

The decline of fisheries in Japan described by a simple dynamic model

ISDC 2016 -- Delft (NL)

The Lotka-Volterra (or Prey-Predator) model was probably the first dynamic model ever proposed, but it was never really validated for real-world system. However, we found that the model can be used for the quantitative description of fisheries: let state R =fish stock resource (the Prey) and C =capital investment of Fisheries (the Predator) and see what happens...

❖ Background



By a simple dynamic model is possible to recognize the moment **to raise up the red flag**, lowering the fishing effort by means quotas

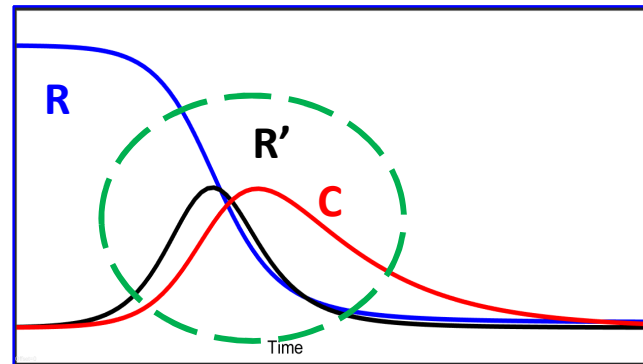
This is a major global necessity of the 21th century.

❖ Lotka Volterra revisited

$$R' = k_1 R - k_2 C R$$

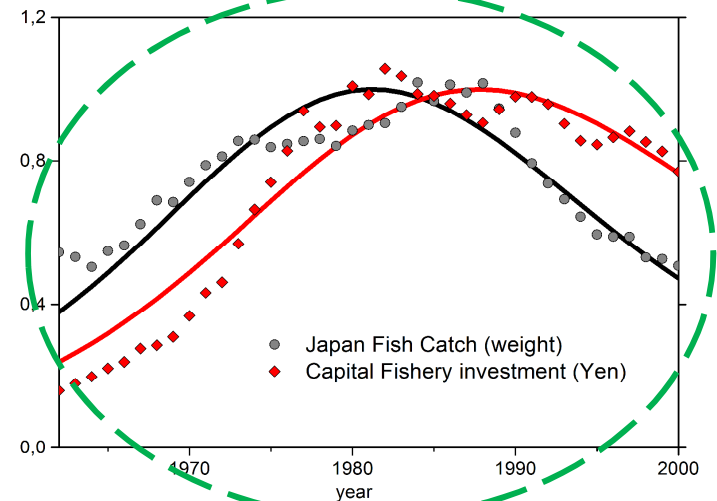
$$C' = k_2 C R - k_3 C$$

fishing rate \gg reproduction rate



❖ Model test Result

Production (R') Predator (C)



Data from <http://www.stat.go.jp/>

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