ARIES:

modelling the flows of ecosystem services from nature to society

11/12/12

Rebecca Runting & Jessie Wells

ARIES: Who's Involved?

ARIES
ARtificial Intelligence for Ecosystem Services

bc3
BASQUE CENTRE FOR CLIMATE CHANGE
Klima Aldaketa Ikergai

INSTITUTO DE ECOLOGÍA, A.C.
INECOL

UNEP

WCMC

The UNIVERSITY of VERMONT

CONSERVATION INTERNATIONAL

EARTH ECONOMICS

ARIES: What does it do?

- modelling & mapping
  - sources
  - beneficiaries
  - flows
- an online platform
  - interface, software, language

ARIES: Which services?

- Currently:
  - Carbon
  - Flood regulation (Rivers or Coastal)
  - Aesthetic views , Open space proximity, Recreation
  - Freshwater supply & Sediment regulation
  - Subsistence fisheries
- Theoretically: any

Key concepts

- Identify beneficiaries

  who & where?

- Flows involve

  sources, sinks, and flow paths

- Services can be:

  provisioning - when flows are beneficial

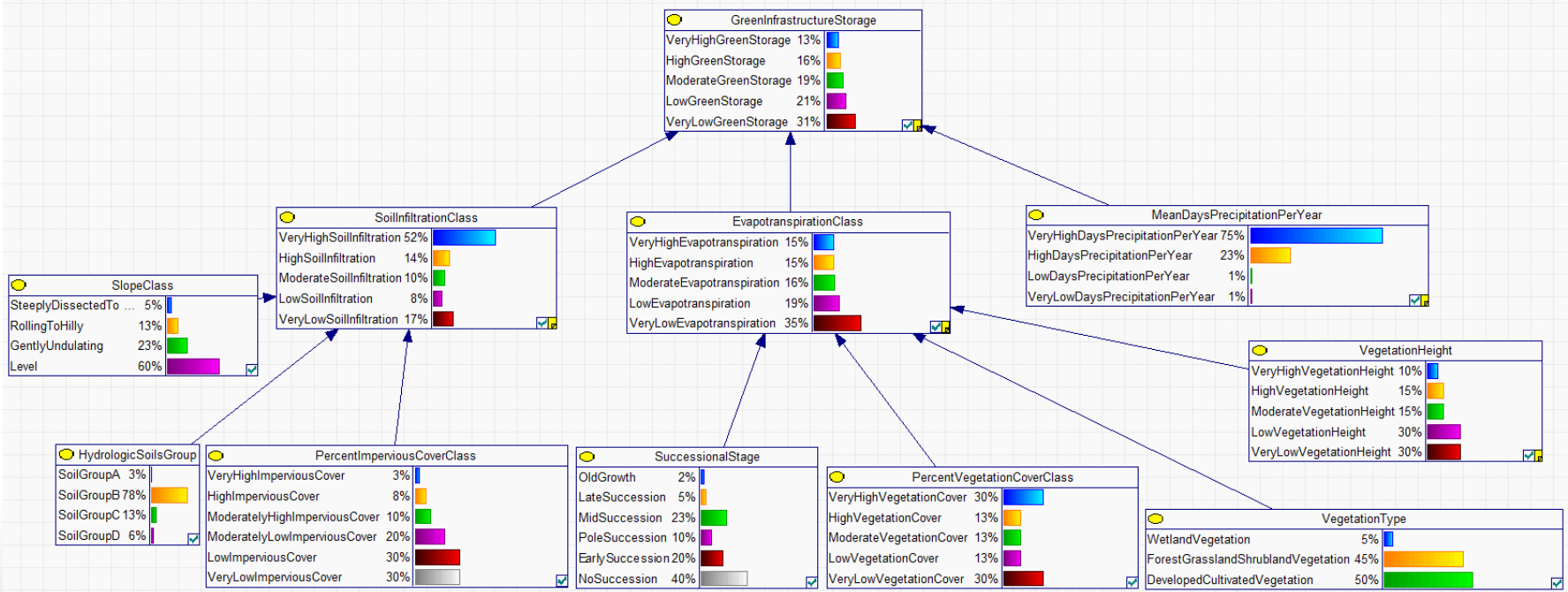
  e.g. food, freshwater, views

  or preventive – of detrimental flows

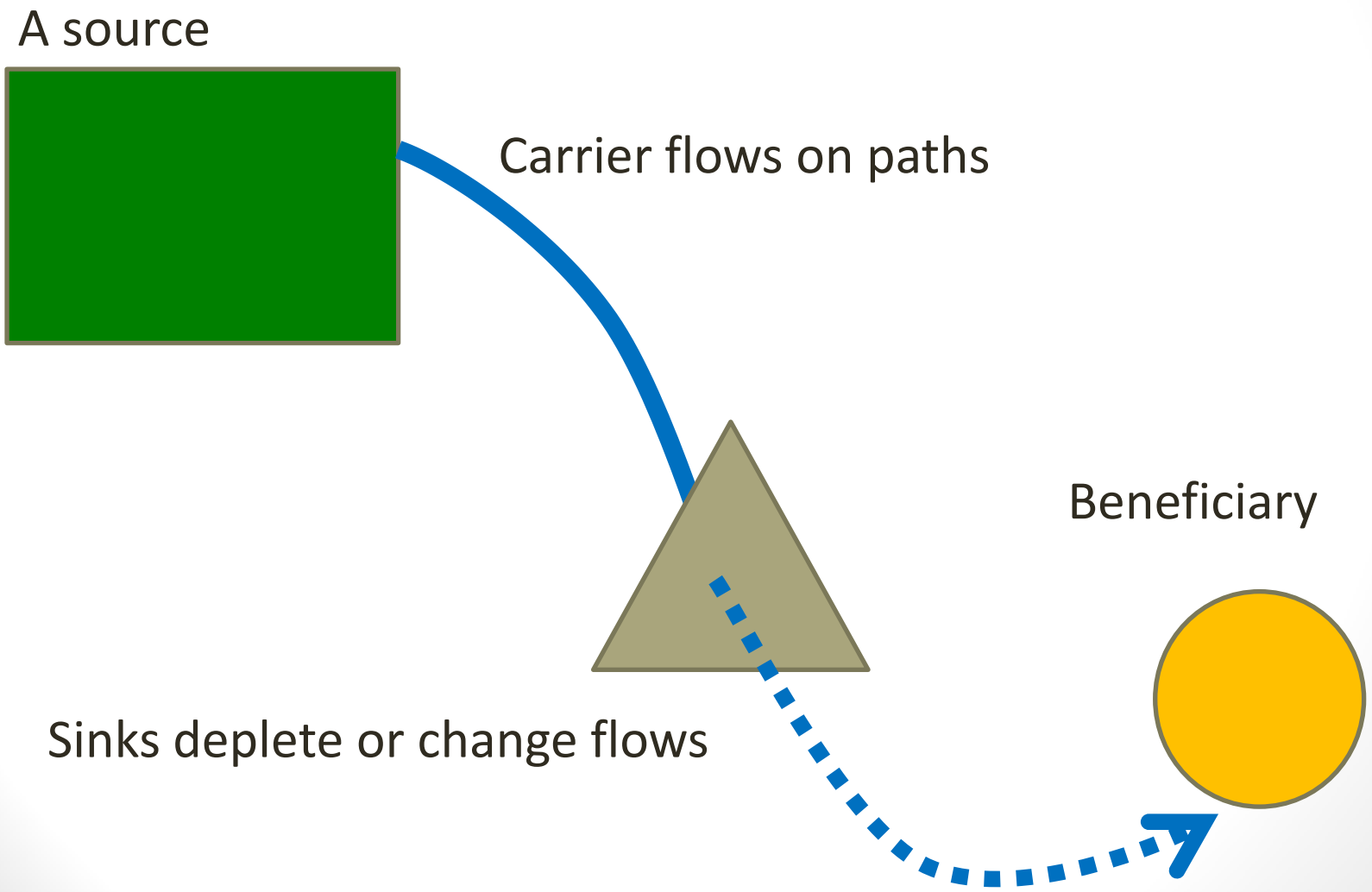
  e.g. floods, pollution

Source models

- deterministic process models
  - like InVEST models
- or probabilistic Bayesian Networks:

