Exercise walk-through

4.3
Aquatic food production systems

International Baccalaureate · IB Diploma · Environmental Systems and Societies · SL

Aquatic food webs and demand

Producers to consumers

Phytoplankton, aquatic plants and algae support food webs.

People eat lotus rhizomes, kelp, carp, shellfish and marine fish.

Pressure pathways

Demand reflects population, culture, income and trade.

Bottom trawling, ghost nets, **bycatch**, poisons and explosives affect different organisms.

Compare farmed-food systems

Possible gains

More controllable food production and employment.

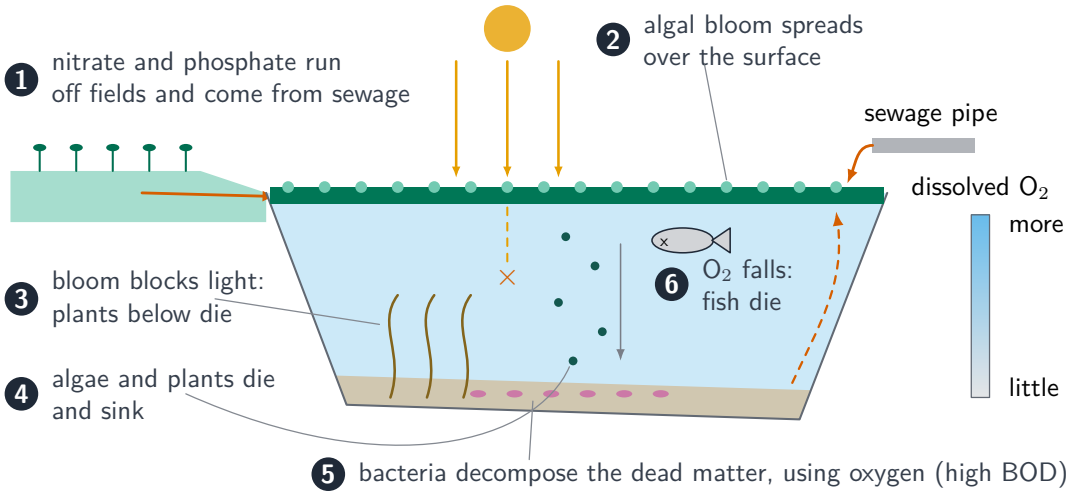
Potential to reduce pressure on some wild stocks.

System costs and limits

Feed substitution can move impacts onto land.

Seaweed uses dissolved nutrients; filter-feeders remove particles; capacity is finite.

Eutrophication and feedback



dashed arrow: low O_2 lets sediment release phosphate, feeding more bloom (positive feedback)

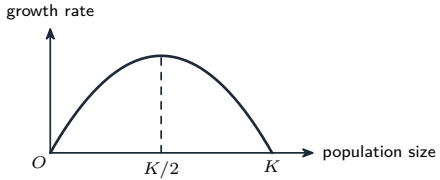
> Low oxygen can release sediment nutrients, feeding further blooms.

Exercises 2.1·2.2

2.1 Explain why the open ocean fishery is called a “commons”. [2]



2.2 Use the MSY graph. (i) State the population size at which MSY is taken. (ii) Explain why catching more than the MSY each year causes the catch to fall later. [3]



Exercises 2.1·2.2

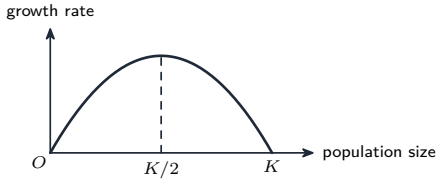
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2.1

it is shared and owned by no one, so access is open to all; each fisher gains by catching more, while the loss of stock is shared, so overfishing results

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2.2

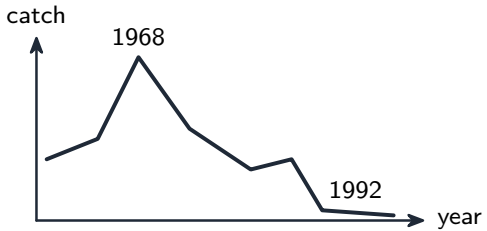
(i) about half the carrying capacity, $K/2$; (ii) catch above MSY is larger than the yearly growth, so the stock falls; a smaller stock produces fewer young, so the growth and the possible catch fall further

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Exercise 3.1 (a)

3.1 The graph shows the cod catch off Newfoundland, Canada.

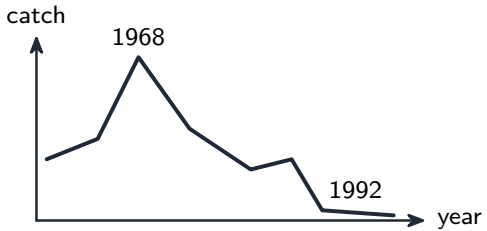
(a) Describe the trend in the catch. [2]



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(a) catches rose to a peak in the late 1960s, fell, then collapsed to almost zero by the early 1990s

Exercise 3.1 (b)

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(b) Explain why the stock has recovered only slowly since fishing stopped in 1992. [2]

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(b) the remaining population was very small, with few large breeding adults; the ecosystem changed: other species and predators took cod's place, and bycatch and cold water also slowed recovery

Exercise 3.2 (a)

3.2 A government wants to protect a declining fishery.

(a) Explain how **two** management methods would help the stock recover. [4]



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(a) any two, each explained: quotas keep the catch below the yearly growth; a larger mesh size lets young fish escape and breed; a closed season or area protects spawning fish

Exercise 3.2 (b)

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(b) Suggest **one** reason why fishers may not follow the rules. [1]

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(b) loss of income or jobs / weak enforcement at sea / other countries keep fishing