



# Portrait of a Civilization

*Dynamics of Overshoot & Collapse*



NOVA School of Science and Technology/UiB

March 2022



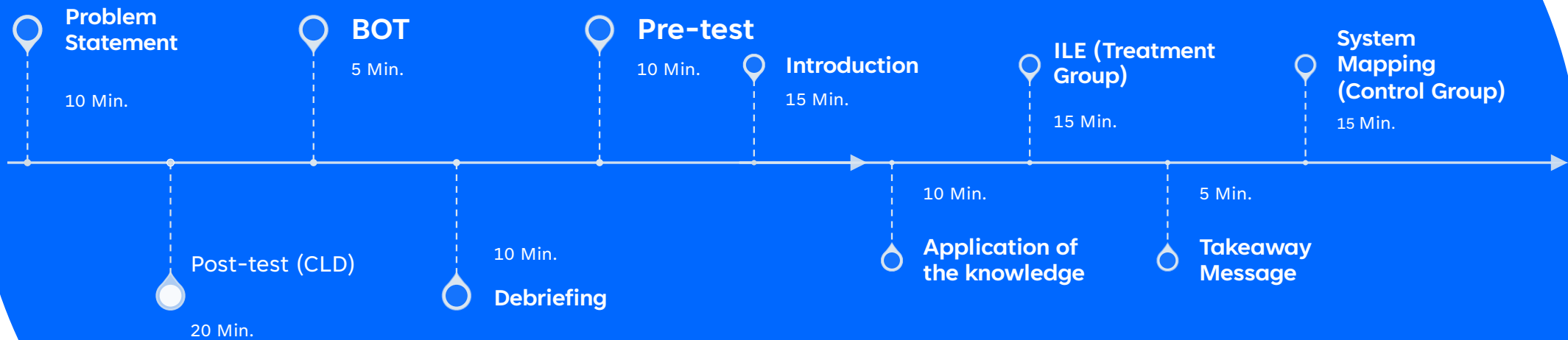


# Agenda

- . Timeline
- . Problem Statemen/BOT/Pre-test
- . Briefing
  - Primary goals
  - Focus Area
  - Tasks of the day
- . Debriefing
- . Application of the Knowledge
- . Takeaway Message



# Timeline





# Tsuna Civilization

Tsuna people arrived at a stunning land; the land was full of wildlife. The forest accompanied the most extensive and cleanest water ever seen by humanity. They decided to settle down and build their cooperative society there. Since the land was full of water, they called it Tsuna, an Amazonian word that means water.

Forest was their only source of food, energy, and raw material for survival and development.

Tsuna society divided their tasks to help them grow and maintain life as a community. They also draw some general rules and policies towards their developments goals. One little yet big mistake over time in Tsuna society was considering forest and its ecosystem services as a lifetime source. However, they had a policy on their consumption rate but no regenerative strategies to maintain the natural resources.

The civilization survived for more than 400 years. Even though, the life quality started changing to bad and worse soon before they collapsed.

## Main developments policies (and system properties) :

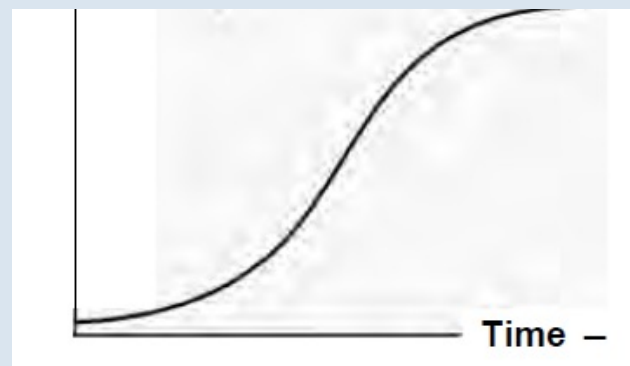
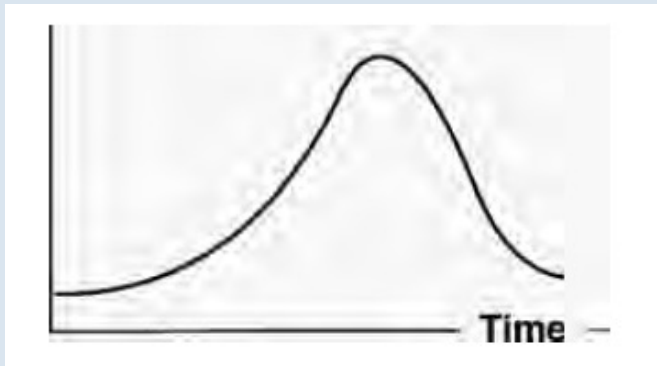
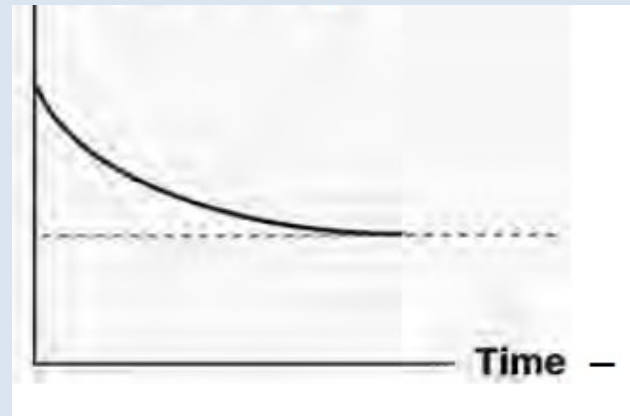
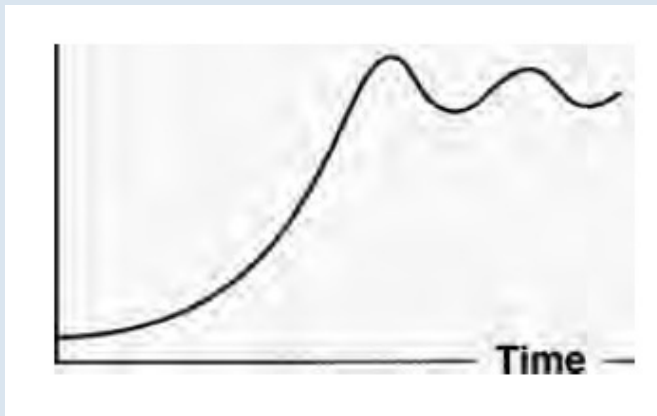
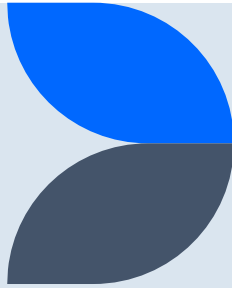
- Everyone should perform daily according to contribute to society's primary goals.
- Access to home and basic life needs for everyone; in other words, to grow as a fair and equal society, they should focus on urban development and building new houses.
- The development must be under no more than 4.5 trees per construction policy.

