Validating maps of land cover and land degradation with citizen science and mobile gaming

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Motivation

Improve earth observation-based land cover and land degradation maps with context-specific data streams using crowdsourcing

Why Crowdsourcing?

- Low-cost solutions
- Up-to-date information
- Geographical scope/coverage
- Environmental stewardship
Degradation Mapping:
South Sumatra & East Kalimantan

Assess disturbances in the land cover and other biophysical disturbances using ALOS PALSAR imagery from 2010 to 2017 and Sentinel-1 imagery from 2015-2019.
Degradation Mapping:
South Sumatra & East Kalimantan

SOUTH SUMATRA
2010 – 2015: 68,000 sites
2015 – 2018: 43,000 sites

EAST KALIMANTAN
2010 – 2015: 47,000 sites
2015 – 2018: 45,000 sites
Degradation Mapping: South Sumatra & East Kalimantan

Primary and secondary forests affected by fires

Degradation Mapping:
South Sumatra & East Kalimantan

Secondary forests cleared and burned for agriculture
What are the gaps?

Different types of degradation

Variable biophysical conditions

Complex land histories

...

How can crowdsourcing help?
Earth Observation + Crowdsourcing

1. Land cover analysis
   Crowd-driven classifications of high-resolution satellite imagery through rapid binary sorting

2. In-situ validation
   Field verification based on EO-based change detected with unknown causes of change

3. Restoration preferences
   Survey of local, community-based preferences of restoration measures

South Sumatra & East Kalimantan:
  April-August & Sept-Nov

South Sumatra & East Kalimantan:
  Nov/Dec

National campaign:
  Oct/Nov

National campaign:
  Q1 2020
Mobile and web-based platform

Urundata Mobile Application

Urundata Website

https://urundata.id
1 Land Cover Analysis

Focus: Onboarding & Engagement
Target Groups: Universities

Various piles of high-resolution imagery
Rapid assessment
Yes / No sorting
Expert inputs for QA
Leaderboards
1 Land Cover Analysis

Focus: Onboarding & Engagement
Target Groups: Universities

14 Universities

9 Local news outlets

1,123 subscribers
676 active users

1.74 million data contributions
Crowdsourcing in-situ validation

Focus: On-site validation of target locations
Target Groups: University students, Researchers, Field officers, NGO workers

VEGETATION STRUCTURE
SPECIES COMPOSITION
DOMINANT VEGETATION HEIGHT
FAUNA
EVIDENCE OF DEFORESTATION
ESTIMATED YEAR/DATE OF DEGRADATION
LAND COVER HISTORY
DEGRADED (YES/NO)
Restoration Preferences

Focus: Local & community-driven restoration potential
Target Groups: University students, Researchers, Field officers, NGO workers

Local-level consultation with communities
Addressing specific degradation challenges
Choosing from specific restoration options
Leveraging mobile technology and Urundata Community
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