

Study and Research Plan
GSGES Short-Term Scholarship Program
Kyoto University, Japan

Dynamics modeling of Environmental systems: Case
study of Forest ecosystems

Kyoto, 16th April, 2015

Student: **NGO QUOC HIEN**

Supervisor in Japan: **Prof. Akira Osawa - GSGES**

Supervisor in Viet Nam: **Dr. Ngo Tung Duc - HUAF**



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Seft – introduction

Full name: NGO QUOC HIEN

Nationally: Vietnamese

Age: 24

Graduated: Hue university of Agricultural and Forestry (HUAF) – Hue University

Major: **Forestry and Environmental manager**

Current academic: Master student of silvicultural – Hue university of Agricultural and Forestry

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Supervisor

Supervisor in Viet Nam

Full name: **Dr. Ngo Tung Duc**

Affiliation: Lecturer of Forestry faculty; Head of Post-Graduate Department - Hue University of Agriculture and Forestry

Study topic: silvicultural, agroforestry, Community Development, social forestry, Climate Change

Supervisor in Japan

Full name: **Prof. Akira Osawa**

Affiliation: Ecosystem Production and Dynamics laboratory, GSGES, Kyoto University

Study topic: Ecosystem production and dynamics (forest, stand development, carbon dynamics, tree ecophysiology, tree-ring, succession, climate change)

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Current Study topic in master course

- **Research Topic:** “Using system dynamics for simulation of factors affecting plantation forestry and forecasting economic efficiency of Acacia forest in Nam Dong district, Thua Thien Hue province”
- **Method:** Literature review, field investigation (acacia forest and home interview) and data analysis (using system dynamics)



Study topic in Kyoto

- **Study topic:** “Dynamics modeling of Environmental systems: Case study on Forest ecosystems”

- Forest ecosystem (specially Acacia Forest Ecosystem)
- System dynamics methodology
- Using software to apply System dynamics

