



# How to Draw Causal Loop Diagrams

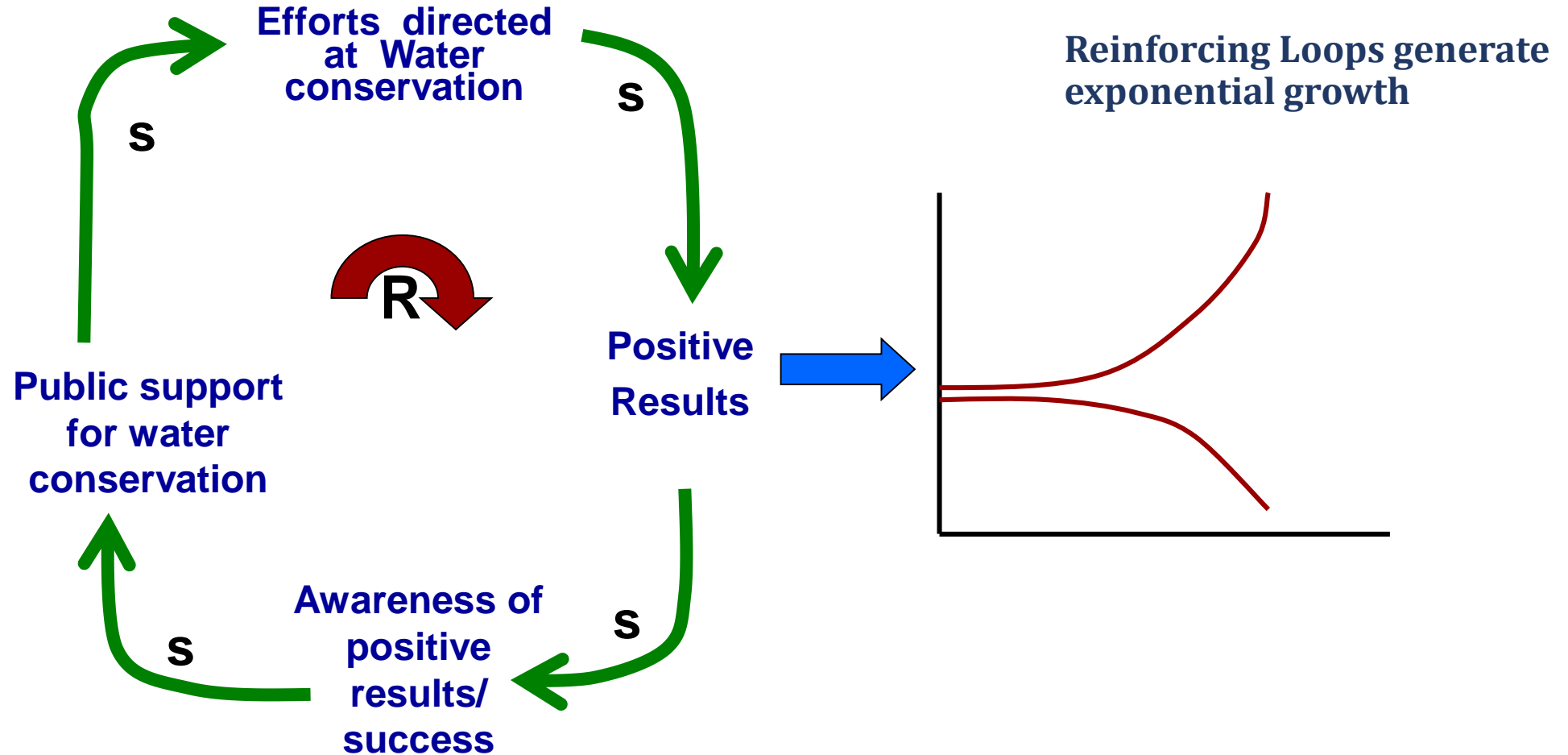
Understanding better relationships, causality, and feedback



All systemic behavior can be described through two basic processes

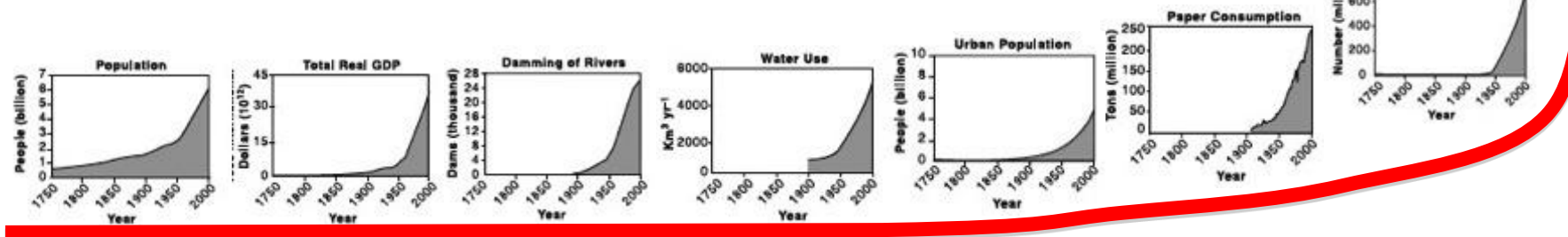
- Reinforcing Feedback
- Balancing Feedback

