Underlying Ideas
The following are some ideas that drive the reasoning presented here:

- There cannot be growth forever in a system that has finite resources.
- Such a system will initially exhibit exponential growth until it starts approaching the limits to growth. Meanwhile the growth will be fueled by a positive feedback, i.e. growth will promote more growth.
- As the system approaches its limits to growth, a negative feedback will commence (or become increasingly strong). This feedback will not enhance growth in the system.
- When the negative feedback is equal to the positive feedback that fuels growth then the system will show no growth and be at stable equilibrium.
- When the negative feedback overwhelms the positive feedback the system will show exponential decay.

Causal Loop Diagram

Underlying Theory
System population at any time = \( P \)

Net finite resources in the system = \( R_0 \)

Let per capita resource consumption = \( R \)

Carrying capacity: The limiting population that the system can support given the resources: \( C = \frac{R_0}{R} \)
Consider the quantity $\frac{P}{C}$.

Also consider fractional birth rate $b$, and fractional death rate $d$. Both these quantities are functions of $\frac{P}{C}$.

Time rate of change of population = $(b - d)P$.

Hence the following conditions hold:

$\frac{P}{C} < 1$, when $(b - d) > 0$: Desirable

$\frac{P}{C} = 1$, when $(b - d) = 0$: Stable Equilibrium

$\frac{P}{C} > 1$, when $(b - d) < 0$: Undesirable