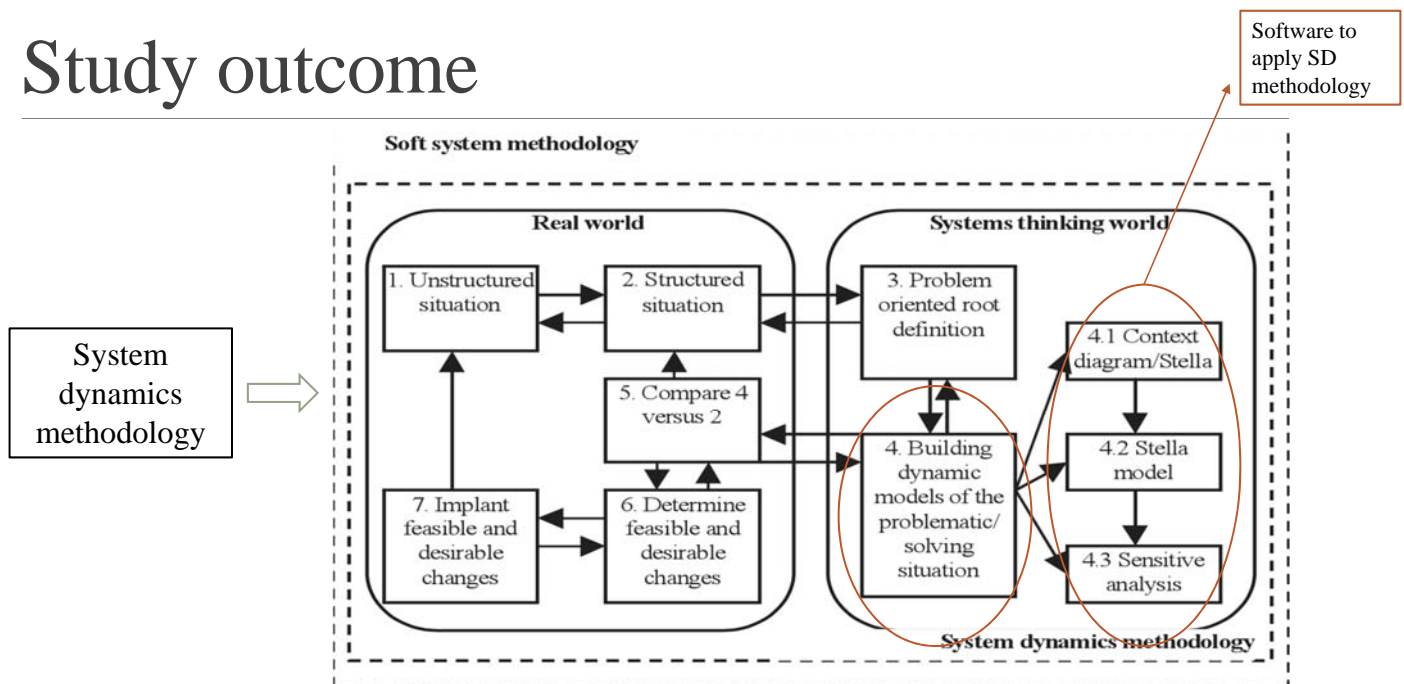


The study plan has been completed

- ❖ Finished 5 classes during the short - term programs provided by GSGES
 - Learn new knowledge about global environmental and natural resource management
 - Go deeper to study about Ecosystem production and Dynamics
- ❖ Literature review
 - Access to many documents, reports, journey on the forest ecosystem and trees grow
 - Could find plenty material about System Dynamics
- ❖ Study about System dynamics
 - Under developing models related to Forest ecosystem by using System dynamics methodology
- ❖ Tried apply data from Viet Nam with System Dynamics computer system software
 - Not succeeded yet

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Study outcome



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Study outcome

Application software



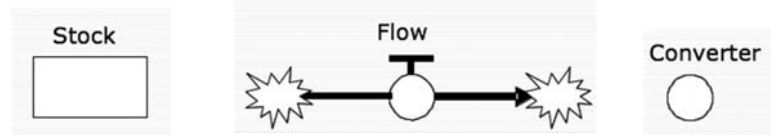
❖ STELLA(isee systems inc)

STELLA supports a very intuitive graphical user interface so that beginners can easily use to learn about SD.

❖ Vensim

Software free for educational use, has equivalent functions to STELLA. Available from the website at <http://www.vensim.com/software.html>.

Model component by STELLA

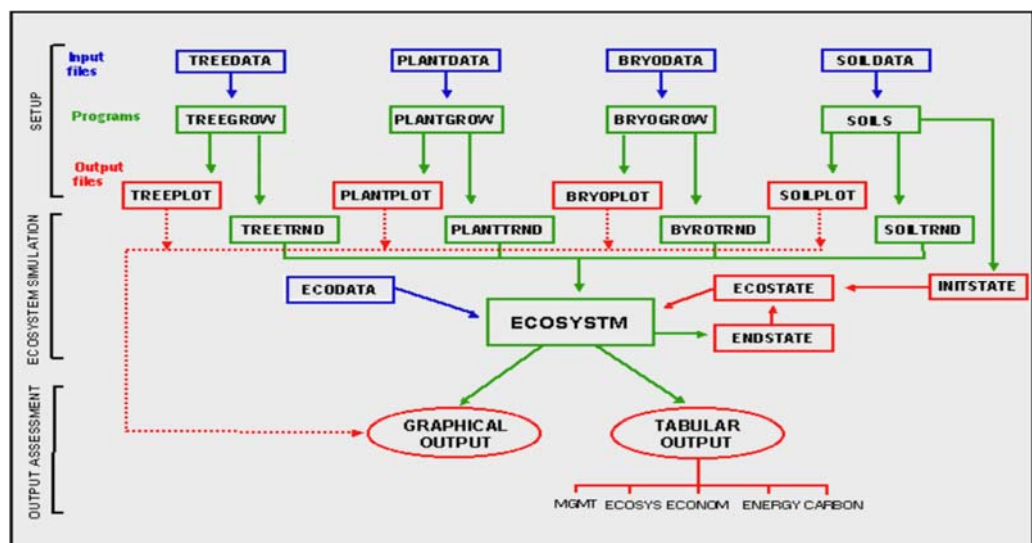


The flow of information among elements can be described by connecting stocks and flows to one another with connectors.

※An Arrow(→) stands for a connector.