**In a reinforcing feedback process, a variable continually feeds back upon itself to reinforce its own growth or collapse.**

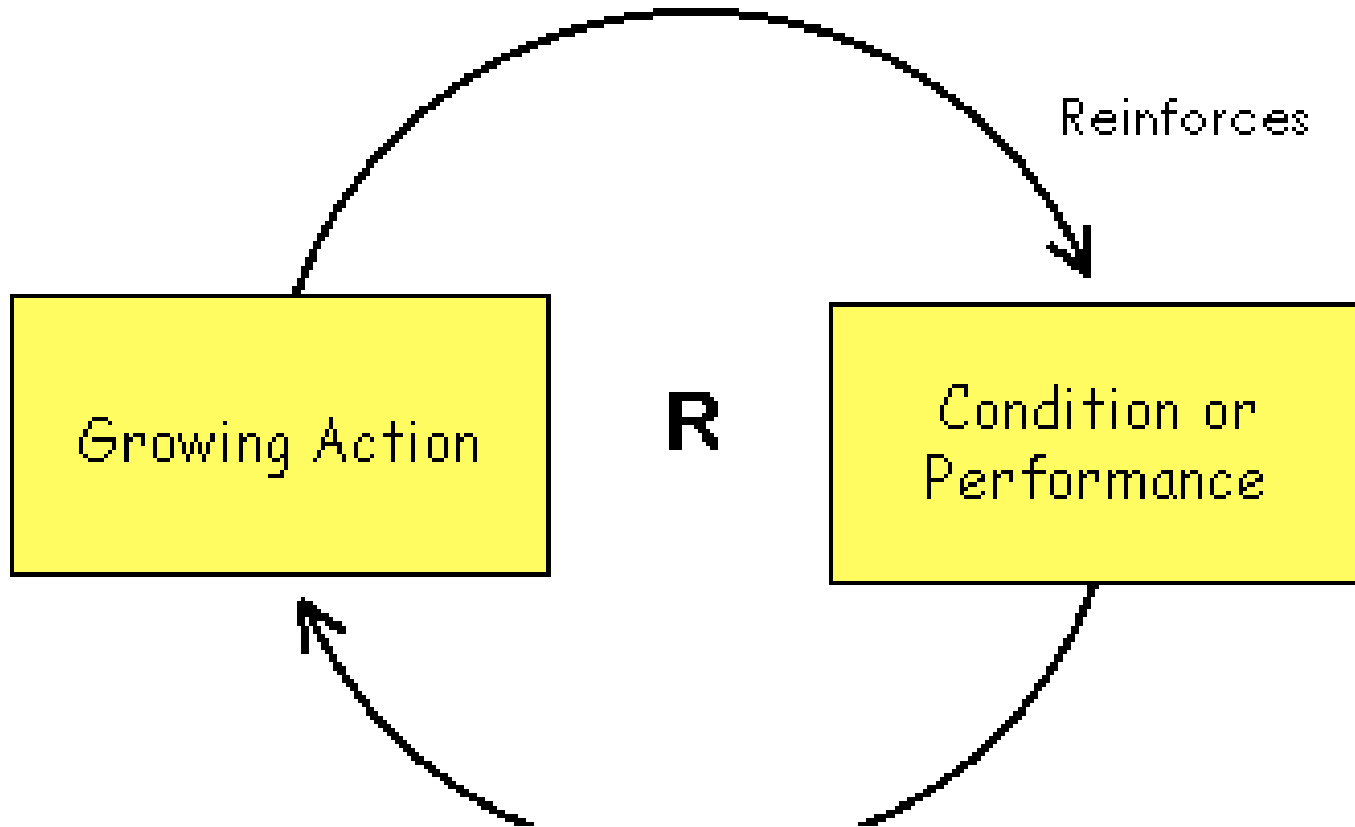


# What Reinforcing Feedback looks like...

These behavior pattern trends are unfortunately disrupting the delicate, systemic balances that make up the biosphere ... and even changing the face of the Earth itself.