## Main assumptions in Tsuna civilization:

- Food resources have reached an equilibrium and have no impact on the civilization growth outcomes.
- The main driving factor for the Tsuna population to grow is the urban development and safe home for everyone.
- There is no forest regeneration policy.
- Civilization is vulnerable to frequent floods caused by forest degradation.



# Behaviour over Time (Tsunami Population )





# Pre-test

Please answer the following questions based on your choice of BOT.

Which BOT did your team chose? Why?

..... Can't be determined

Identify the main variables in the presented civilization system.

..... Can't be determined

Identify causal relationships among the variables.

..... Can't be determined

Identify feedback loops in the civilization system.

..... Can't be determined

Can you identify a contemporary system with similar behavior to Tsuna civilization? Identify at least one.

..... Can't be determined

	ID number
Age	
Level of English Basic-good-fluent-native	
Year of the program you are in (your semester number)	
The program you are enrolled in	
Similar Experiences (group model building/ILE)	





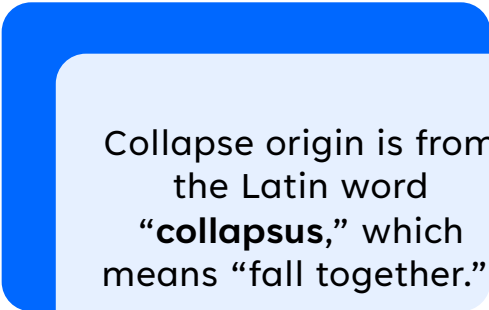
# Briefing Materials



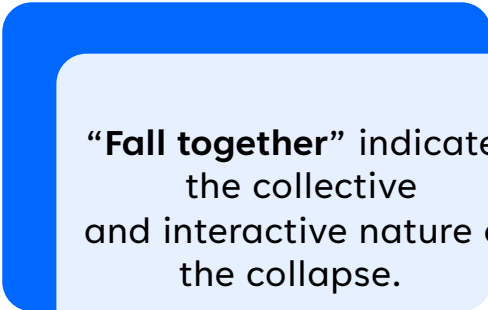




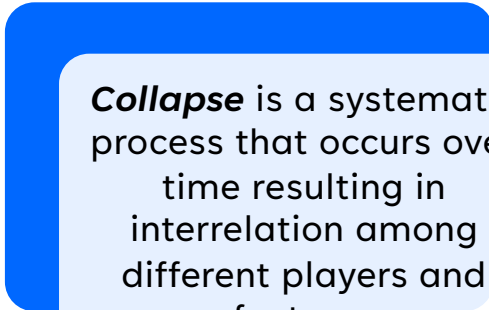
# Introduction of Collapse



Collapse origin is from the Latin word “**collapsus**,” which means “fall together.”



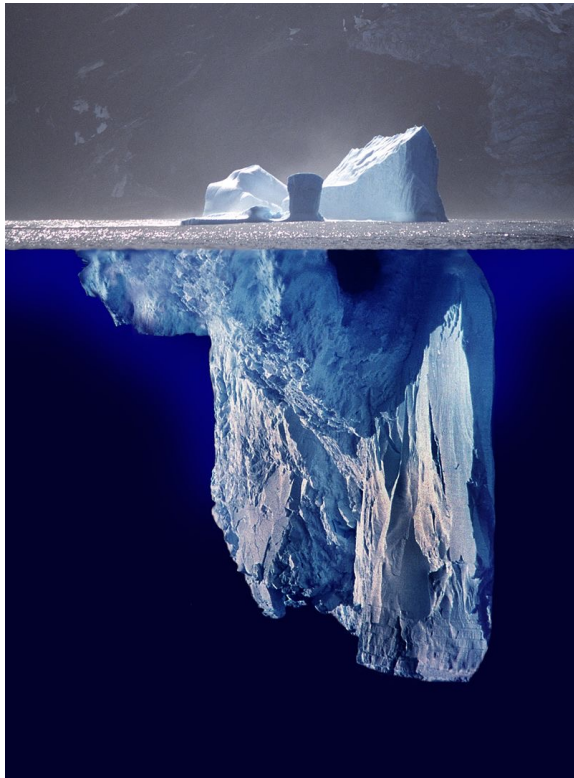
“**Fall together**” indicates the collective and interactive nature of the collapse.



***Collapse*** is a systematic process that occurs over time resulting in interrelation among different players and factors.



# Why is important to study the collapse?



The alarm of a system is going to collapse usually goes off while the collapse is happening, therefore, to avoid the collapse and crisis management, we need knowledge about the process and study the pre-collapse behaviour.

The collapse process is like an iceberg melting process.





