Aquaculture

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Overview

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What is aquaculture

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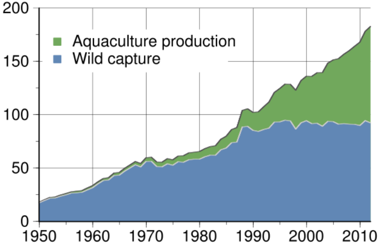
- 

Figure: Global production of aquatic organisms in million tonnes, since 1950, as reported by the FAO

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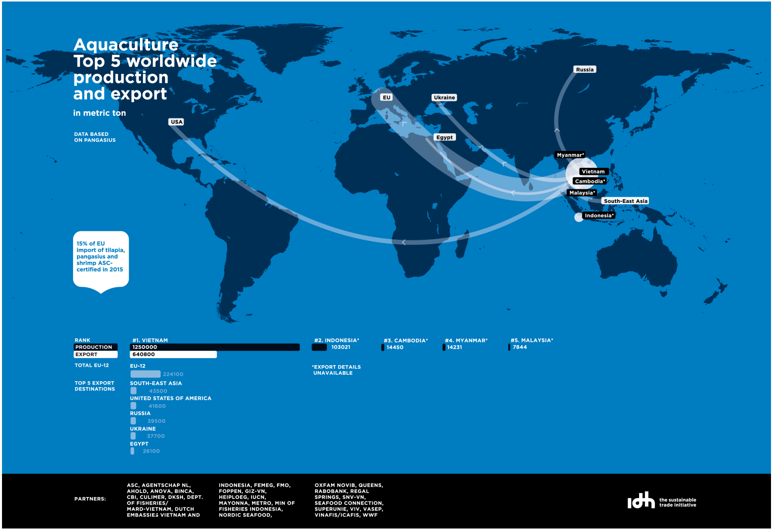

Figure: Aquaculture production and exports

What is aquaculture

Today will talk about farming fish!

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What is the current problem?

Current status

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Solution

We can help by determining the best time for harvesting the fish.

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Defining our model

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Biologists often refer to equation (1) as the **allometric equation**

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$$W(t) = [\ (1-\alpha)\ Kt + C)]^{\frac{1}{1-\alpha}}$$

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$$\frac{dW}{dt} = KW^{\alpha}S \tag{2}$$

$$S = 1 - (\frac{W}{W_{max}})^{\mu}$$

Adjusting our model

We can find W(t) using some constant given for t measured in months ($K = 10$, $\alpha = \frac{3}{4}$, $\mu = \frac{1}{4}$, $W_{max} = 81$ ounces and $W(0) = 1$ ounce).

$$\frac{dW}{dt} = 10W^{\alpha} - \left(\frac{10W}{3}\right)$$

$$W(t) = e^{\frac{-10}{3}t}\left(3e^{\frac{5t}{6}} - 2\right)^4$$

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Cost function

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We can find the function $C(t)$ using some empiric constants: $K_1 = 0.4$, $K_2 = 0.1$, $C(0) = 1.1$ (dollars), and $W(t)$ we determined already.

Cost function

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Optimal harvesting time

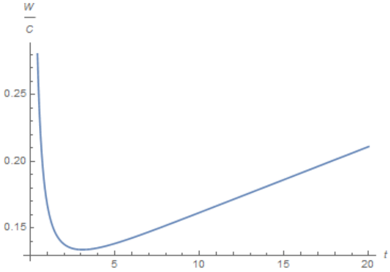

Figure: Cost / Weight ratio.

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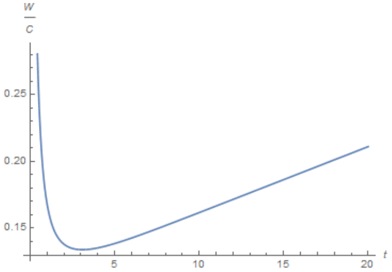

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