**Source:** International Geosphere-Biosphere Program; see AtKisson, *The ISIS Agreement*, for complete citation.

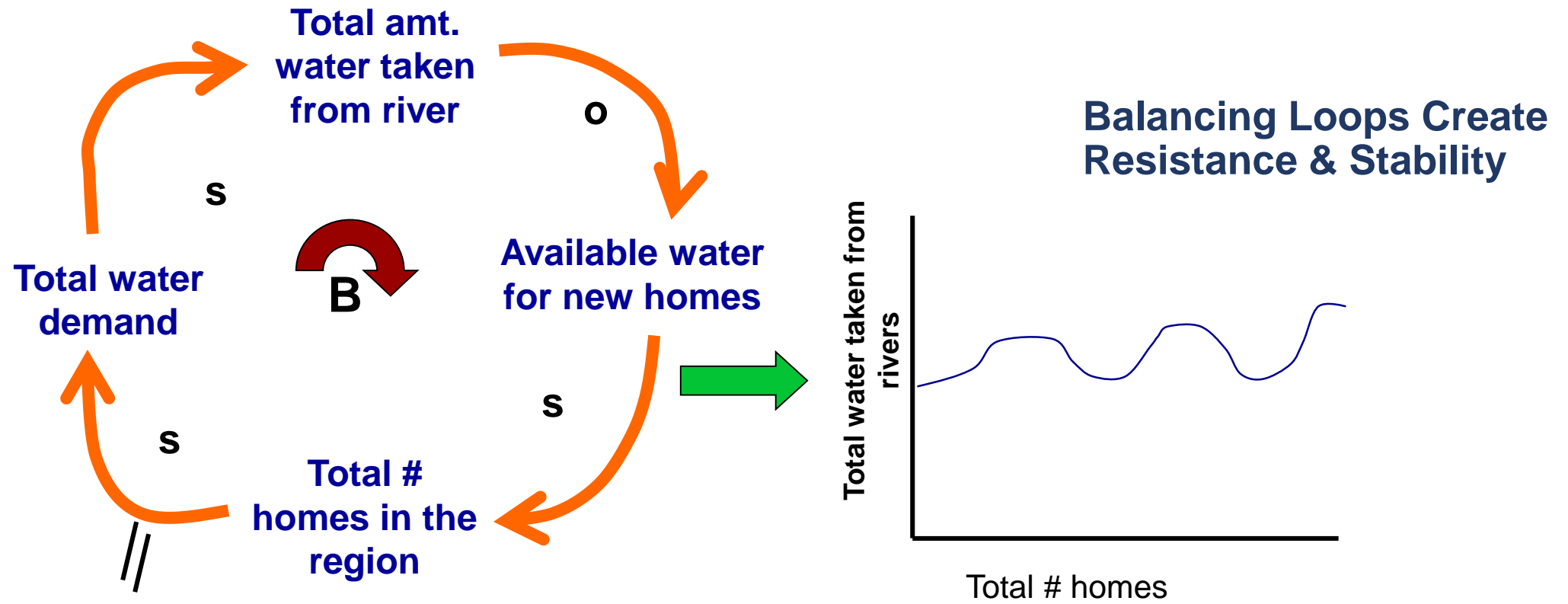


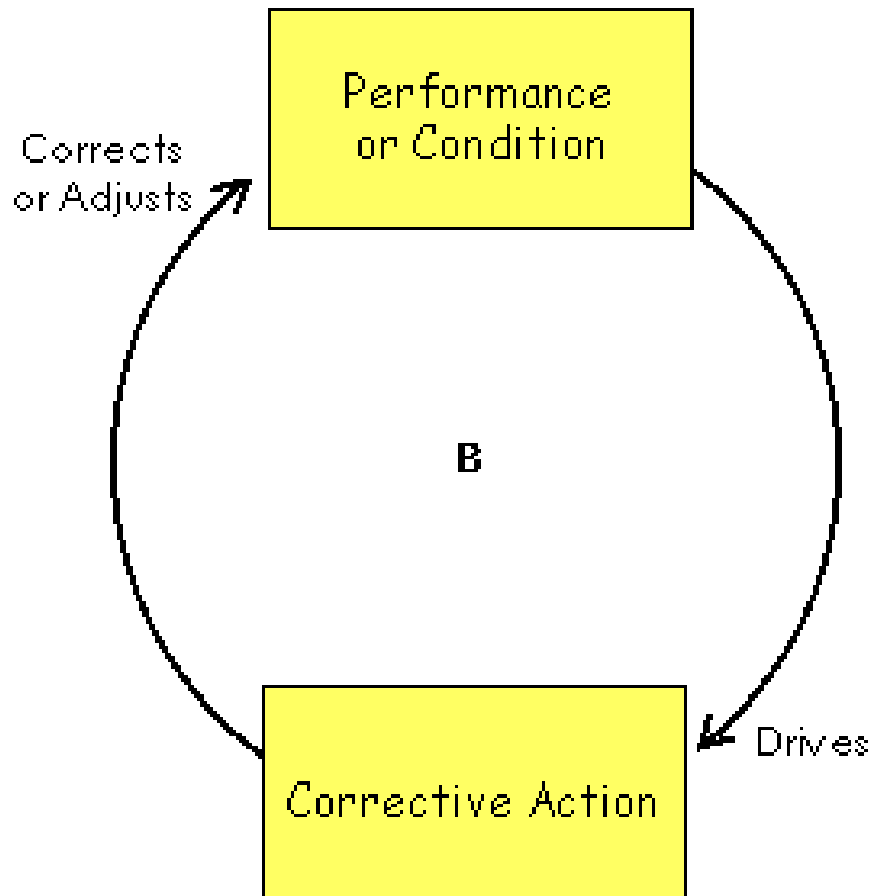
## Reinforcing Feedback: Definition & Description

- In a reinforcing feedback process, a variable continually feeds back upon itself to reinforce its own growth or collapse.
- Reinforcing processes tend to be self-perpetuating, and sometimes have a runaway quality, especially in their later phases.

Balancing loops tend to counteract changes to systems. They seek goals, provide stability and push towards equilibrium.

Sometimes they can help create oscillation.