Study outcome

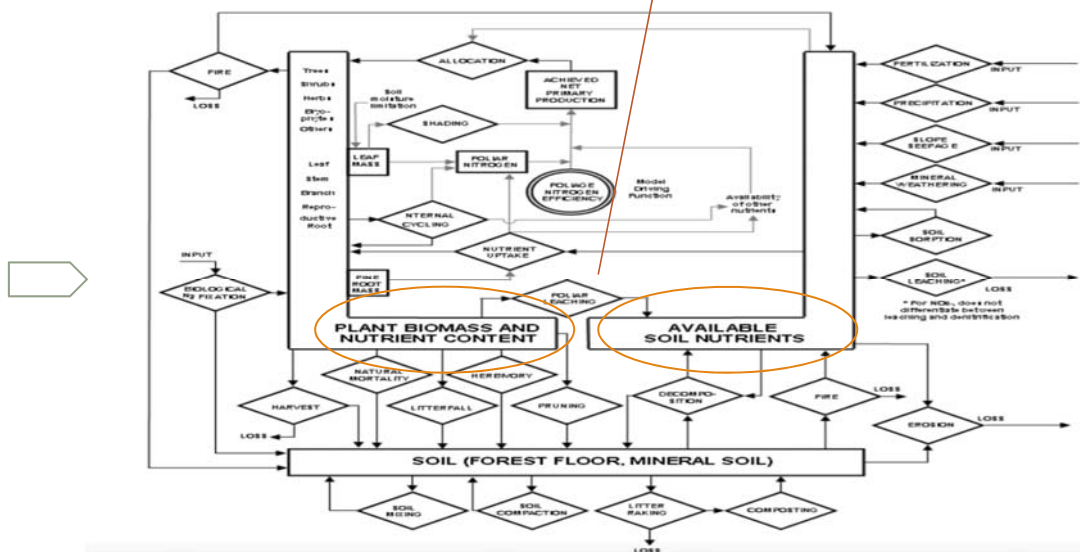
Flow chart of the setup programs, datafile, and management files that are required for forecasting Forest modelling structure



Study outcome

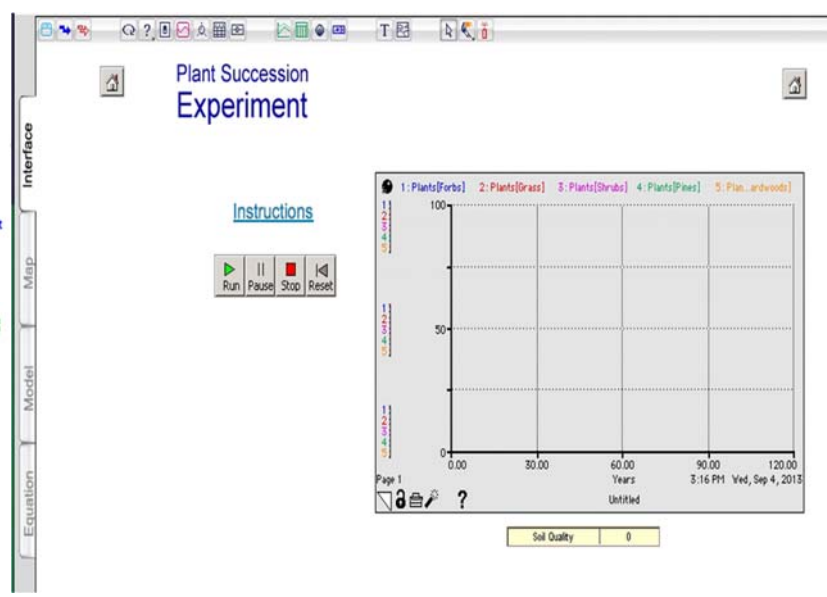
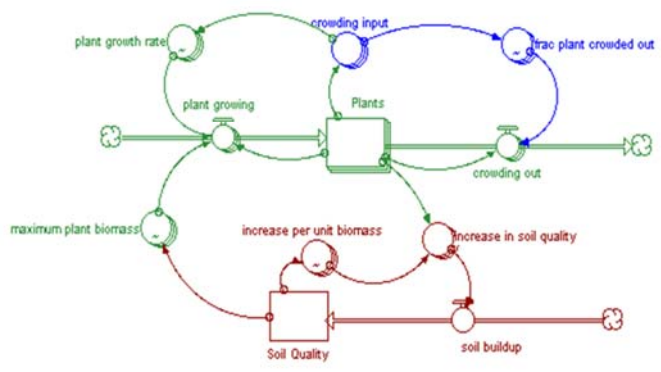
Separate to smaller system to study about

Major ecosystem compartments and transfer pathways of forest ecosystem are used for SD modelling