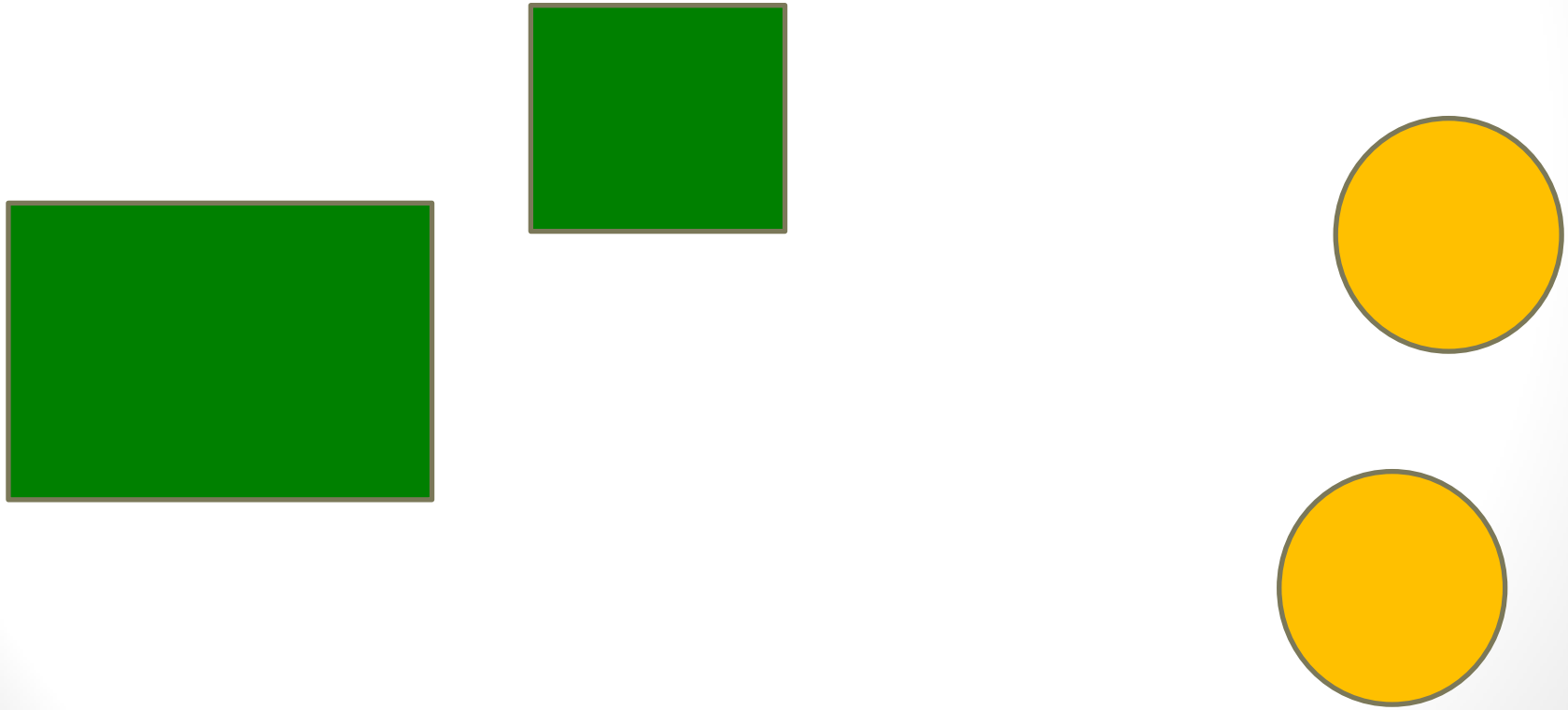


Flows: SPAN models



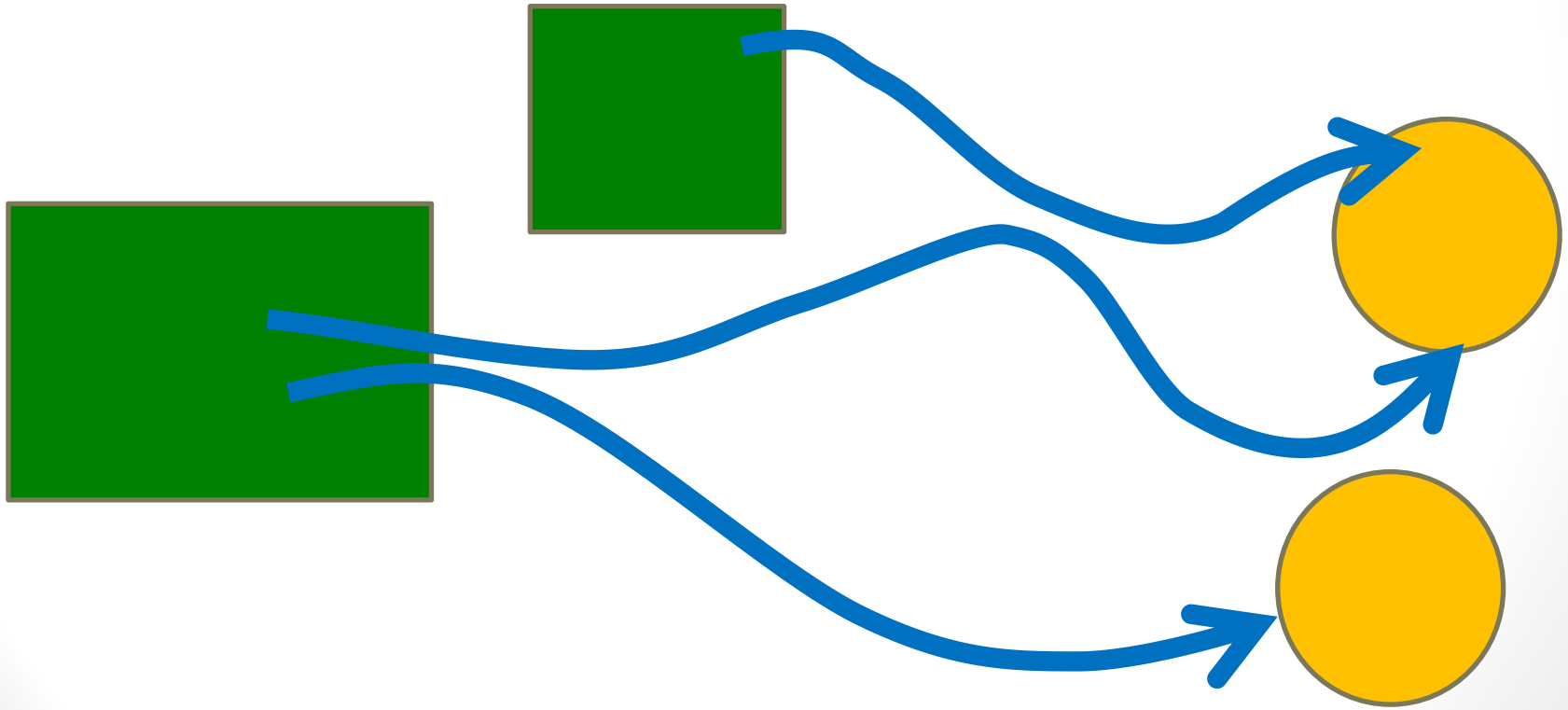
Theoretical

- **SOURCES** and BENEFICIARIES or needs, without considering flows



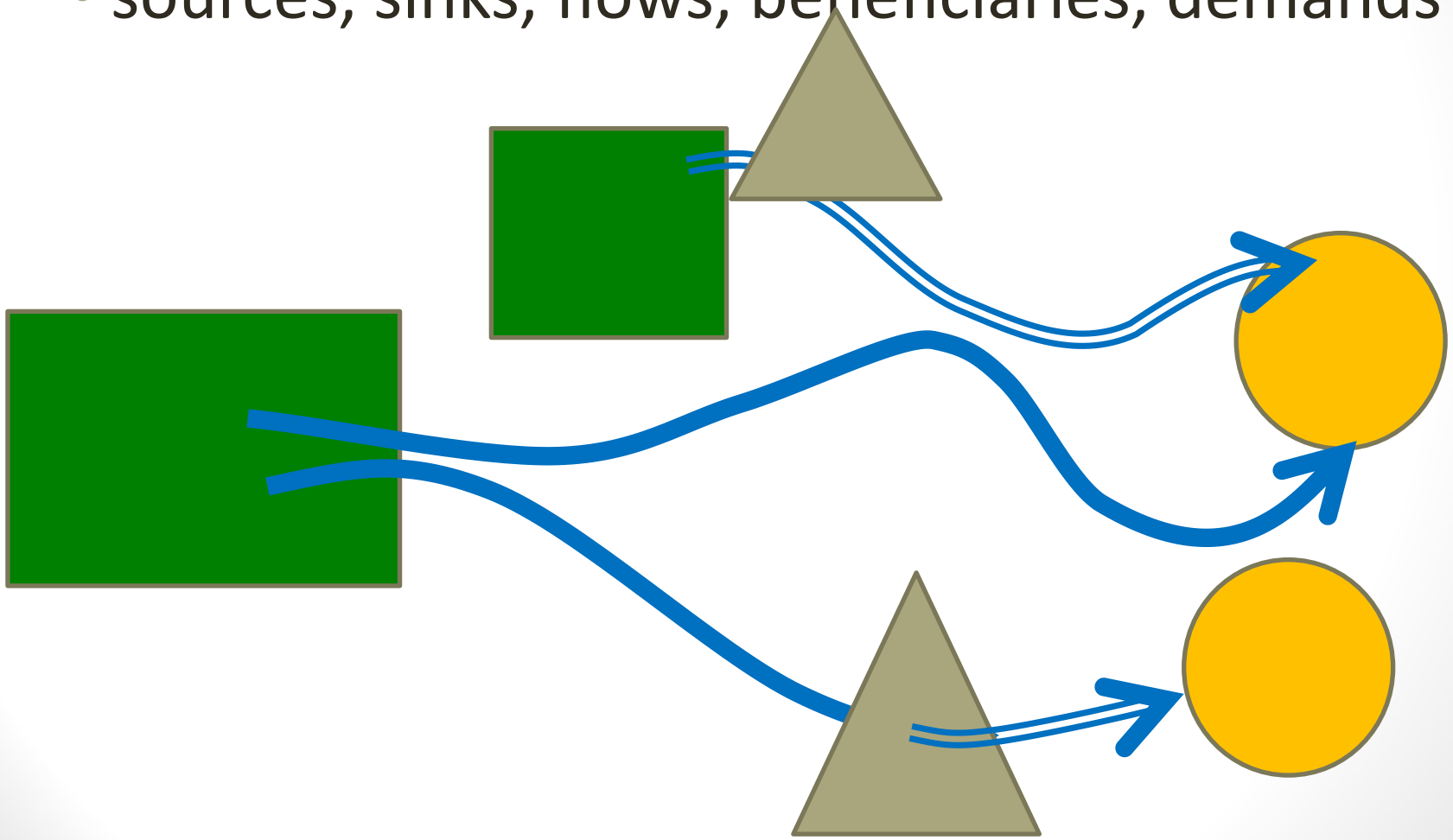
Possible

- maximum possible flows, without considering sinks