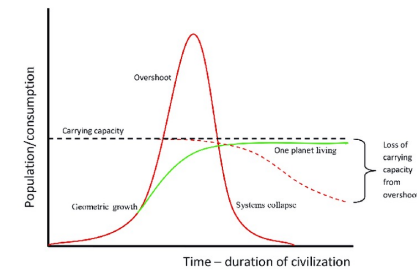
# Primary goals

Understanding The Generic Structure &  
Behaviour





# Behaviour over Time.....



**Collapse** is a possible outcome of an **overshoot** behaviour; in other words, the main driving force for collapse is overshoot in the system.

**Overshoot** occurs when the demand exceeds the regenerative capacity of the system.

For example, the global overshoot occurs when humanity demands more than the biosphere can renew.

This capacity is called **carrying capacity** and is defined as the system's maximum load.

The **carrying capacity** of an environment is the maximum population size of biological species that that specific environment can sustain.

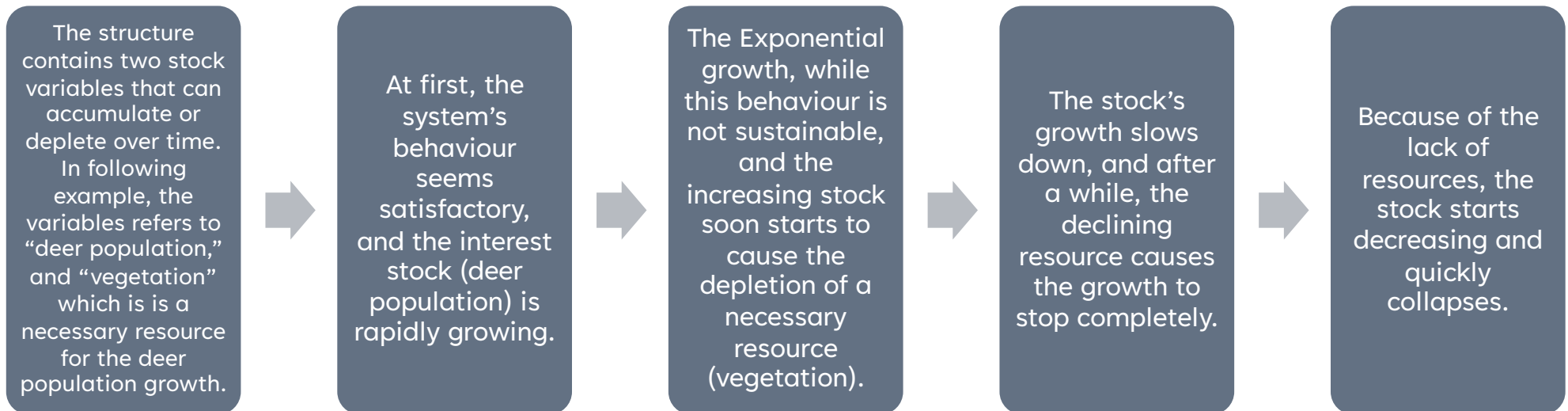
Based on mentioned terms and definitions, we arrive at the concept of limit to growth.

**Systems running beyond their carrying capacity will experience overshoot behaviour and fall into collapse.**

*Reference: Breierova, L. (1997). Generic structures: Overshoot and collapse. System Dynamics in Education Project, Massachusetts Institute of Technology: Cambridge, MA, USA*



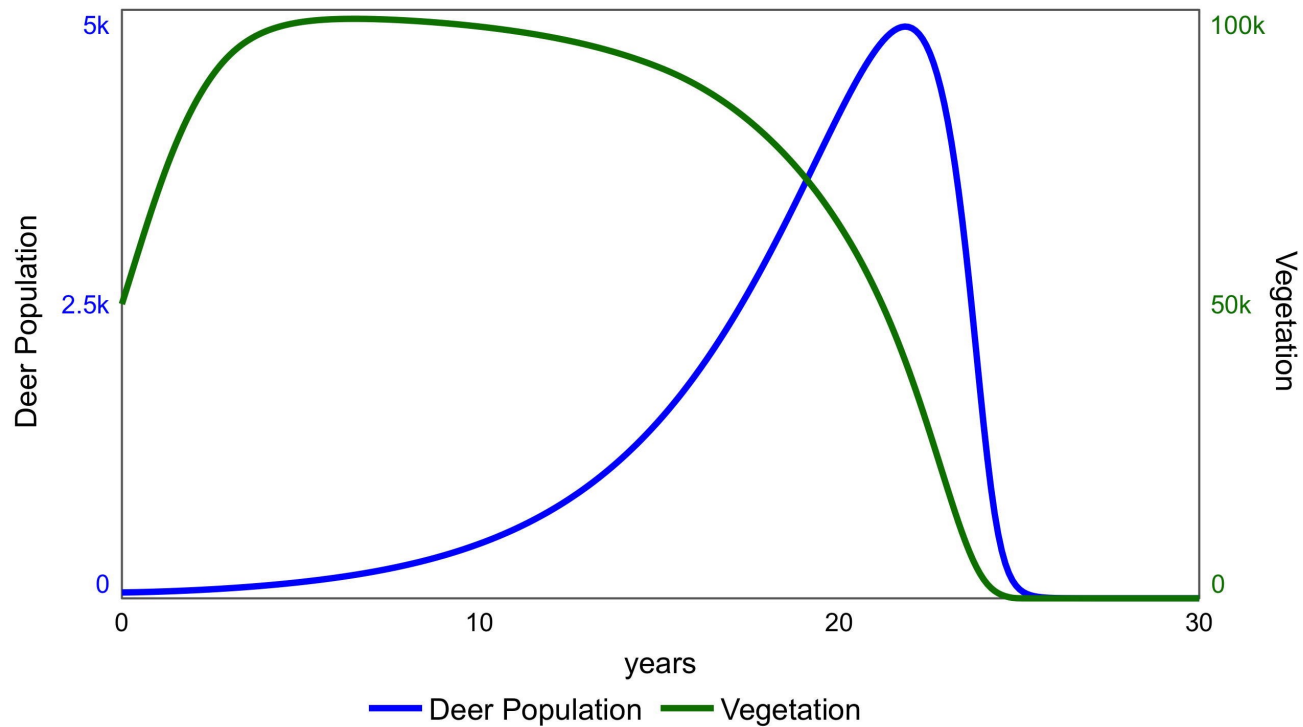
# Generic Structure & Behaviour



*Reference: Breierova, L. (1997). Generic structures: Overshoot and collapse. System Dynamics in Education Project, Massachusetts Institute of Technology: Cambridge, MA, USA*



# Generic Structure & Behaviour



Reference: *Fundamentals of System Dynamics* by Erling Moxnes (UiB)





# Focus Area

Causal Loop Diagram (CLD)





# Causal Loop Diagram

The causal loop diagram (CLD) helps visualize different variables and their relations in the system.

