



Drone-Assisted Sample Design for Developing Countries

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Team

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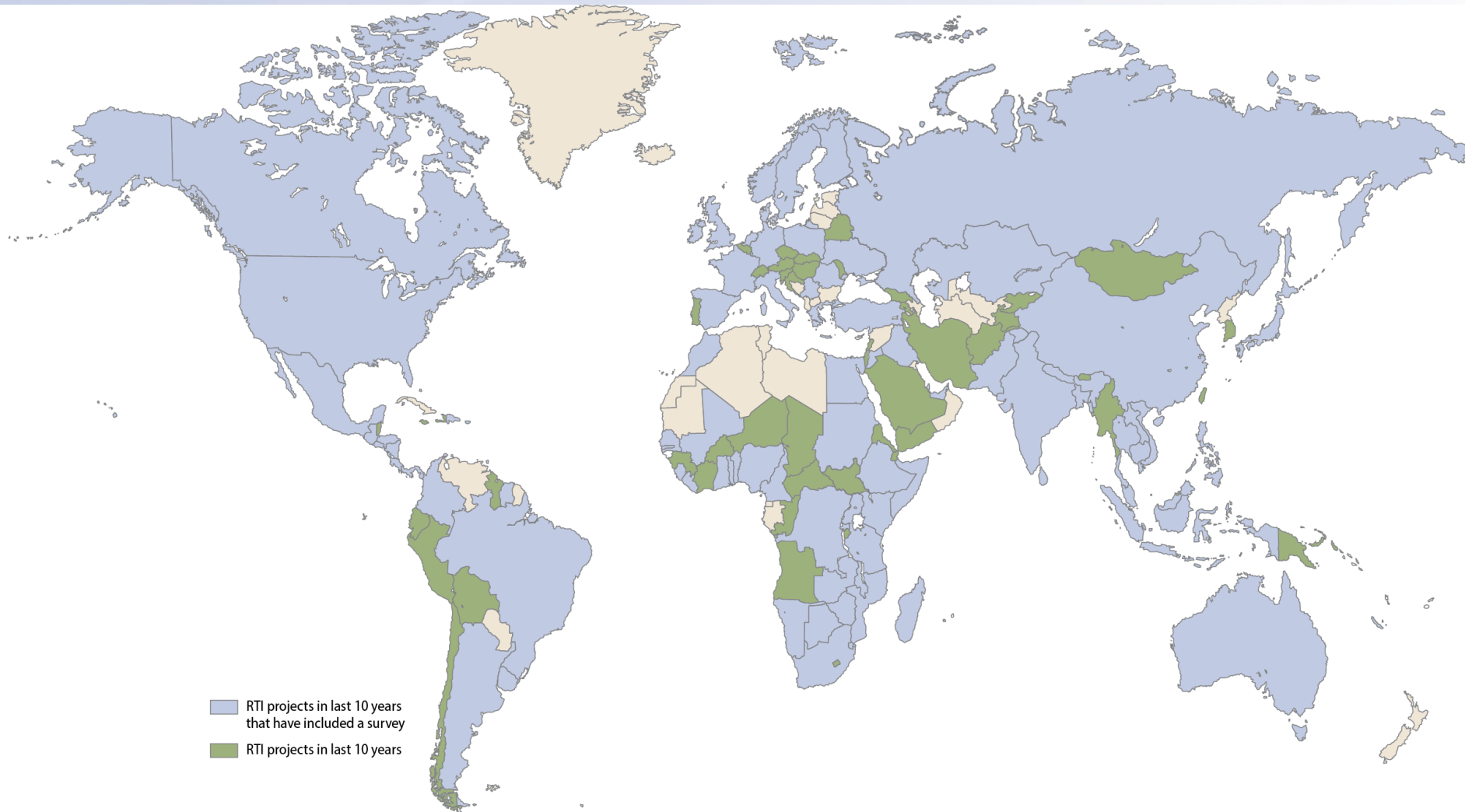
Overview

- **Study Objective**
 - Determine if unmanned aircraft systems (UAS) can be used to supplement sample design methods used in developing countries
- **Challenge**
 - Sample design in developing countries is difficult due to limited infrastructure
 - Need to find ways to simultaneously implement random selection and avoid selection bias
- **Process**
 - Conduct feasibility tests in FAA-approved research site at North Carolina State University (NCSU) to evaluate value added of UAS to the survey process

RTI and Unmanned Aircraft Systems

- RTI scientists have worked with UAS for many years, primarily developing sensors to support UAS missions
- In 2012 began to expand to other RTI units
 - Research in the social behavioral sciences to understand public perceptions, privacy, ethics, training requirements, and issues related to technology transition into the workforce
 - Tracking drone-related injuries and associated risk factors
 - Applications in developing countries to support agriculture, health, and environmental monitoring
 - Developing policy and methods for inserting drones into existing RTI research model