## Balancing Feedback: Definition & Description

- A balancing process seeks stability and to maintain conditions around a given level.
- Balancing processes are often characterized as goal-seeking or as growth-limiting.
- Balancing feedback is essential for situations that are self-correcting or self-regulating.

# Implications of Reinforcing Feedback



Reinforcing feedback is ultimately unstable.



Nothing grows or shrinks forever.



The change produced may occur very rapidly



A slow accelerating trend can be underestimated



Reinforcing process can cause change unknowingly



# Interventions for Reinforcing Feedback

Reduce

Gently reduce the input of energy or the "push" on the process.

Discover, share,  
evaluate, and  
reframe

Discover, share, evaluate, and reframe the goal or the original motivation that set the process in motion

Determine

Determine the "choice" links in the structure and see if these are leverage points in a vicious cycle.

Anticipate

Anticipate unintended, distant, or long-term consequences of current actions or new choices; expect "limits to growth."

Build in

Build in braking or balancing processes and feedback mechanisms to detect unintended effects and reduce the likelihood of runaway acceleration.

# Implications of Balancing Feedback



A balancing process responds when performance deviates from the goal.



Pressure for change or correction weakens when performance improves



Balancing feedback loop can break down and result in failure

# Interventions for Balancing Feedback

Identify

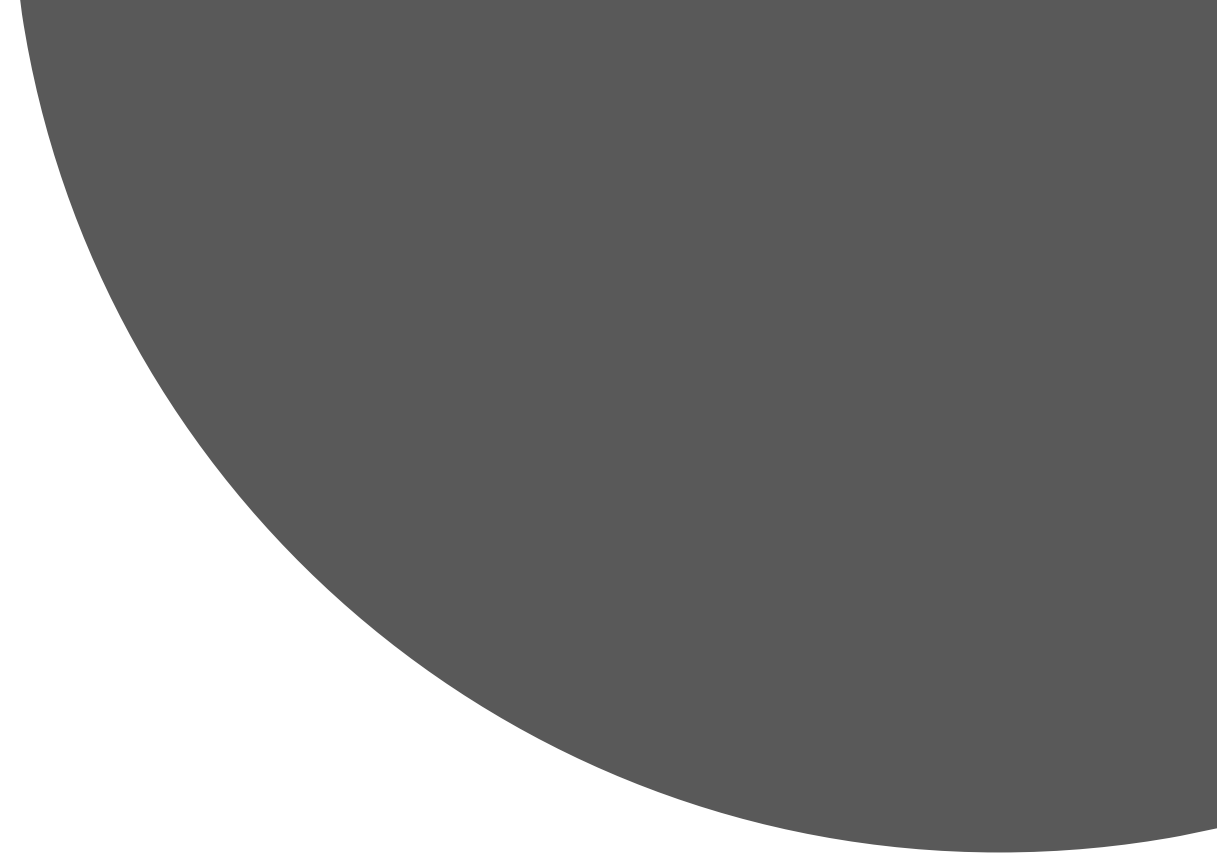
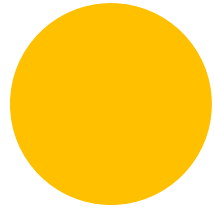
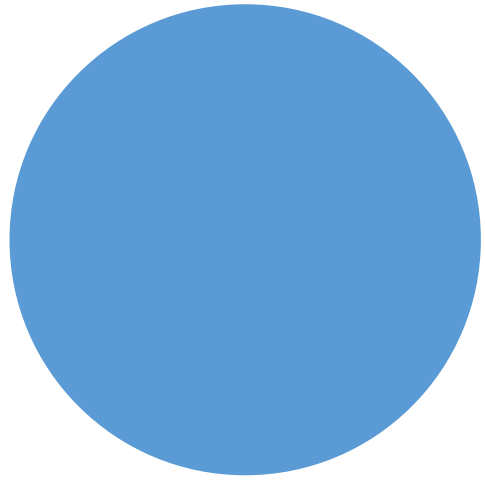
Identify the goal or the variable limiting the balancing process..