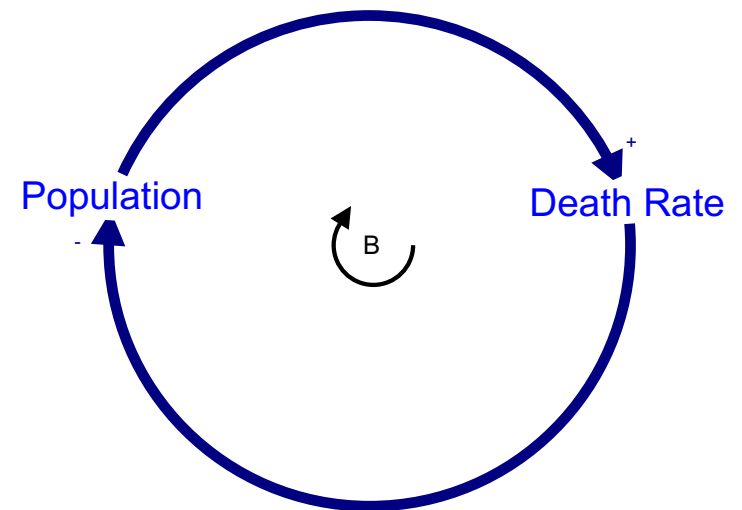
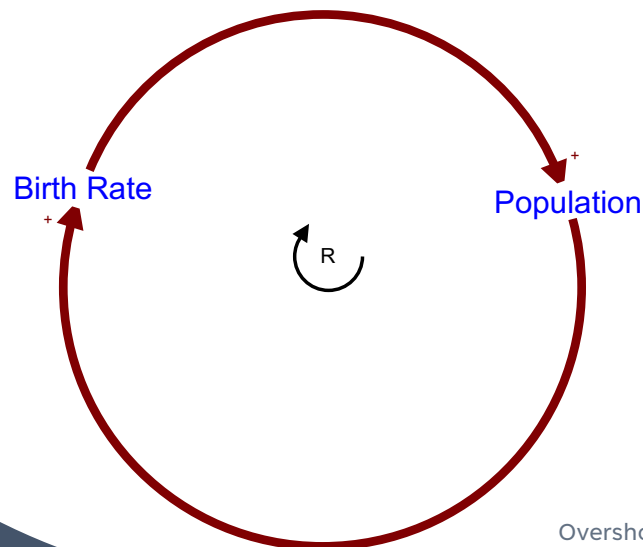
The CLD consists of arrows and variables' names. The arrows represent a connection between the variables—the links marked with a negative or a positive sign.

+

The positive link means the two variables are changing in the same direction, e.g., if the variable starts to decrease, the other one also decreases and vice versa.

—

The negative link means the two variables are changing in the opposite direction, e.g., if the variable increases, the other decreases, and vice versa.







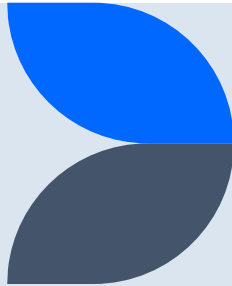
# Task of The Day/Strategy

Dividing students into two; Treatment  
and Control group





# Strategy Plan



1

## Divide

Divide students into two groups; Treatment and Control

2

## ILE (Treatment)

Access link to the ILE and accompanied support material. Brief introduction about the journals and application methods

3

## Standard GMB (Control)

Introducing the agenda and brief walking through the tasks.

4

## Introducing the final task

Double check that everybody understood about the final task (CLD)

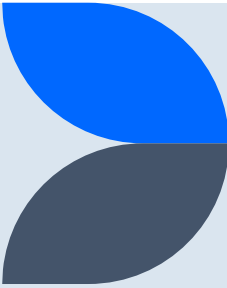
5

## Launch

Now both group are ready to lunch the sessions



# Post-test



During the post-test challenge, participants must develop the CLD for the civilization collapse system.

The post-test will be carried out as a group activity.

Note: Post-test is merged into the standard systems mapping activity session for the control group, while it's a separate activity for the treatment group.



