OPTIMIZING MODEL UTILITY IN RESOURCE MANAGEMENT

Shifting Cultivation in Thungyai Naresuan Wildlife Sanctuary, Thailand

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THE CONTEXT

The Cycle of Shifting Cultivation

The Karen of Thungyai Naresuan

Caretakers of the Forest Environment?

This research concerns three Karen villages in Thungyai Naresuan Wildlife Sanctuary. Two of the villages (referred to here as GS) are near all-weather roads that permit access to outside markets. These two villages are also attractive to Karen kin both from Thailand and across the Myanmar border. Community rules governing fallowing are limited and not very effective because immigration breaks down community control.

In contrast, the third village (G) is more isolated, does not have very dependable road access and limited immigration mostly by kin, but respected community-based rules for fallowing choice.

Shifting Cultivation in Thungyai Naresuan

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All Karen-Thungyai photographs
courtesy of Dr. Kulvadee

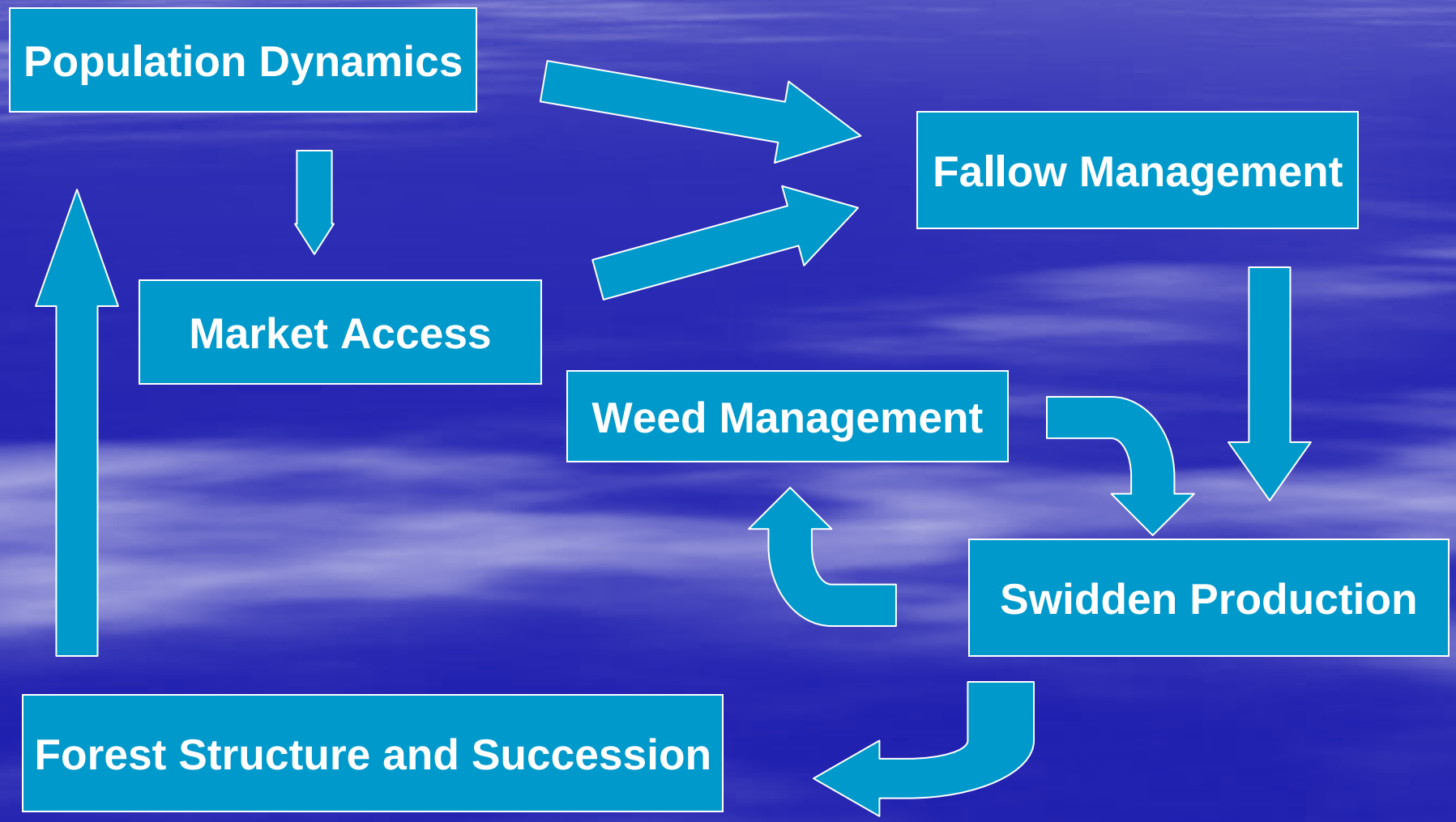
Four Questions About the Future of the Thungyai Karen

Forecasting the future is always tricky business, especially from short-term studies resulting in limited data. Nevertheless, predicting the future is very important. Here are four questions which cannot be answered by short-term studies.