Reduce

Reduce or eliminate delays.

Test

Test the effectiveness of the corrective action



# Exercise: Drawing Feedback Loops

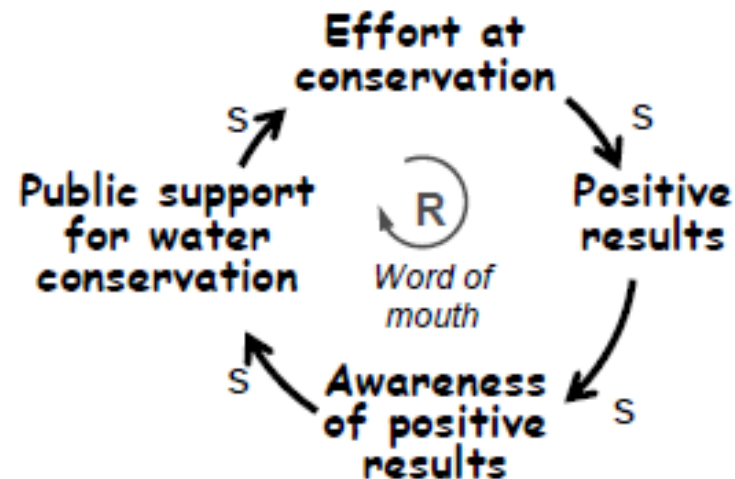
# How to Read a Feedback Loop Diagram

## Words

A local effort at water conservation produced **positive results**. **Over time**, there was general **awareness of positive results**. **Awareness boosted** overall **public support for water conservation in the community**.

Community support lead to additional **effort at conservation which** produced even more **positive results, leading to even greater awareness of positive results ... and so on...**

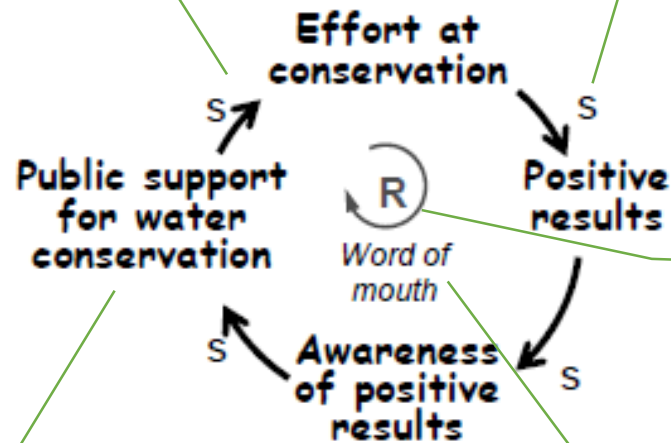
## Feedback Loop Diagram



# Parts of a “Feedback Loop Diagram”

2. Arrow -- Means one variable affects the next one in some direction, all else being equal. (Whether the loop is drawn as clockwise or counterclockwise does not change anything.)

1. Variable -- Important factors in the systems. Can get bigger or smaller.



3. Sign -- “S” or “+” means the second variable changes in the Same direction as the first. “O” or “-” would mean the Opposite direction

4. Type of loop -- R for reinforcing. B for balancing, which we will get to later.

5. Name for the loop

# Diagrams Can Have Multiple Loops

## ❑ Learning by doing Loop

The more the NGO achieved results in its work, the better its reputation.

## ❑ People Loop

The better its reputation, the higher quality people it was able to hire, boosting its capacity.

## ❑ Money Loop

Also, the better its reputation, the more funds were available, boosting capacity.



# Case Study 1: Sustaining Organization Success

## The Case Study

The more the nongovernmental organisation (NGO) achieved results in its work, the more it increased its cumulative experience in its work area. Experience built the overall capacity to achieve results (*e.g., people were more efficient, more effective, had more contacts and ideas etc.*). With greater capacity, they found their ability to achieve results increased.