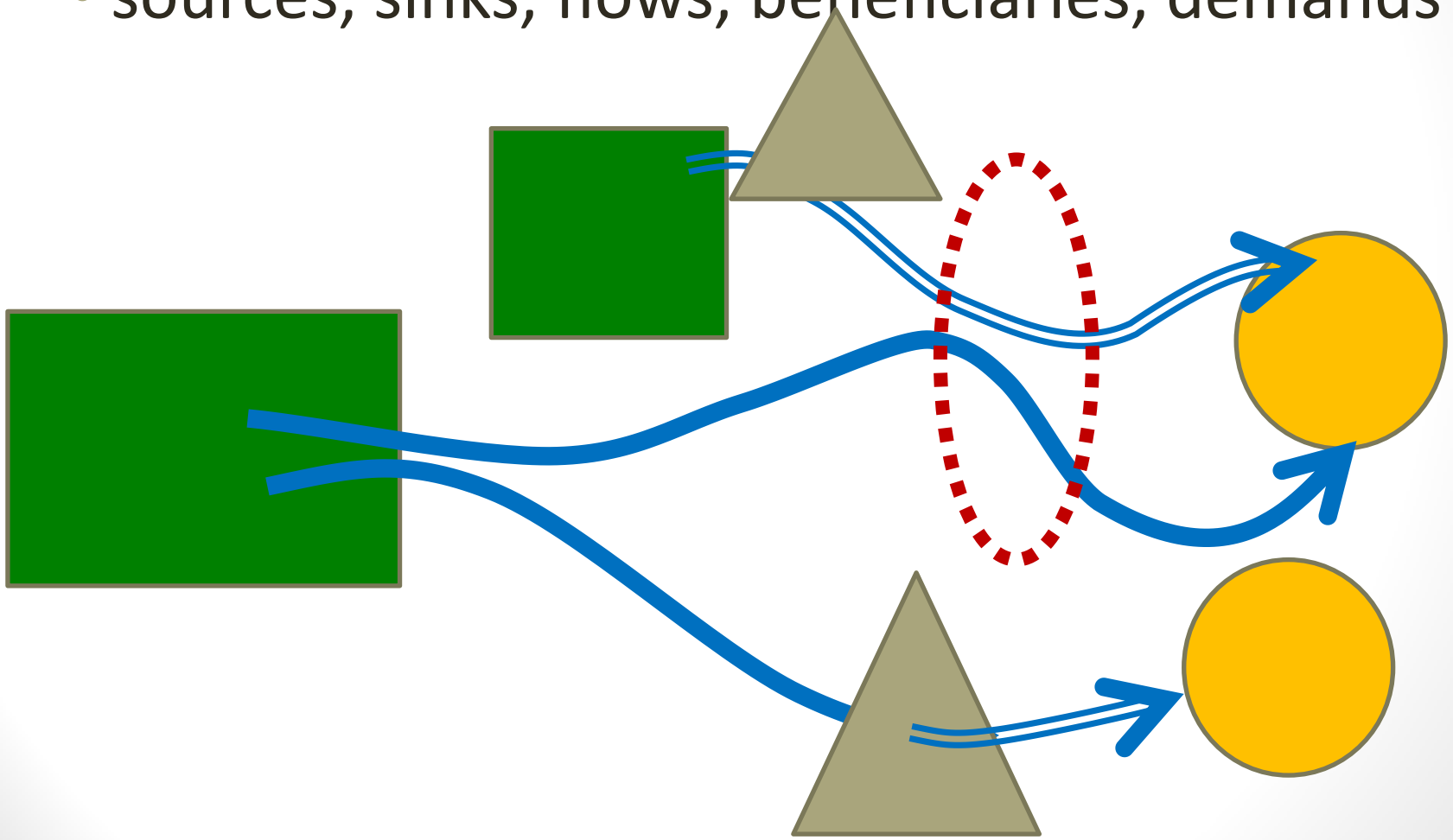
Actual

- sources, sinks, flows, beneficiaries, demands



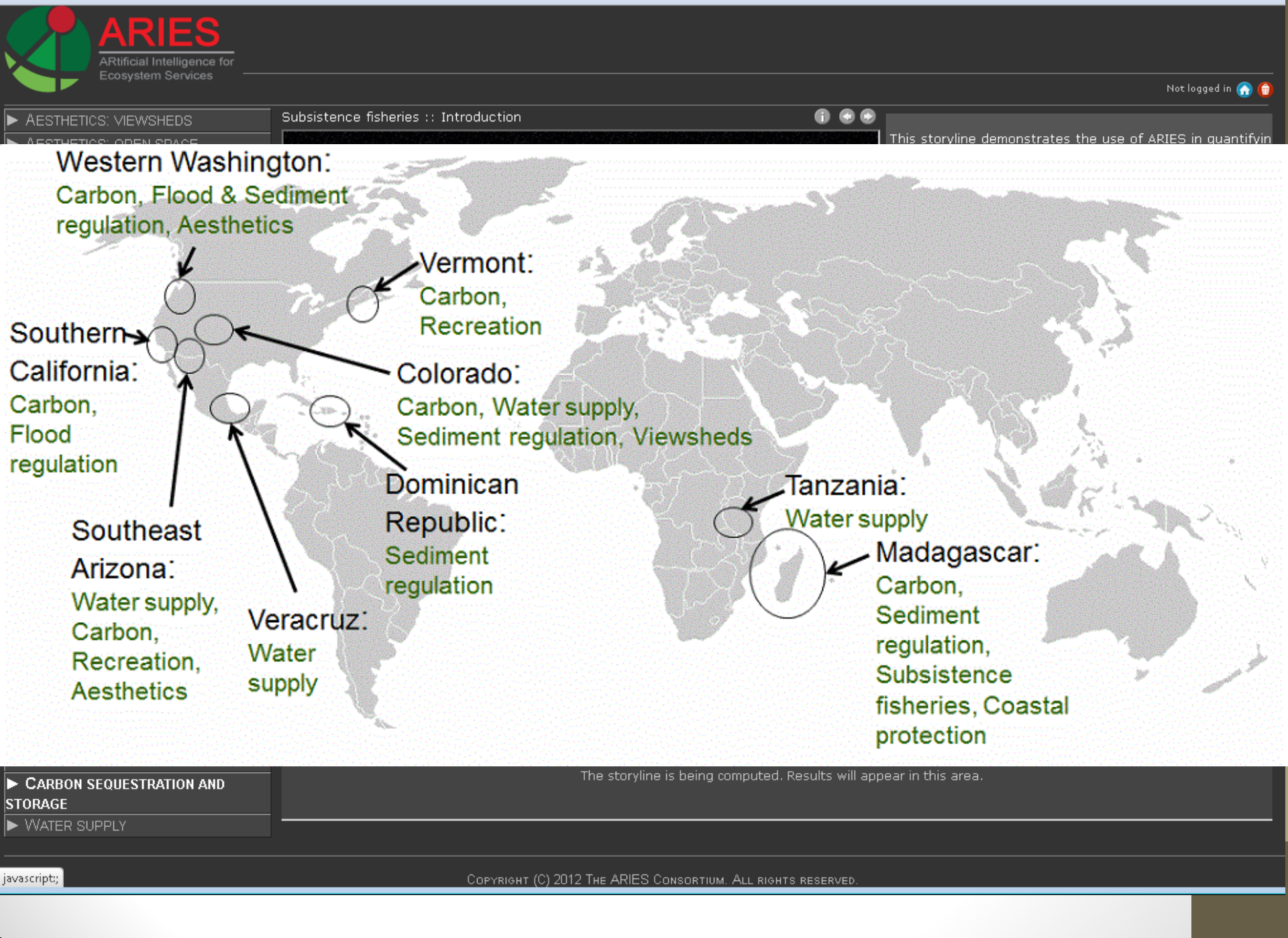
Actual

- sources, sinks, flows, beneficiaries, demands



Input / Output

- **Input:**
  - Varies depending on the ecosystem service being modelled.
  - Minimum requirements but can incorporate additional information
- **Output:**
  - Maps of sources, sinks, and flows.
  - physical units or other values


ARIES
ARtificial Intelligence for Ecosystem Services
Not logged in
AESTHETICS: VIEWSHEDS
Subsistence fisheries :: Introduction
This storyline demonstrates the use of ARIES in quantifyin
Western Washington:
Carbon, Flood & Sediment regulation, Aesthetics
Vermont:
Carbon, Recreation
Southern California:
Carbon, Flood regulation
Colorado:
Carbon, Water supply, Sediment regulation, Viewsheds
Dominican Republic:
Sediment regulation
Tanzania:
Water supply
Madagascar:
Carbon, Sediment regulation, Subsistence fisheries, Coastal protection
Southeast Arizona:
Water supply, Carbon, Recreation, Aesthetics
Veracruz:
Water supply
CARBON SEQUESTRATION AND STORAGE
WATER SUPPLY
The storyline is being computed. Results will appear in this area.
javascript:;
COPYRIGHT (C) 2012 THE ARIES CONSORTIUM. ALL RIGHTS RESERVED.