- What is the future course of Villages GS and G?
- Which village (G or GS) is likely to suffer destabilization of shifting cultivation first?
- Does the 10-year rule imposed by RFD affect G or GS more?
- Which has the greater net benefit? Spatial isolation or market access?

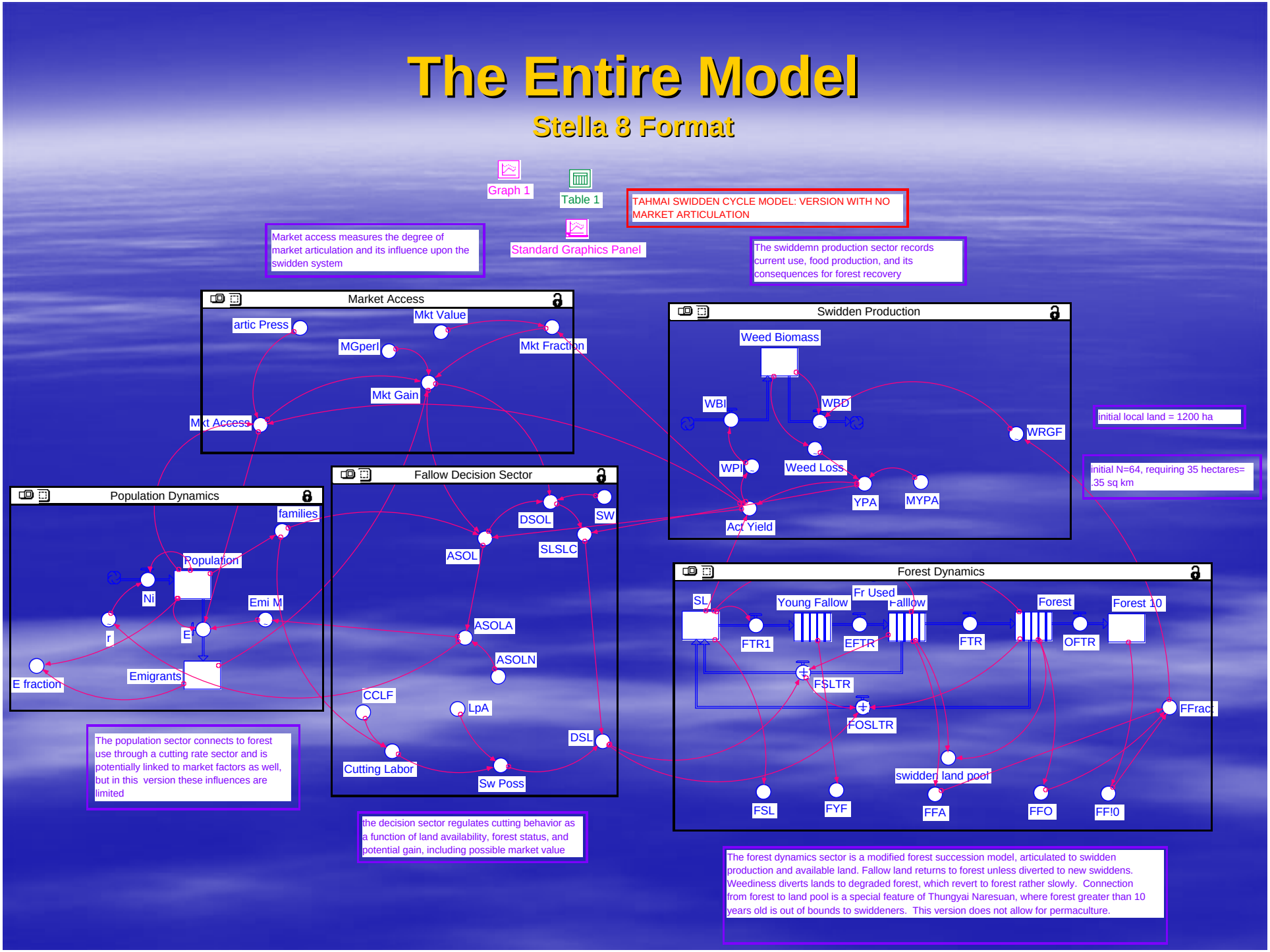
STRUCTURAL DESCRIPTION OF THE MODELS

Overview of the Models



The Entire Model

Stella 8 Format



Experimental Design

	G1	G2	G3	GS1	GS2
population dynamics	no emigration	forced emigration	voluntary emigration	voluntary emigration	voluntary emigration
cutting practice	community regulation	community regulation	community regulation	free for all	community regulation
market production	none	none	yes	yes	yes
labor market access	none	none(for residents)	yes	yes	yes
imported income	none	none	yes	yes	yes