## The Steps

- ☐ Identify the possible variable names? (underline them)
- ☐ Draw the links showing what affects what?
- ☐ Can you draw the links in a way that the story loops back on itself?
- ☐ Identify whether the dynamic between links is an S or O.
- ☐ Identify whether the loop is a reinforcing or balancing loop by tracing out the behavior around the loop

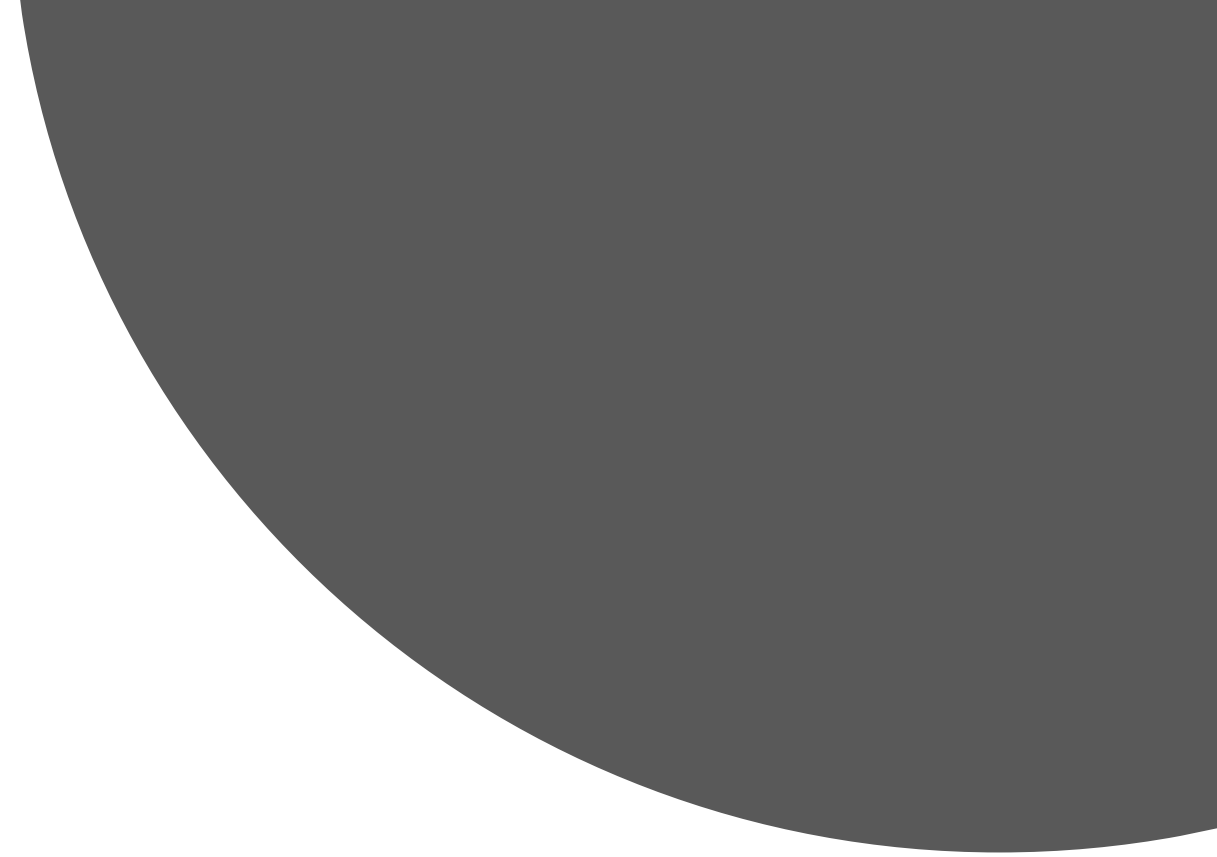
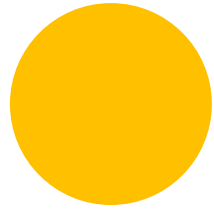
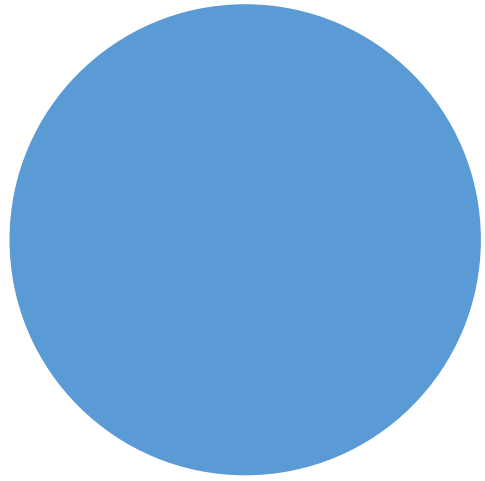


# NGO Case Answer



## Learning by Doing

- The more the nongovernmental organisation (NGO) *achieved results* in its work, the more it increased its *cumulative experience* in its work area. Experience built the *overall capacity to achieve results* (people were more efficient, more effective, had more contacts and ideas etc.). With greater capacity, they found their ability to *achieve results* increased.