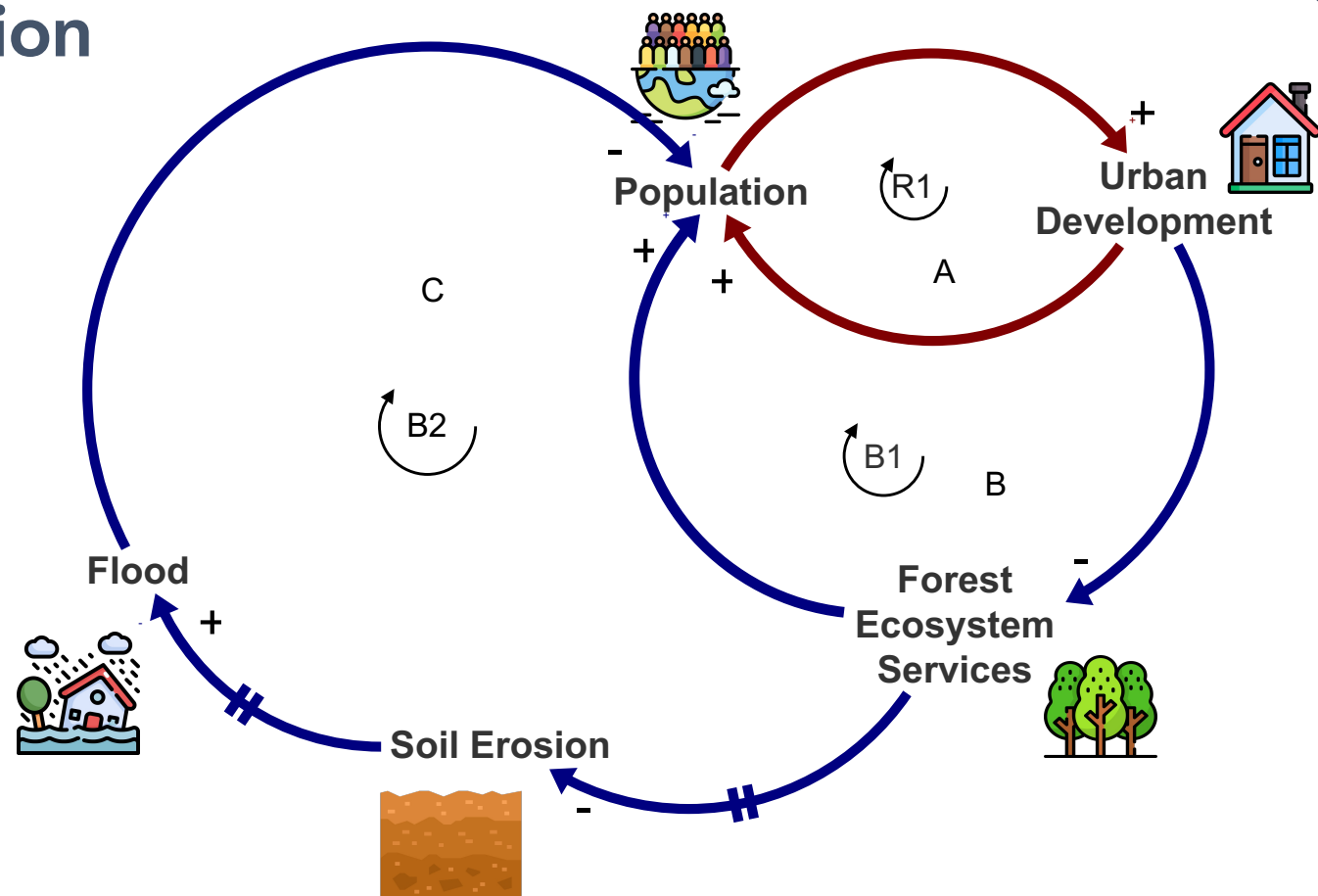
# Debriefing

## System Mapping

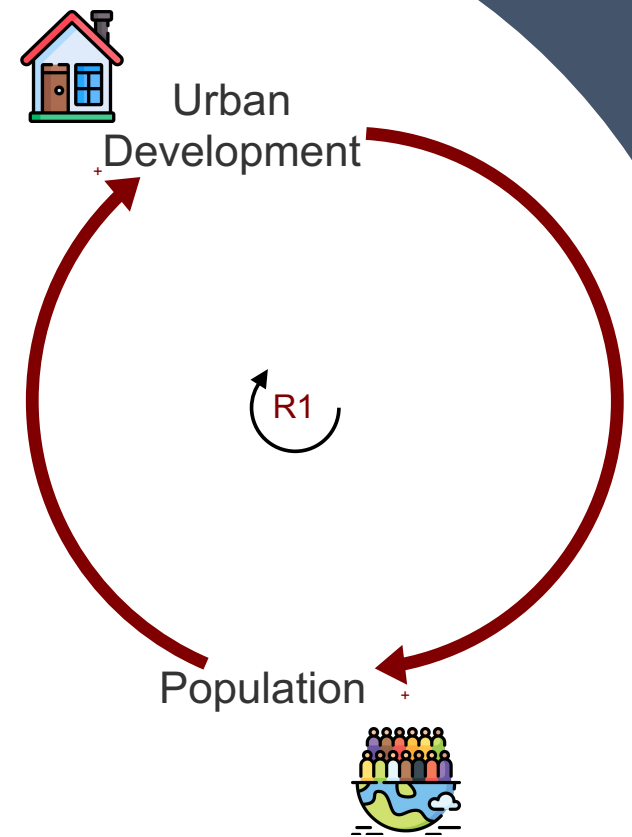
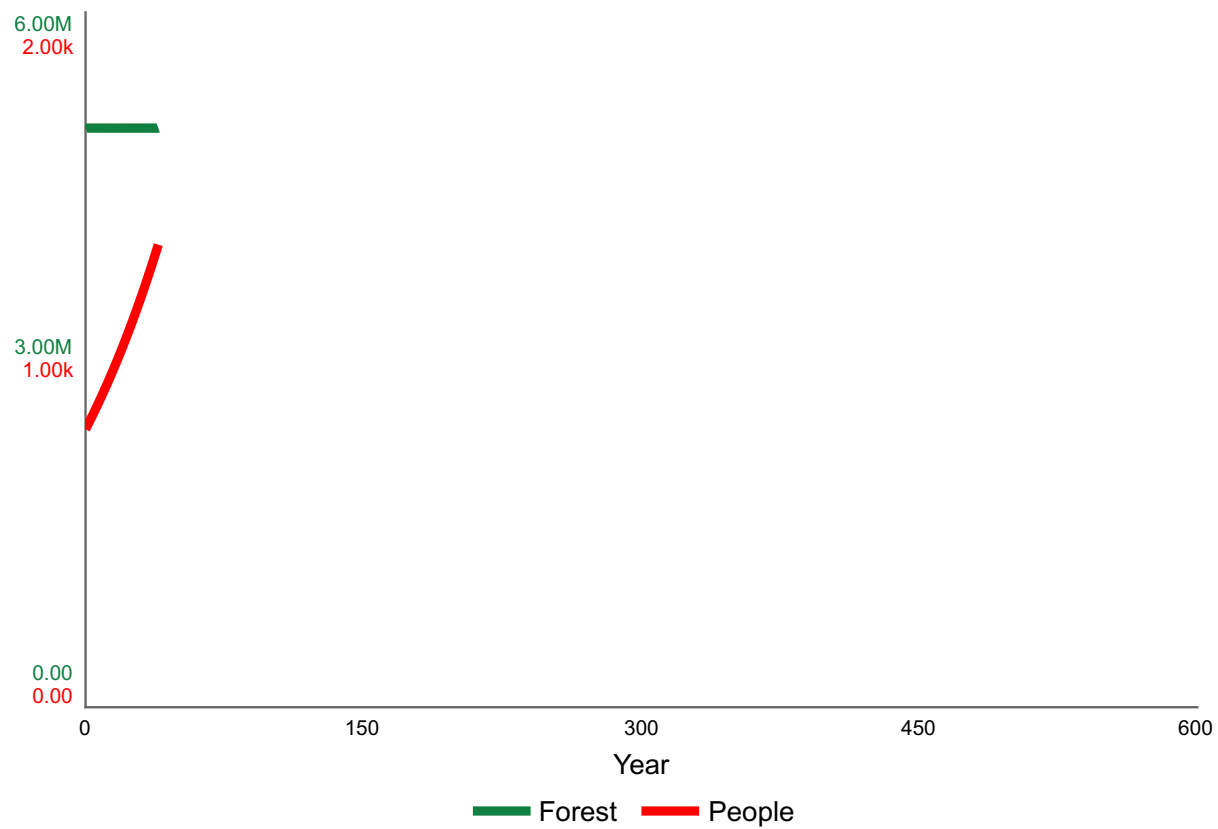