Study outcome > Modelling by Stella

Plant Succession Core Model Structure

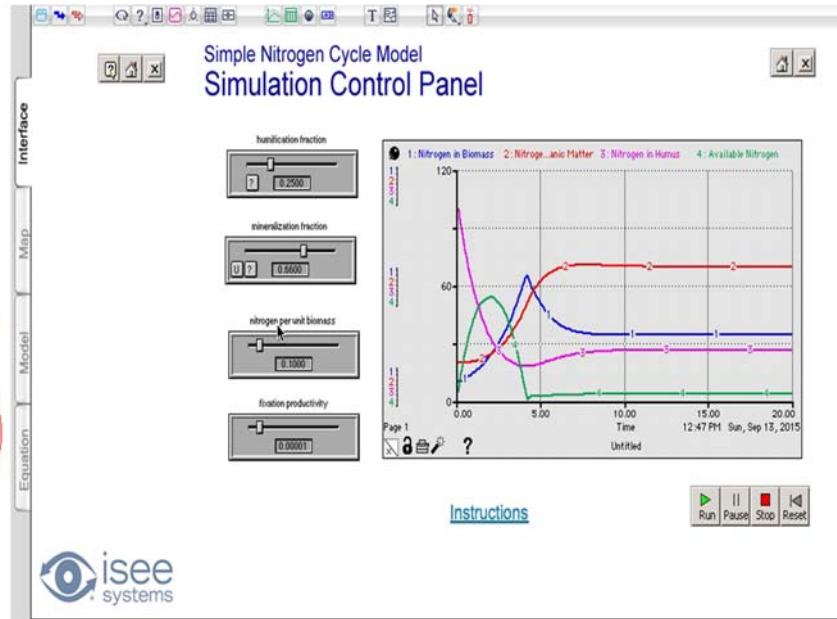
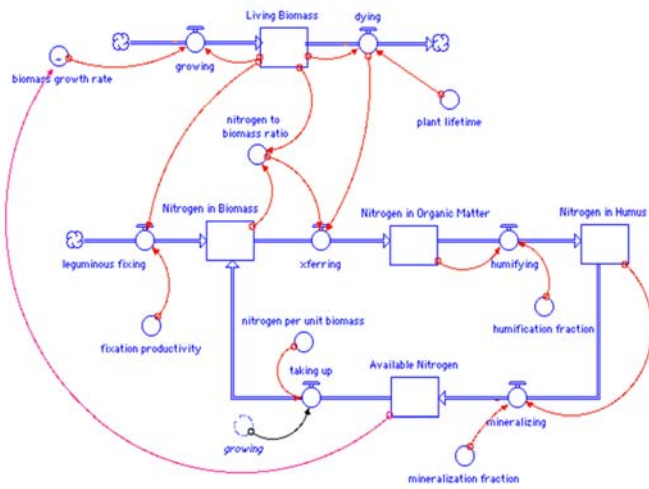


➔ Data and fomulation apply for this model are incorrect and simple

➔ still need to improve

Study outcome > Modelling by Stella

Simple Nitrogen Cycle Core Model Structure

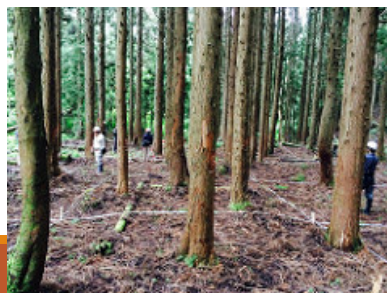


➔ Didn't success to apply this model for long term

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Experience through study in Kyoto University

- Learn more knowledge about forest research (specially NPP and find root production of forest) during the time studying in Ecosystem Production and Dynamics laboratory
- Experience new learning about environment and how are Japanese students working
- Knowing the characteristics of agricultural production of Japanese through Wakayama field trip provided by GSGES
- Knowing how Japanese working on Forest field for research through many Laboratory working field trip and specially 5 day working in Ashiu forest.



Plant for future

- Still working to apply System dynamics methodology to simulation an forest ecosystem untill finish my master course
 - Extension to apply SD to specific object is Acacia forest
 - Using and supply the actual data in Nam Dong, Thua Thien Hue, Viet Nam into the model has been built
 - Finish master course.
- Continue to study more about the NPP and find root production (learned during studying time in laboratory)
 - Apply to study in Natural or plantation forest in Viet Nam
 - Find opportunities to continue learning to learn more knowledge about this research

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Japanese cultural experiences



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Thank you for your attention