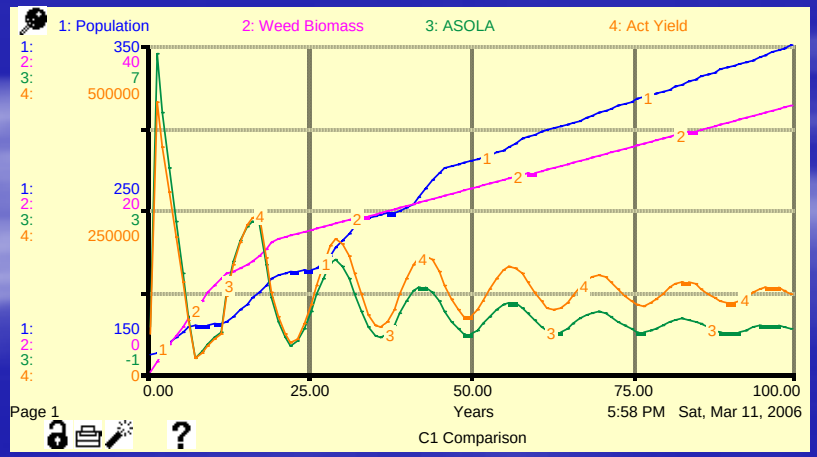
RESULTS

Indicator	G1	G2	G3	GS1	GS2
forest stabilization time constant	near limit cycle in 65 yr	same as G1	damped equil. @ 75	same as G3	same as G3
population size @ yr 100	350, increasing	25, declining	519, @ equil.	1074, @ equil.	Same as GS1
emigrants	0	one large flush decimates pop @ t8, low after	30% at 100 yr	40% @ 100 yr	same as GS1
fraction of available forest used	13%	same as G1	29%	12%	29%
standard of living attained	3% of N	1765% of N	147%	140%	same as GS1

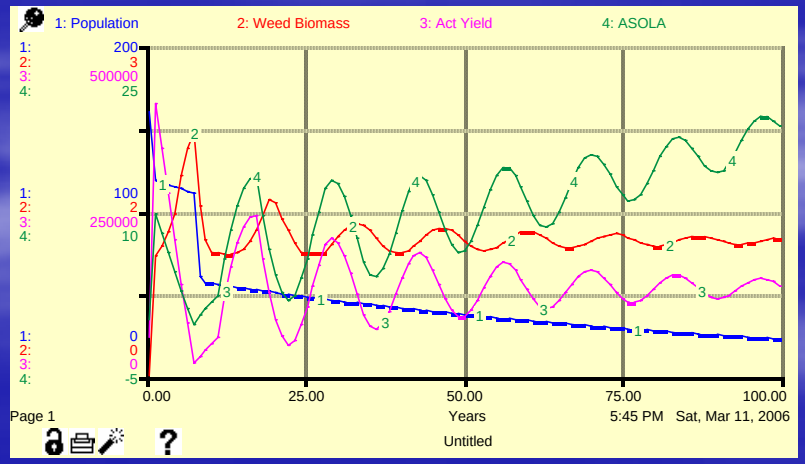
Direct Interpretation

The Three Versions of Model G

- With no escape from the system, population builds and productivity crashes as weeds build to high levels in version G1. With emigration possible G2 has a completely different outcome as most of the population leaves. The few remaining families do relatively well.



