Beyond the tragedy of 'open access': An exploratory model of governance rules for the commons

Ema Gusheva European Master in System Dynamics (2018-2020)

Summary

- Developed an **exploratory model** of two users extracting a forest for firewood
- Special emphasis is put on **non-compliance** as a result of dissatisfaction with governance rules.
- Results show that non-compliance can lead to **unstable behavior** further amplified by perception delays, efficiency drops or demand increase.
- **Governance rules** for the commons = fertile ground for study using system dynamics.

Background

There are system dynamics models describing the tragedy of open access. But, none of them include an endogenous governance structure for the commons, even though this is most representative of real-world common pool resources. Governance rules are important for mediating the effect of population pressure and market mechanisms on the sustainability of the commons.

Research question

What dynamic implications arise from an exploratory model of commons governance?

Model structure

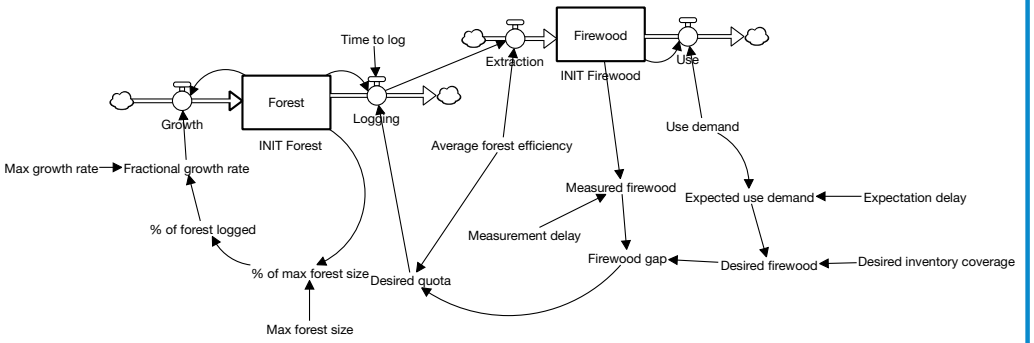

Figure 1: Single user model

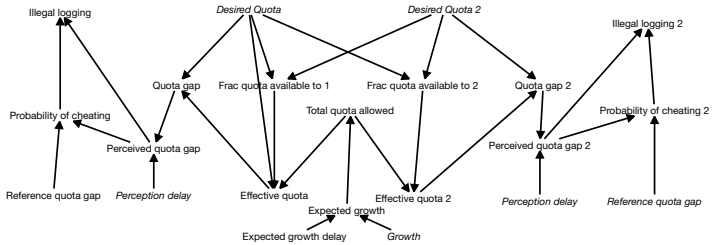

Figure 2: Group decision-making structure

Model behavior

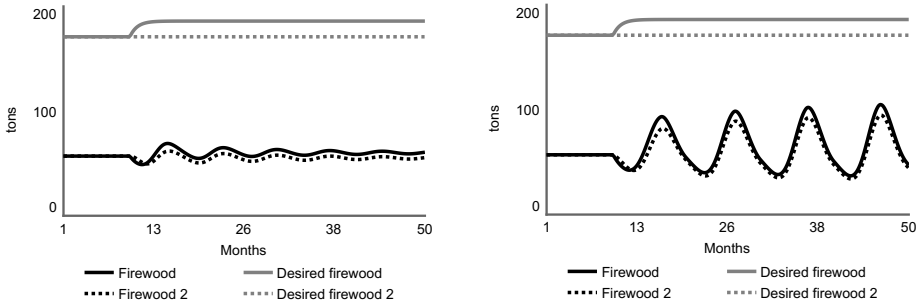

Figure 3: Oscillations as a result of a step-up in demand and increased perception delay

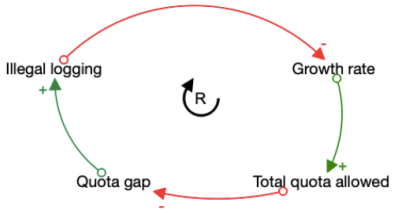

Figure 4: The reinforcing loop

- Illegal log is a way of coping to demand
- Results in **oscillatory model** behavior
- Amplified oscillations when coupled with a perception delay or bigger proportions
- Dissatisfaction grows when forest is below maximum sustainable yield
- Leads to more illegal logging and effectively reduces the forest growth rate
- Decreases the quota even further ultimately leading to even more dissatisfaction.

Conclusion

- The model includes a general top-down policy, individual preference formation, group rule-making and rule non-compliance.
- **Answer to research question**
  Illegal logging, as a way of breaking governance rules, yields highly unstable behavior. This is amplified by the presence of perception delays or dissatisfaction with governance rules.
- System dynamics is a good tool for studying commons governance.
- **Future work**
  To include monitoring and sanctioning mechanisms as well as increase model quality through the use of empirical data

References

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Contact Information

Email emaguseva@gmail.com