EMBEDDING ECOSYSTEM SERVICES INTO POLICY LEARNING SERIES

Session 1: Cloud Computing for Landscape Assessment

about
our workshop

Cloud computing is everywhere, and Geographic Information Systems (GIS) are also migrating to cloud-based engines, such as Google Earth. This session provides insight into the the two major ways in which cloud computing can be used to support landscape assessments - to gather the required information for modelling, and to provide context to the modelling. This is illustrated through the example of Zambia freshwater resources assessment.

Keywords: Cloud computing, Geographic Information Systems (GIS), InVEST, Google Earth Engine, freshwater resource assessment

learning
objectives

- Explore how cloud computing resources give support and context to ecosystem services modeling using InVEST, focused mostly on freshwater resources and landcover.

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As part of the Latin American Water Funds Partnership in The Nature Conservancy for more than 10 years, he supported the creation of technical and financial mechanisms aimed to invest in restoring and protecting the green infrastructure that provides the water for mega cities such as Mexico City, Lima and Sao Paulo. His research interests include improving scientific knowledge around water security for metropolitan areas and expanding the monitoring network to identify the impacts of natural infrastructure in water quality and quantity. His academic interests are focused on the use of artificial intelligence to take advantage of big data generated by space agencies around the world that can contribute to water security at local level. Jorge is currently supporting the World Bank team on Landscape Assessments of Ecosystem Services across Africa and Asia using Remote Sensing, GIS modeling and Cloud Computing.

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Cloud Computing for Landscape Assessment

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Contents for today

1. Concepts
2. Examples
3. Questions & Materials

Cloud Computing

Computing... on the cloud ("cloud": a cluster of high performance servers).

Benefits: the same that any cloud based service has: high processing capacity - low cost (maintenance, storage, processing power).

Examples are practically all around right now, the phone in your pocket, this presentation downloaded from Google cloud, etc.

Geographic Information Systems are also migrating into a cloud based service, slowly but steadily (ArcGIS Por, Google Earth Engine, etc.)

Landscape Assessment

The assessment of the landscape... but with these characteristics:

1. The scope is the whole country - regional scale assessments
2. Landscape condition has a temporal dimension - how it is and when did it become like this?
3. The main source of data is remote sensing - no data gaps
4. The tools for the assessment are models - what would happen if _____ occurs?

Cloud Computing x Landscape Assessment

We use Cloud Computing to support Landscape Assessment in two ways mostly:

1. To gather the required information for modeling
2. To provide context to the modeling

Our Cloud Computing platform of choice is Google Earth Engine. Our modeling platform of choice is InVEST.

We have found that Google Earth Engine and InVEST go like bread & butter

An example…

Zambia freshwater resources assessment

Let´s say we want to evaluate the current condition of freshwater resources in Zambia. We want to have an spatial explicit assessment of water quality and quantity.

It could be interesting to see what are the "freshwater resources trends", and then evaluate using models what could happen if degradation trends continue, or, if these degradation trends are reversed.

In this example we will use Google Earth Engine to

1. Provide context to the analysis by analyzing historical trends
2. Gather the required data for InVEST modeling of Water Balance/Yield and Sediments.

What we are going to see:

1. Context - Historical analysis of freshwater resources trends using FLDAS
2. Context - Historical analysis of land cover condition using MODIS
3. Context - Analysis of Agricultural Landscape
4. Support - Get the data required to run InVEST Seasonal Water Yield and InVEST Sediments SDR models
5. Support - Create a Web App to show results

Switch back and forth to live demo and these slides…

Questions?

Thanks!!!
Cloud Computing for Landscape Assessment

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https://github.com/leonsarmiento/Google-Earth-Engine-for-NatCAP-InVEST-models/tree/master