

# Telecoupling GeoApp: Cloud-based Platform Overview and Widgets

March 12<sup>th</sup>, 2019

Webinar series

*Telecoupling: A New Frontier for Global Sustainability*



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Geospatial Data Scientist



# *Telecoupling: A New Frontier for Global Sustainability*

- February 19th, 2019: Telecoupling 101: Concepts, Terminology, and Published Case Studies
- February 26th, 2019: Telecoupling Toolbox: Integrated Tools for Sustainability Science
- **March 12th, 2019: Telecoupling GeoApp: Cloud-based Platform Overview and Widgets**
- March 19th, 2019: Telecoupling GeoApp: Case Studies with Story Maps

**WEBINAR REGISTRATION AVAILABLE @**

**<https://telecouplingtoolbox.org/webinar>**



**POLL**

# Online Presence

- <http://csis.msu.edu/telecoupling>
- <https://telecouplingtoolbox.org/>

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Telecoupling: Understanding how small -- and connected -- the world is

MSU Center... Liked

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To understand today's hyper-connected world and achieve a sustainable future, it takes an umbrella. That umbrella is telecoupling, a new avenue of research that enables natural and social scientists across various disciplines to understand and generate information for managing how humans and nature sustainably coexist.

Telecoupling Toolbox

HOME CODE COMPONENTS CASE STUDIES COMMUNITY

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## Telecoupling Toolbox

A suite of geospatial software tools and apps for socioeconomic and environmental analysis of coupled human-natural systems (CHANS) from local to global scales

OPEN  
COMMUNITY  
FORUM



# Telecoupling Toolbox - Systems Integration Approach

## What's in the Toolbox?

### Desktop GIS Tools



ArcGIS  
Toolbox  
(v2.3)

### Web-based GIS Application



GeoApp



# Telecoupling Toolbox - ArcGIS Toolbox (v2.3)

## Pros

- Full control on layer symbology
- Adjust coordinate projections
- Integrate with other ArcGIS tools
- Can run lengthy processing tasks

## Cons

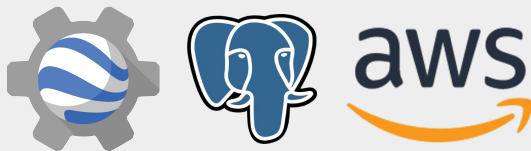
- Windows OS only
- Annual paid license
- Proficiency in ArcGIS required
- Several installation steps (3rd party tools integrations)
- Runtime errors are system-dependent
- Execution time can vary (CPU/RAM)



# Telecoupling Toolbox - GeoApp

## Pros

- No software installation required
- Free and cross-platform
- Same experience for every user
- Scalable - load balance
- Integration with several publicly available GIS layers
- Interactive and dynamic experience
- No GEE authentication