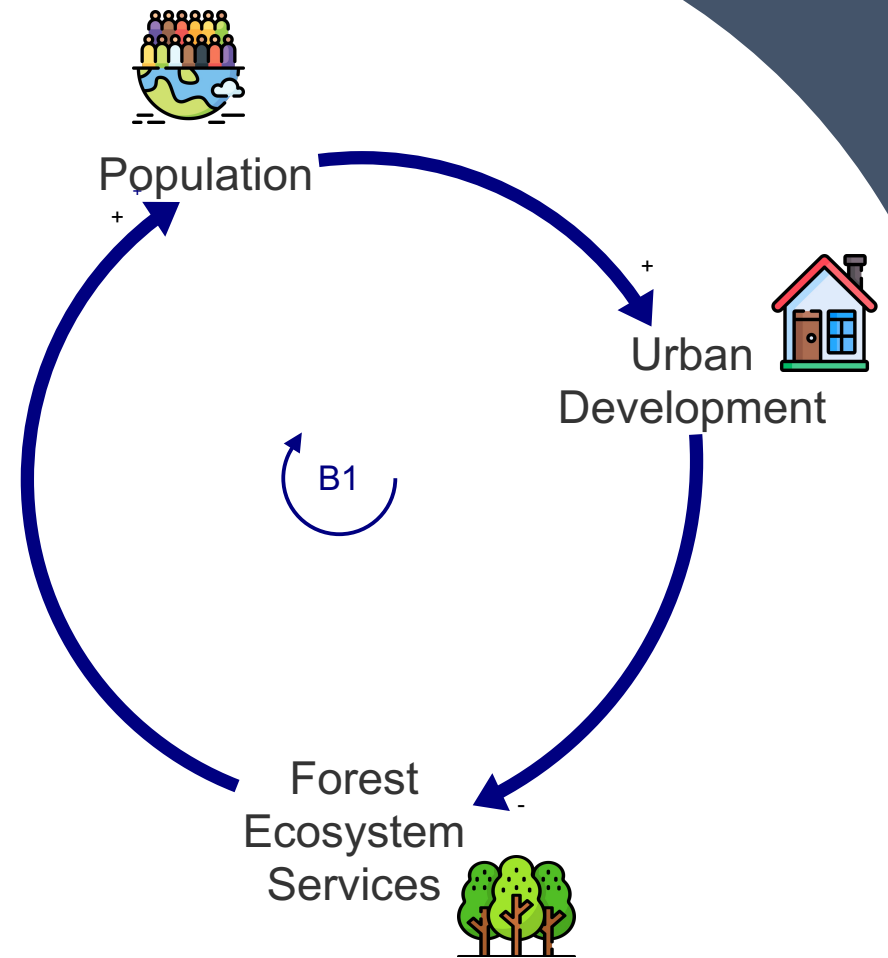
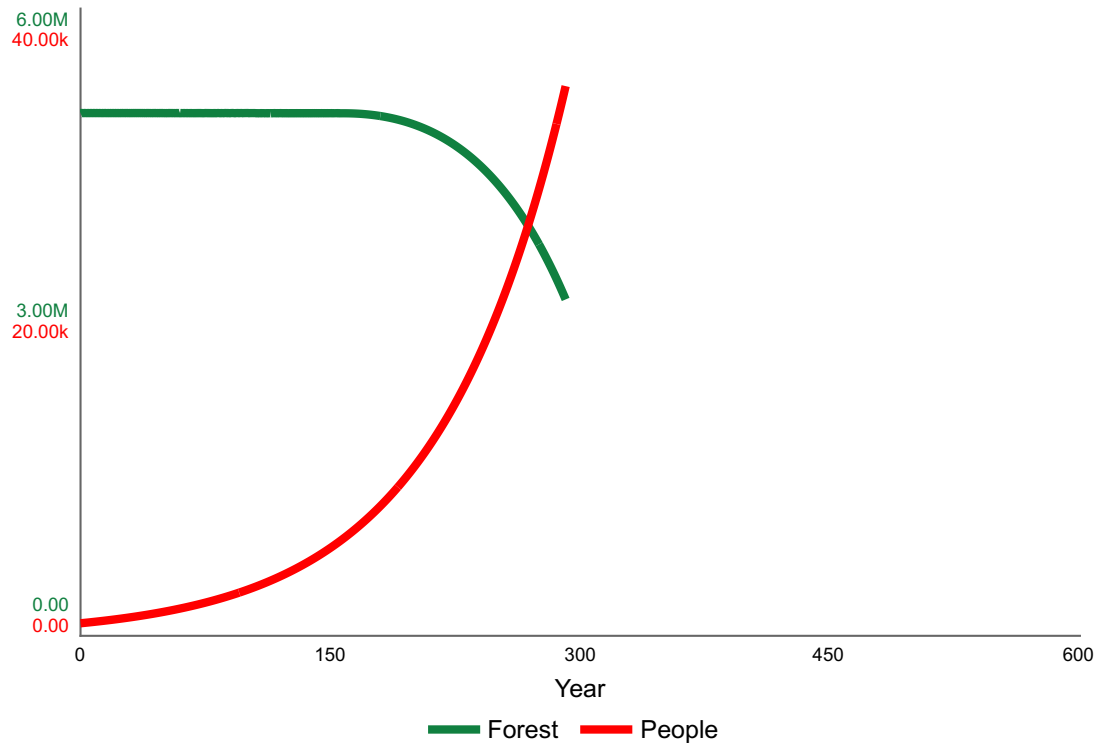
# Tsuna Civilization CLD



