Patch Depletion Model

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1 Parameters

- Amount of resources for patch at time t: R_t
- Area of the patch: A_p
- Maximum area an agent can forage per unit time: A_f
- Number of foraging agents at time t: F_t
- Maximum consumption rate (resources foraged per unit time) of an agent: F_c

2 Derived Values

- Density of resources at time t: $D_t = \dfrac{R_t}{A_p}$
- Effective area available for an agent to forage at time t: $A_{t,eff} = \min\left(A_f, \dfrac{A_p}{F_t}\right)$
- Amount of resources foraged by an agent at time t: $F_{c,t} = \min(F_c, A_{t,eff} \times D_t)$
- Total amount of resources foraged at time t: $R_{F,t} = F_{c,t} \times F_t$
- Resources remaining after time t: $R_{t+1} = R_t - R_{F,t}$
- Total amount of resources foraged up to time t: $R_{FTot,t} = \sum_{i=0}^{t} R_{F,i}$
- Value of a patch: $V = \max\left(\dfrac{R_{FTot,t}}{t}\right)$