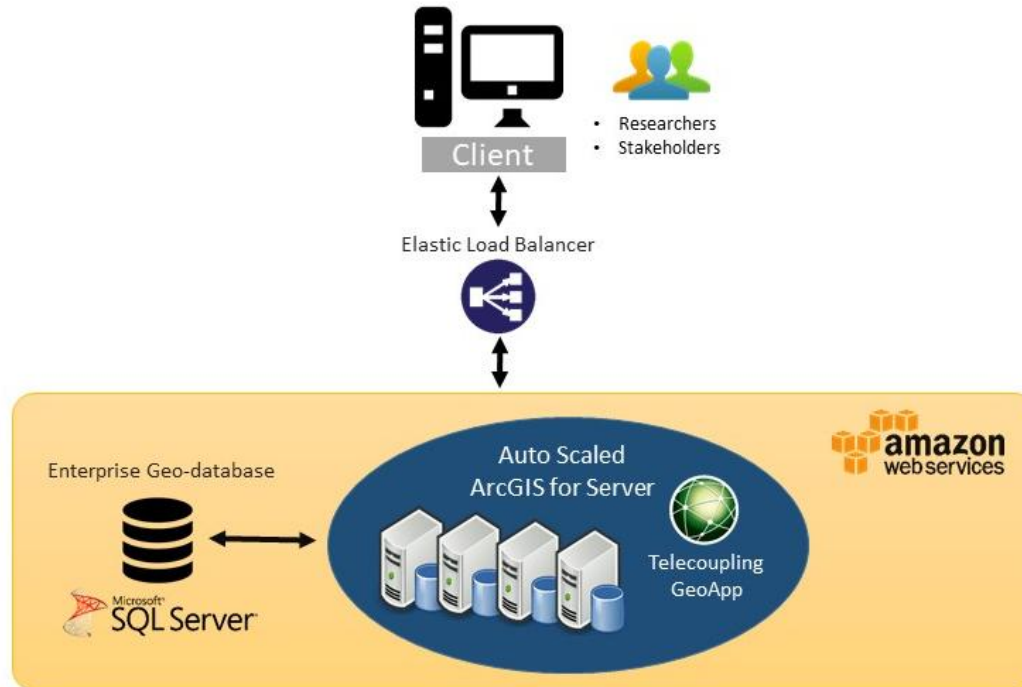


## Cons

- Requires internet connection
- Data preprocessing still needed
- Widgets cannot be modified by users
- Layer symbology is fixed
- Users cannot add raster data directly to basemap (*might change soon*)
- Only operational layers are permanent (*browser session cannot restore output layers after re-opening*)



# Telecoupling Toolbox - GeoApp





# Telecoupling Toolbox - GeoApp



## TELECOUPLING GEOAPP

### MAIN WIDGET CATEGORIES



#### MAPPING & VISUALIZATION

- Basemap
- Add Data
- Draw
- Layer List

#### QUERY & SELECTION

- Select
- Time Slider
- Attribute Table

#### TELECOUPLING ANALYSIS

##### Systems

- Add interactively
- Upload from table
- Network analysis grouping

##### Causes

- Factor analysis for mixed data
- Model selection

##### Agents

- Add interactively
- Upload from table

##### Environmental Analysis

- Calculate flows CO<sub>2</sub> emissions
- Habitat quality
- Forest carbon edge effect
- Habitat risk assessment
- Seasonal water yield
- Nutrient delivery ratio
- Sediment delivery ratio
- Coastal blue carbon

##### Flows

- Add media flows
- Draw radial flows

##### Socioeconomic Analysis

- Visitation rate
- Cost-benefit analysis
- Nutrition metrics
- Crop production
- Food security analysis
- Population count and density
- Fisheries harvest

#### IMAGERY ANALYSIS

- Pick imagery layers
- IS renderer
- Temporal selector
- Imagery comparison
- Change detection
- Temporal & spectral profile
- Export to disk

# Telecoupling Toolbox - GeoApp



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InVEST models

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EPA  
EnviroAtlas

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ESRI  
Imagery  
Services  
widgets



# Telecoupling Toolbox - Open Access

Code is publicly shared and freely available on Github  
(<https://github.com/MSU-CSIS/telecoupling-toolbox>)



# Telecoupling Toolbox - Main reference

<https://telecouplingtoolbox.org/>

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ARCGIS TOOLBOX

**GEOAPP**

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**LIVE DEMO**

# Thank you!

## Q&A

<https://www.surveymonkey.com/r/YWBYHF5>

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FrancescoTonini.com



f-tonini (github)

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# Reference Publications

- McCord, P., Tonini, F., and Liu, J. (2018). Making strides in sustainable development with the Telecoupling GeoApp. *Science Trends*, September 6, 2018. <https://sciencetrends.com/making-strides-in-sustainable-development-with-the-telecoupling-geoapp/>
- McCord, P., Tonini, F., and Liu, J. (2018). The Telecoupling GeoApp: A Web-GIS Application to Systematically Analyze Telecouplings and Sustainable Development. *Applied Geography*, 96, pp. 16-28. <https://doi.org/10.1016/j.apgeog.2018.05.001>
- Tonini, F., and Liu, J. (2017). Telecoupling Toolbox: Spatially explicit tools for studying telecoupled human and natural systems. *Ecology and Society*, 22 (4), pp. Art11. <https://doi.org/10.5751/ES-09696-220411>