RTI worldwide project work

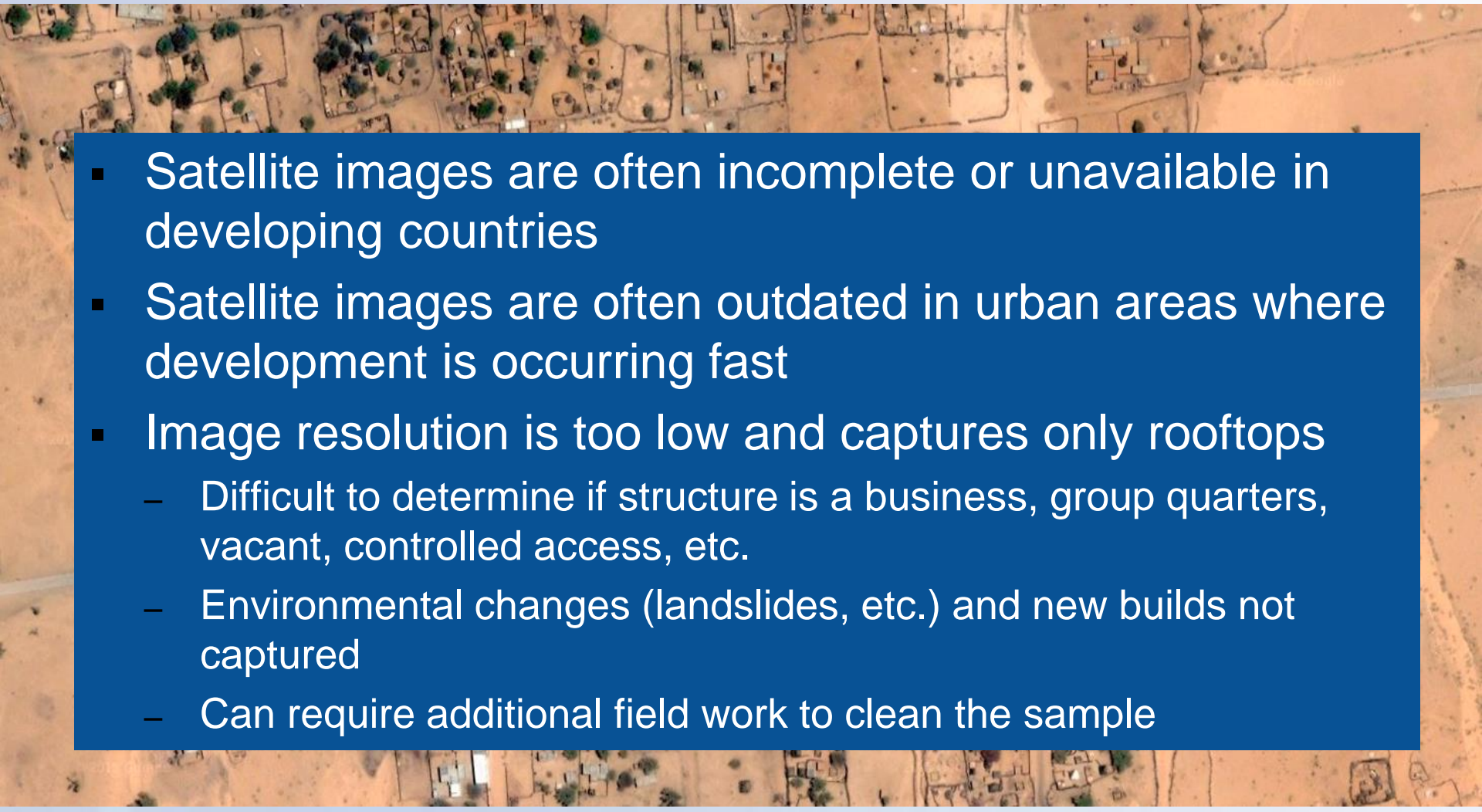


■ RTI projects in last 10 years that have included a survey
■ RTI projects in last 10 years

Challenges for Household Survey Sample Design in Developing Countries

- Lists of dwelling units used to draw the sample are generally not available or incomplete
- In past, field staff visited selected primary sampling units (PSU) to count and list (time consuming, expensive, and difficult)
- Need methods that use random selection and avoid selection bias
- New methods have been developed to use satellite images and Google Street View to identify and sample dwelling units within a PSU (Amer, Krotki, et. al, AAPOR 2015)

Challenges for Household Survey Sample Design in Developing Countries

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- Satellite images are often incomplete or unavailable in developing countries
 - Satellite images are often outdated in urban areas where development is occurring fast
 - Image resolution is too low and captures only rooftops
 - Difficult to determine if structure is a business, group quarters, vacant, controlled access, etc.
 - