Legalization of Poppy in Afghanistan

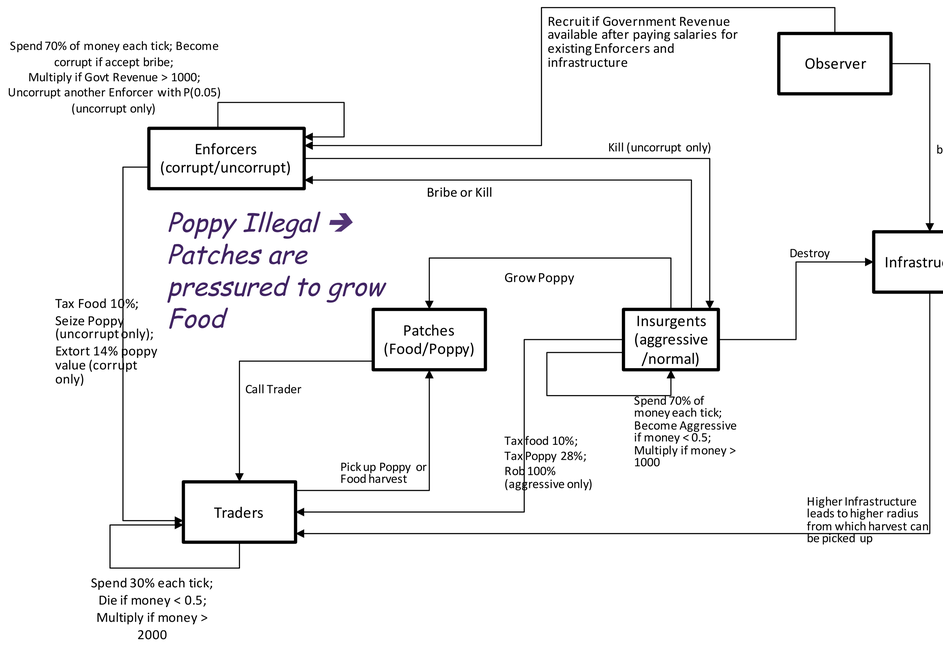
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Abstract

- Afghanistan has a major cash crop in the opium poppy. Poppy is a "lootable" resource that fuels drug addiction inside and outside of Afghanistan, fostering corruption and insurgency.
- Developing countries appear to need poppy-based medicines.
- In 2007, NATO leadership considered legalization of poppy cultivation in Afghanistan. At that time numerous news reports such as [Speigel 2007] and several research papers such as [Young 2007] and [Bhattacharji 2007] explored the topic. However, little has been heard recently on this front.
- We use agent-based modeling (ABM) to analyze the influence of poppy cultivation on insurgency, and to explore possible outcomes for a legalization scenario.
- Notably, the model generates distinct and stable territories of poppy production and enforcer corruption.
- With legal growth and taxation of poppy, insurgents are eliminated from the model faster and corruption decreases.
- Reducing corruption or raising food prices produces similar results.

Model Overview

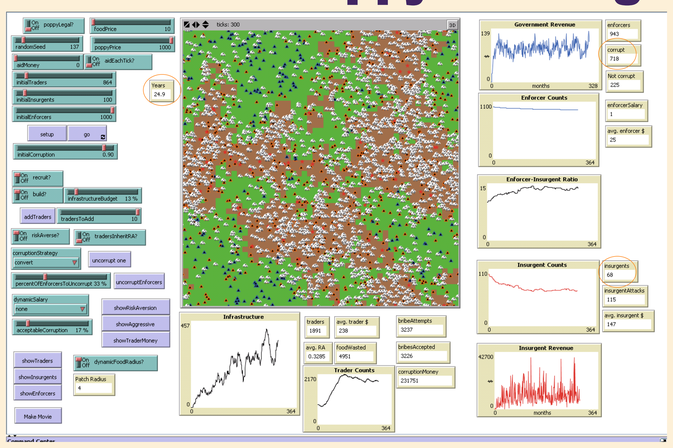
Poppy Legal – Agent Interactions



Experiment # 1: Poppy Not Legal

Runs for 25 Years

Distinct Poppy and Food Areas



Corruption High

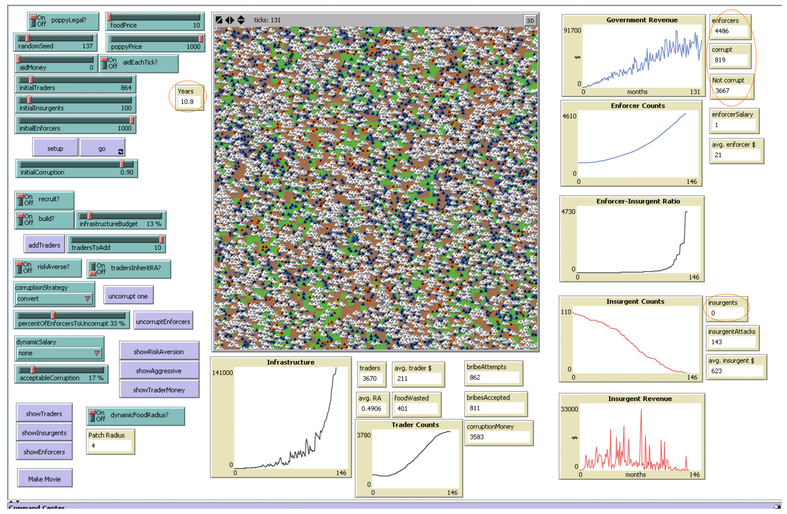
Equilibrium State

Insurgents Survive

Experiment # 2: Poppy Legal

Runs for 11 Years

Some Food Areas



Corruption Low

Insurgents Defeated

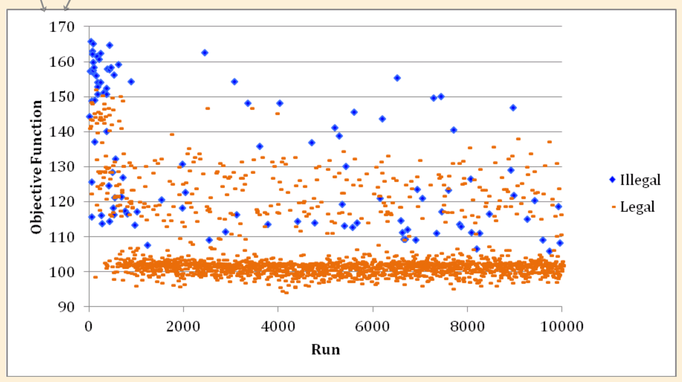
Experimental Results

Selected Parameter Sweeps

Input Parameter	Sweep Values	Corresponding Results for Number of Years insurgents survive or are eliminated	Corresponding Results for Insurgent Counts
Poppy Legal	[False, **True**]	[24.91, **11.33**]	[40, **0**]
Poppy Price	[**10**, 100, 500, 700, 1000]	[**24.91**, 24.91, 24.91, 24.91, 24.91]	[**10**, 8, 50, 50, 40]
Food Price	[10, 100, 500, 700, **1000**]	[24.91, 24.91, 23.25, 21.58, **19**]	[68, 40, 0, 0, **0**]
Aid Money	[0, 1000, 5000, 10000, **15000**]	[24.91, 24.91, 23.58, 20, **12.5**]	[40, 27, 0, 0, **0**]
Initial Trader Counts	[**100**, 250, 500, 864, 1000]	[**24.91**, 24.91, 24.91, 24.91, 24.91]	[**43**, 51, 59, 40, 61]
Initial Corruption	[**0.1**, 0.25, 0.5, 0.75, 0.9]	[**23.5**, 18.66, 24.91, 24.91, 24.91]	[**0**, 0, 1, 9, 40]
Infrastructure Budget Percentage	[**13**, 25, 50, 75, 100]	[**24.91**, 24.91, 24.91, 24.91, 24.91]	[**40**, 51, 71, 70, 79]
Dynamic Food Radius	[False, **True**]	[24.91, **24.91**]	[110, **40**]

Behavior Search

- *10,000 runs, each for 100 ticks (8.3 years)*
- *Fitness defined as the sum of ticks and insurgent count*
- *Minimized by a standard GA*
- *Run ended if insurgent count fell to 0*
- *Each fitness value averaged from 5-15 runs with different seeds*



Single Factor Effects

Main Effect of One Factor on Results	Poppy Legal?	Food Price	Poppy Price	Aid Each Tick?	Initial Enforcer Count	Initial Corruption	Infrastructure Budget	Dynamic Food Radius
Years	-3.38	-3.03	-2.13	-2.82	-3.03	7.58	2.28	-0.12
Final Corruption Percentage	-9.87%	-8.61%	-0.90%	-12.19%	-8.17%	21.00%	3.84%	-1.78%
Insurgent Counts	-11	-8	3	-13	-11	14	4	-2
Trader Counts	241	2051	1649	15	10	31	41	147

Strongest beneficial effects on model outcomes, in decreasing order of impact:

- *Lower initial corruption level*
- *Legal poppy*
- *Higher initial enforcer count*
- *Higher food price*
- *Higher aid monies*

References

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