G1

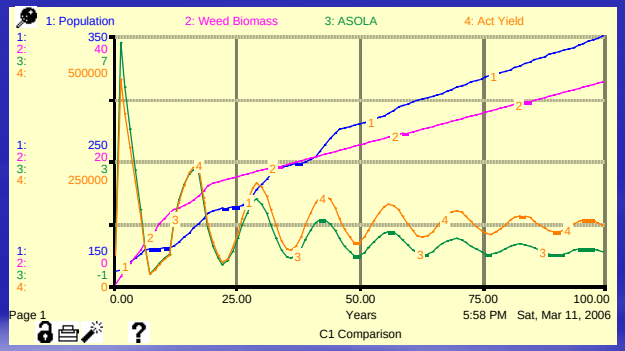


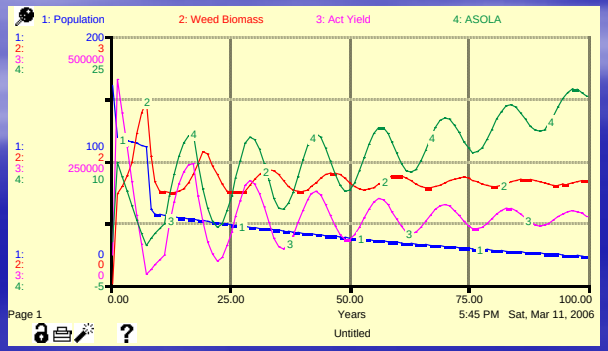
G2

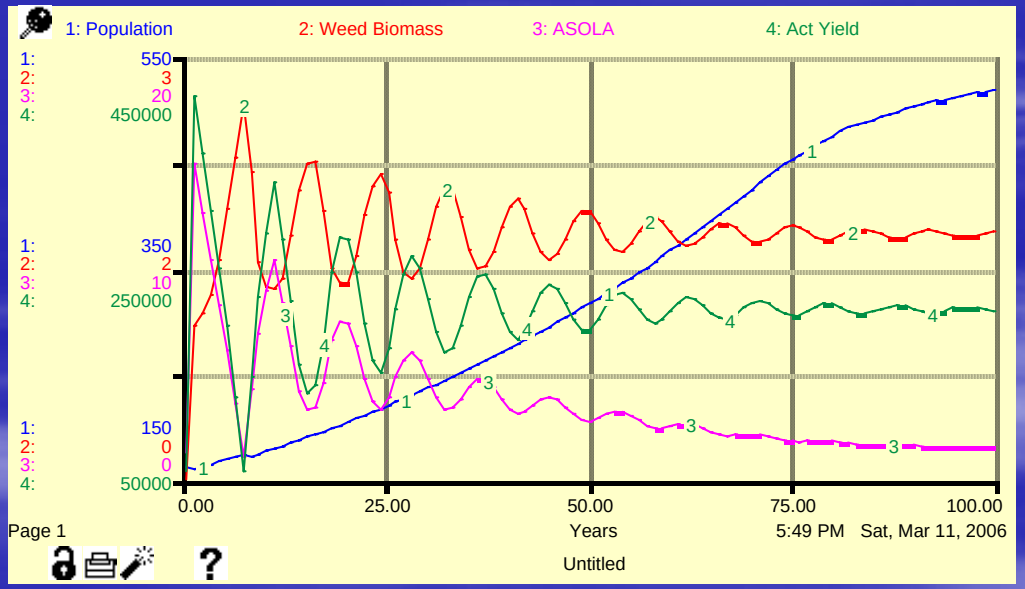
Direct Interpretation

The Three Versions of Model G

- In G3, import of income doubles the population while maintaining yield at the expense of ASOLA and forest (forest shown previously).







G3

Direct Interpretation

The Three Versions of Model G

In all three cases, the forest reacts as predicted, increasing agricultural lands at the expense of maturing forest.

In each case, the forest goes to successional steady state through a period of decreasing oscillations.

Weed biomass reflects the pressure of production and the status of the mature forest.

Summary

- Shifting cultivation systems are inherently unstable because forest recovery is so much slower than human ability to exploit it.
- As population growth or resource availability become limiting, it can develop in two different directions:
  - a shifting cultivation system may persist but its performance will decline
  - a shifting cultivation system will participate in the market for its products or its labor.
- Do these conclusions apply to the Thungyai Karen villages?

Agricultural Evolution in Isan

Agriculture in Isan is doing well. According to a study published by Terry and Somluckrat Grandstaff (2008), this is due to a combination of market rice, labor opportunities in the region and in Bangkok, and the influx of funds back to the villages.

This result is consist with the G/GS models. Tempting, but is it indicative that agroecosystems evolve like I have argued?

IMPLICATIONS

Model Development Strategy

MODEL ATTRIBUTES	Data Adequate	Data Inadequate
Causation Understood	Model should be a productive tool	Push sensitivity testing
Causation Not Understood	Alternative, simple models	Exploratory models, if that much

Implications For GTAP

- Uncertain understanding of cause and effect relationships is dangerous for model prediction. Complex social systems model with many human behavioral inputs are especially dangerous.
- Models should routinely be developed in multiple versions to better understand variation in output.
- In the best possible circumstances, predictions may be reliable; but more often, the model is only a step towards better understanding and better predictions
- Ask yourselves: do you believe your predictions, and why?