ARIES
ARtificial Intelligence for Ecosystem Services

Not logged in

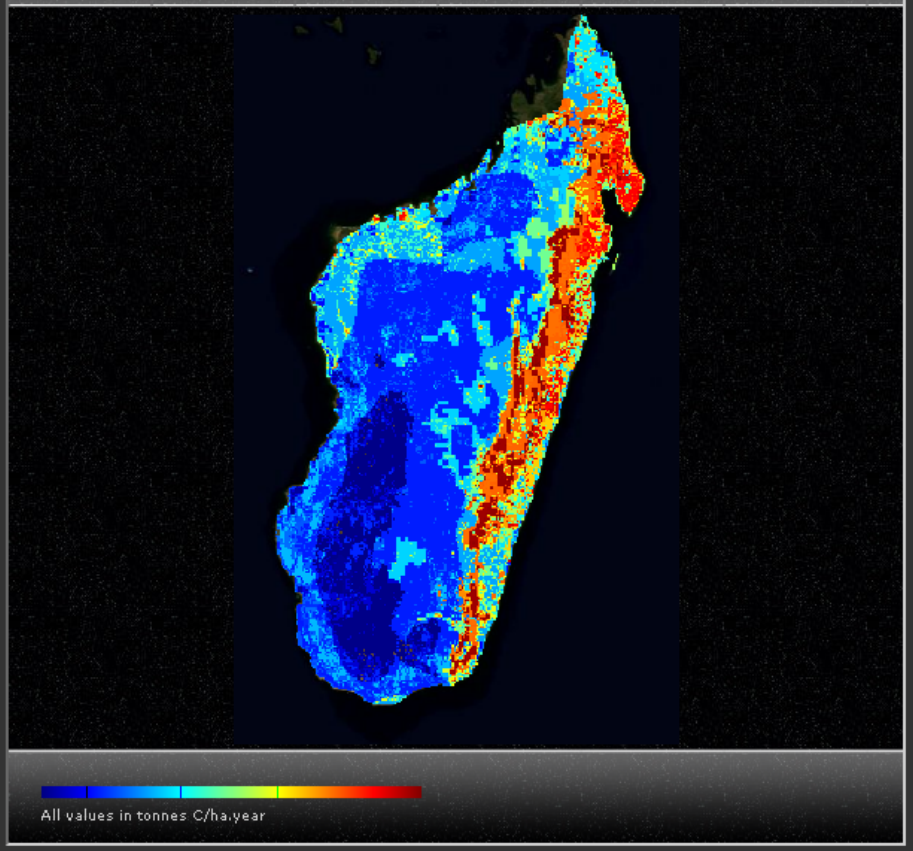
- ▶ AESTHETICS: VIEWSHEDS
- ▶ AESTHETICS: OPEN SPACE PROXIMITY
- ▶ COASTAL FLOOD REGULATION
- ▶ SUBSISTENCE FISHERIES
- ▶ SEDIMENT REGULATION
- ▶ FLOOD REGULATION
- ▶ RECREATION
- ▼ CARBON SEQUESTRATION AND STORAGE

Carbon sequestration and storage

The values associated with

Carbon sequestration and storage :: Carbon sequestration

Data over imagery :: click map for values



CO_2 sequestered. The amount of carbon taken up by vegetation and soils and added to biotic and soil carbon stocks. This is the quantity available for mitigating anthropogenic carbon emissions.

Role in models

The value of the area in mitigating the adverse effects of rising atmospheric CO_2 is indicated by the amount of carbon sequestered by vegetation and soil.

Representation

Data are in physical units of tonnes of carbon sequestered per hectare per year. As the output of the models is probabilistic, each point contains the probability distribution of the amount of carbon. The distribution can be visualized by clicking on the map; the mean value and the coefficient of variation are reported along with the probabilities.

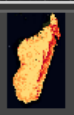
Source

Carbon model details from the ARIES website
IPCC website

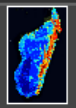
Data source: *MODIS net primary productivity data.*
Funding: *U.S. National Science Foundation.*

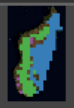

Soil C:N ratio

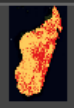

Seasonal temperature


Tree canopy cover


Forest degradation


Atmospheric CO2


Soil pH


Population

- ▶ WATER SUPPLY

Q: Is ARIES the best tool for mapping ecosystem services?

A: In theory – Probably
In reality – Not yet