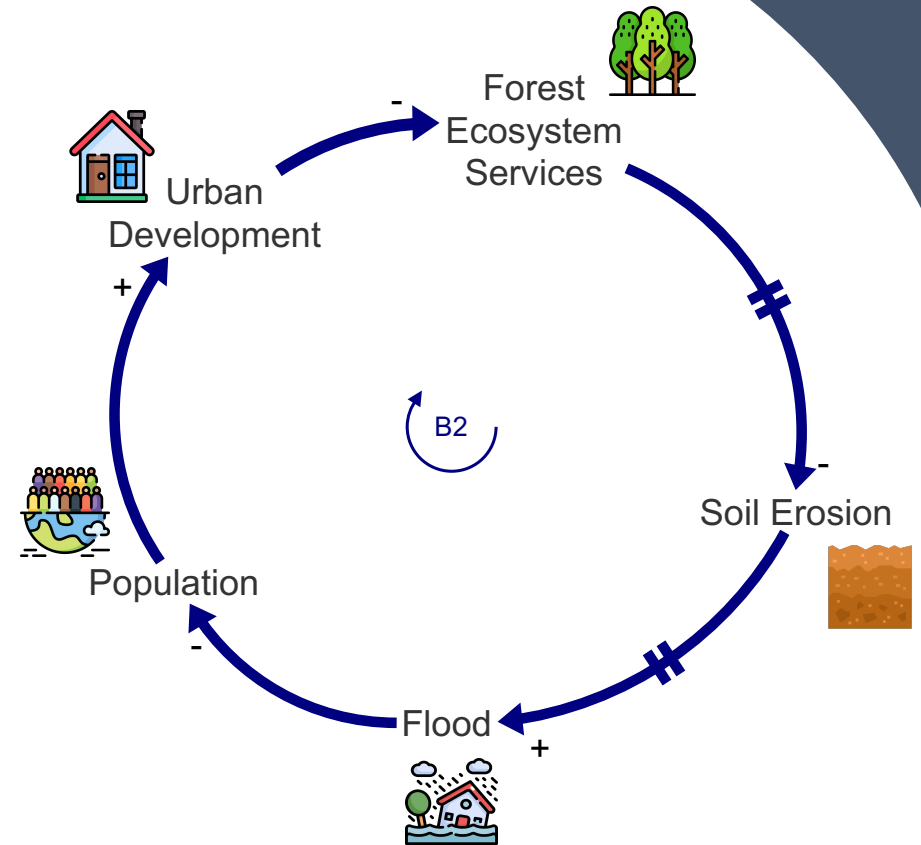
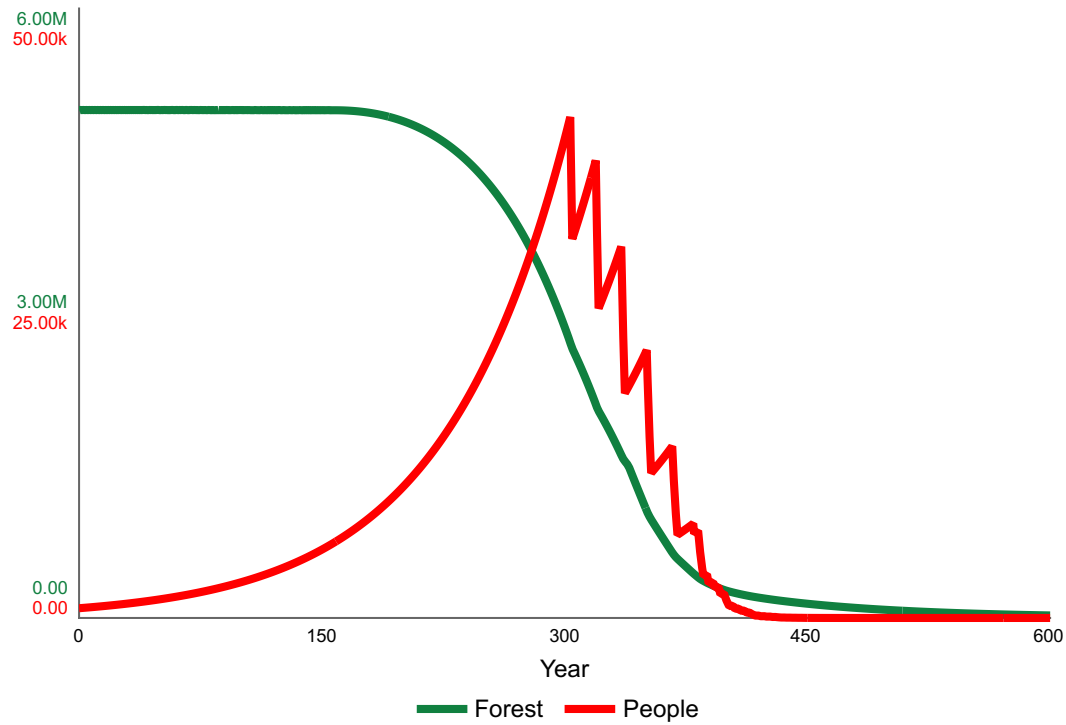
















