	29 006 802	30 303 231	32 282 070	33 391 457	35 660 308	38 190 534	40 051 149	41 597 648	43 548 989	44 658 515
Diadromous fishes	3 333 125	3 544 328	3 603 471	4 037 492	4 536 560	4 584 617	4 840 622	4 937 318	4 917 026	5 646 013
Marine fishes	1 941 615	1 906 071	1 859 128	2 021 802	2 137 706	2 215 486	2 323 009	2 447 431	2 579 152	3 098 133
Crustaceans	5 016 240	5 292 029	5 478 791	5 807 792	6 016 038	6 222 539	6 748 259	7 108 516	7 688 202	8 442 713
Molluscs	13 001 467	13 388 949	13 728 260	13 818 432	14 346 670	14 906 979	15 707 778	15 836 771	16 788 177	17 394 305
Miscellaneous aquatic animals	615 753	721 880	791 485	714 243	778 890	829 828	830 394	844 963	906 213	893 908
Aquatic plants	17 262 245	18 856 886	20 174 317	21 768 607	24 668 145	27 993 710	29 052 897	31 062 941	31 649 981	31 810 883

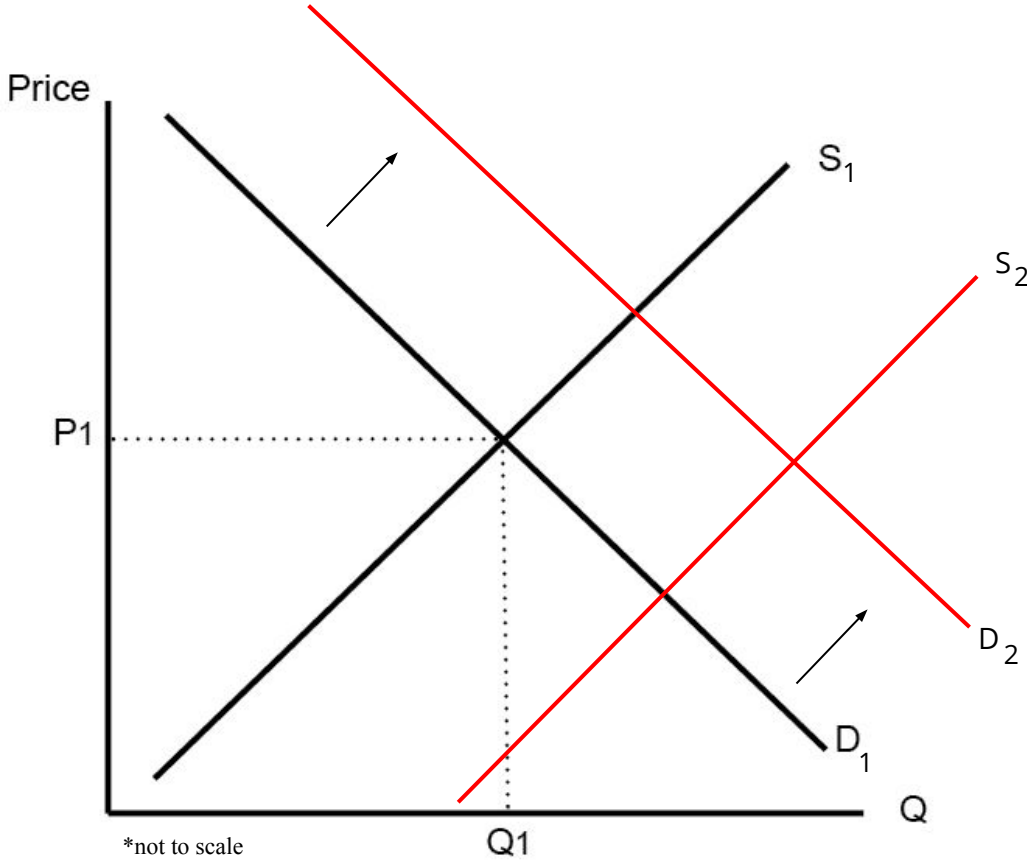
The United Nations reports that around 47 percent of the world's total fish supply comes from aquaculture.

World aquaculture remains a fast-growing food-producing sector, yielding nearly 80 million tonnes with an estimated value of \$231.6 billion in 2016, for an average annual growth rate of 5.8 percent from 2001-2016.

World-wide aquaculture demand has been projected to increase from 52.8 million metric ton (MT) in 2008 to around 93.6 million MT by 2030 (FAO, 2013)

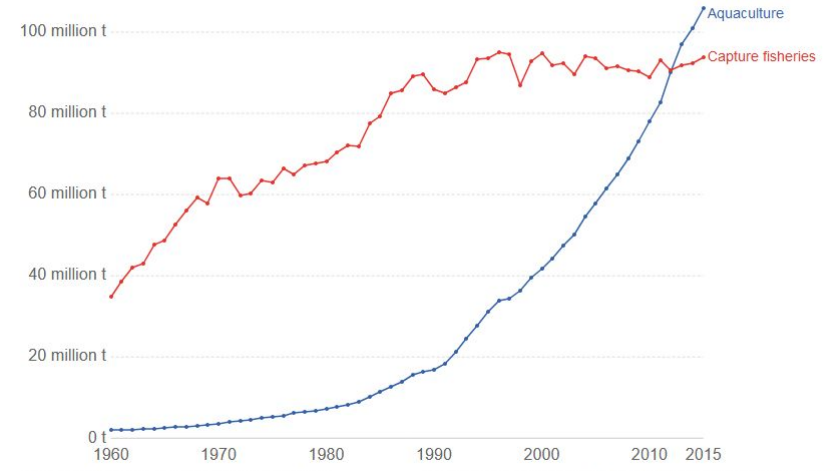


# Projected Aquaculture S&D by 2030



### Seafood production: wild fish catch vs aquaculture, World

Aquaculture is the farming of aquatic organisms including fish, molluscs, crustaceans and aquatic plants. Capture fishery production is the volume of wild fish catches landed for all commercial, industrial, recreational and subsistence purposes.



Source: UN Food and Agriculture Organization (FAO)

[OurWorldInData.org/meat-and-seafood-production-consumption/](https://www.ourworldindata.org/meat-and-seafood-production-consumption/) • CC BY

# Current Events

There have been massive impacts on supply and transportation of aquaculture products as a result of COVID-19. In addition, “two major industry events have already been postponed: Seafood Expo North America, the largest such exhibition in the continent, was due to take place in Boston mid-March, and Seafood Expo Global was planned for Brussels in April”.

<https://www.maritime-executive.com/editorials/coronavirus-hits-sustainable-aquaculture>

“A new report from Lux Research explores the future of alternative aquafeed ingredients, evaluating insect protein, single-cell protein, and algae protein as potential replacement options in fishmeal”, a much needed find, as “over the next 30 years, 15 million MT of new protein will be needed for aquaculture to meet the shortfall between supply and demand”

<https://www.seafoodsource.com/news/aquaculture/new-report-explores-the-future-of-alternative-aquafeed-ingredients>



# Sources

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