# Exercise: Drawing Systems Map



# Three Ways to Create a System Map



**The “Jigsaw Puzzle” Approach**



**The “Mental Model” Approach**



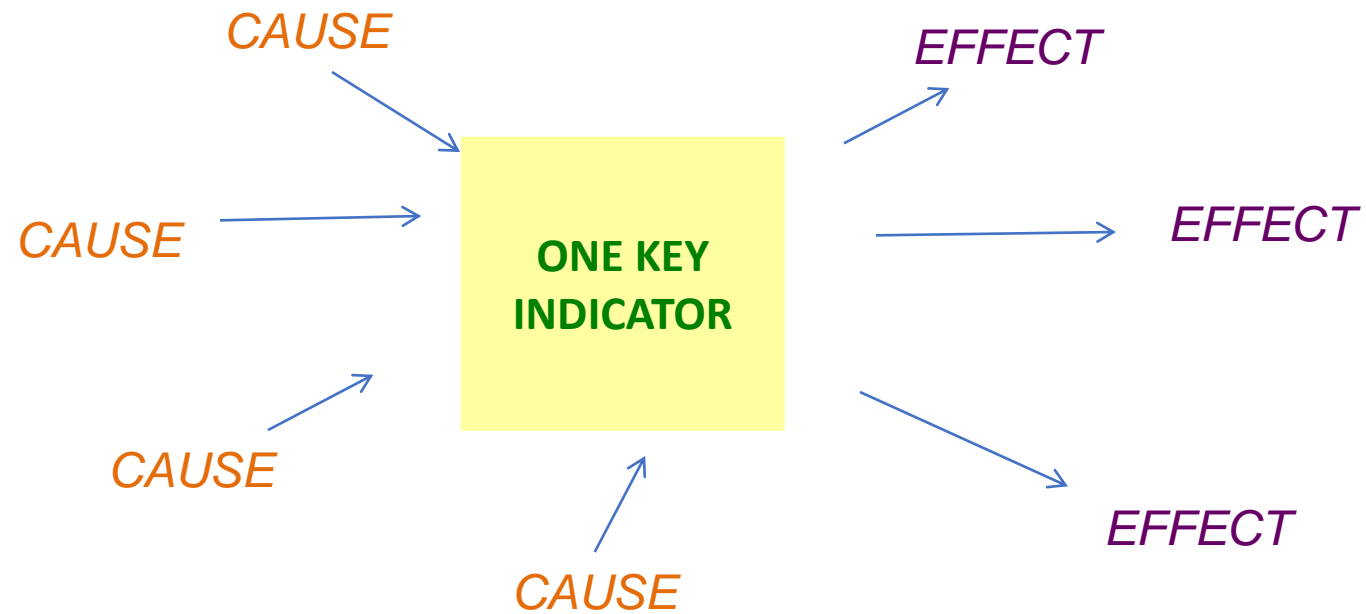
**The “Start with One” Approach**

# Systems Diagramming Example

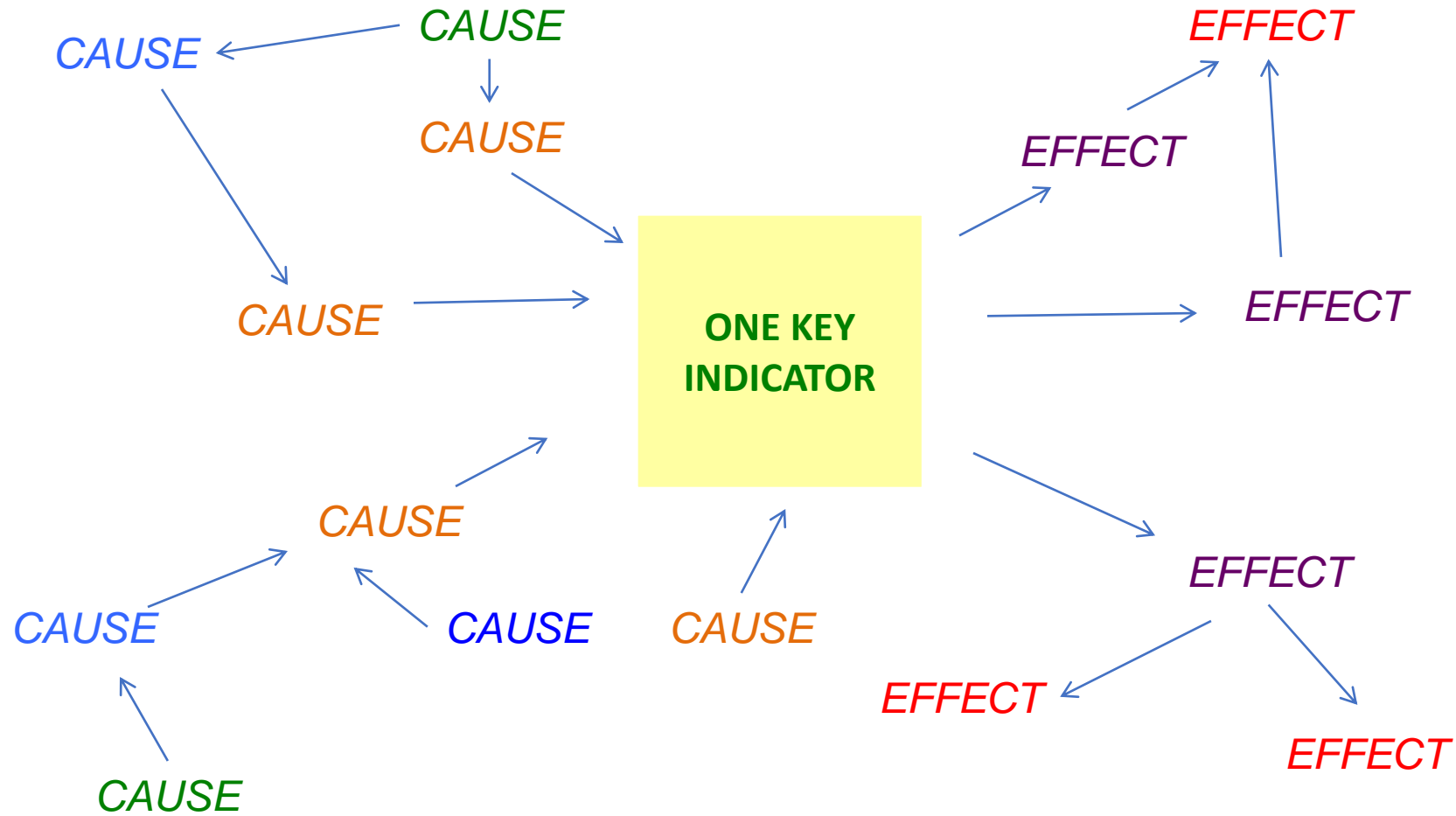