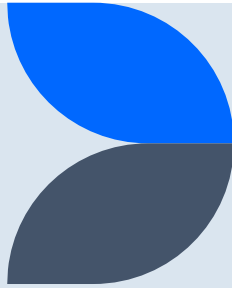
# Application of the Knowledge

Conceptualizing the concept into the  
similar contemporary complex-  
problems





# List of Queisitions to Conceptualize the Theme



1. Trees are considered a renewable resource, but they grow slowly. What kind of resources does the present (our) civilization rely on? And are they non-renewable or renewable?
2. Imagine that the trees in the game were like oil, non-renewable. What would happen to the civilization then?
3. Just as the population of our civilization grew fast before collapse, the world population today is growing in a similar manner. What do you think this comparison can tell us about the future?
5. Is there a way to create a sustainable civilization or are we doomed to collapse just like some of the past civilizations?
6. If you think we can create a sustainable civilization, how do we create a sustainable world/civilization?

*Reference: A STUDY OF RESOURCE USE AND SUSTAINABILITY STELLA MODEL AND SIMULATION GAME  
By National Science Foundation*



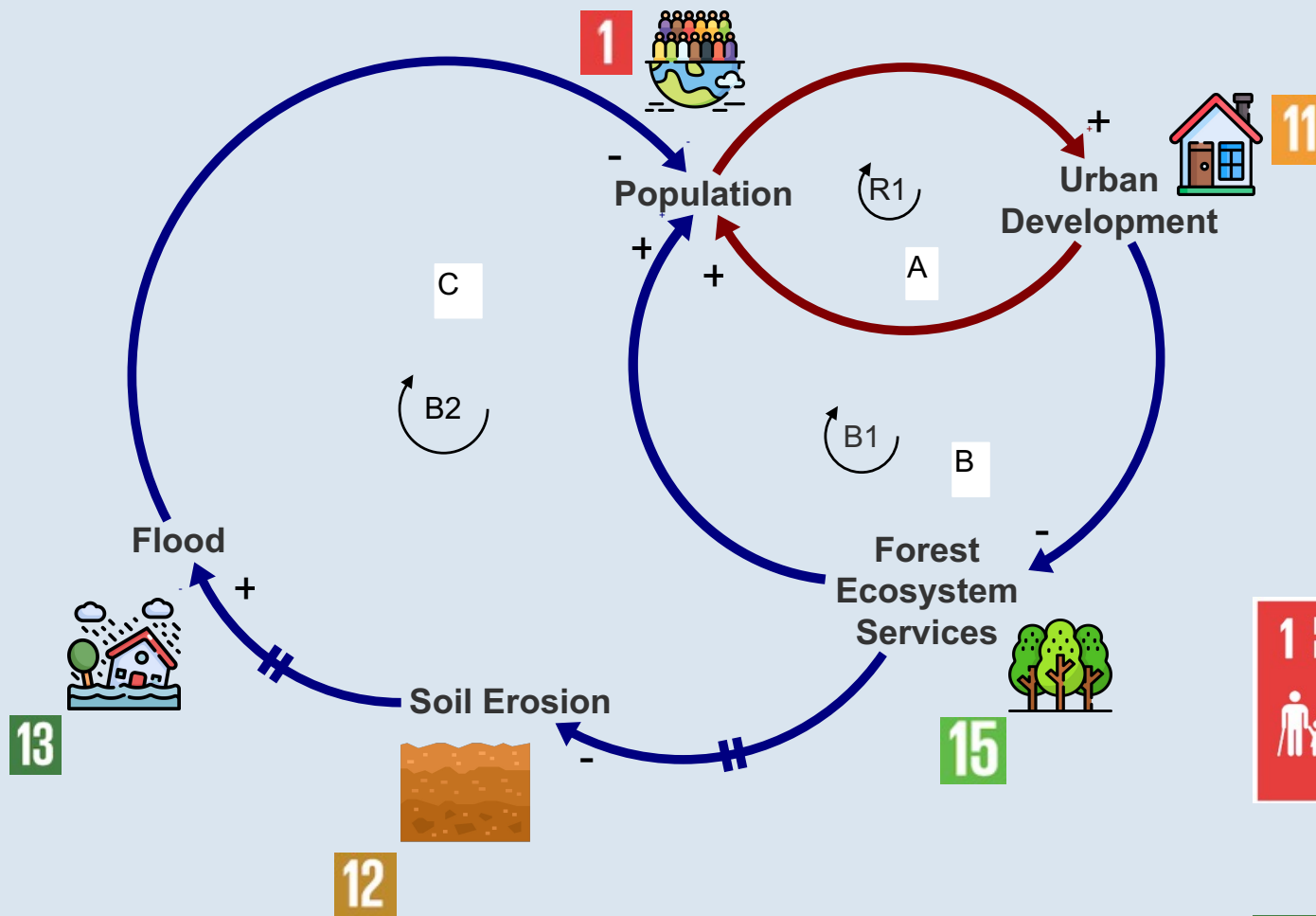


# Takeaway Message

Sustainable Developments Goals  
(SDGs) and Civilization Collapse  
System







Reference: <https://sdgs.un.org/>





**Thank you!**