**ONE KEY  
INDICATOR**

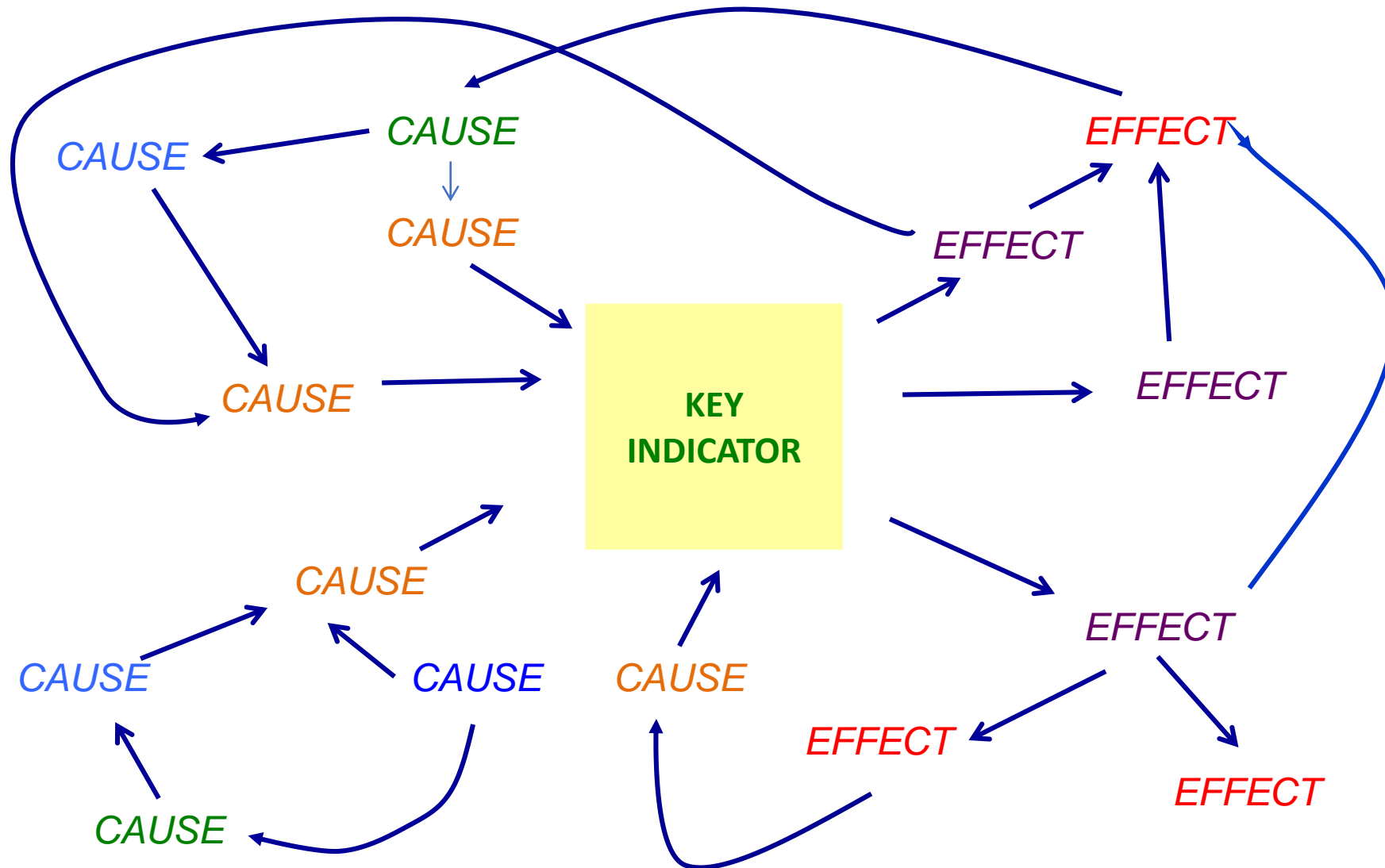
# Step 1 - Systems Diagramming



# Step 2 - Systems Diagramming



# Step 3 - Systems Diagramming



# Some corporate examples - Bang Negara Indonesia (BNI) Sustainability Team

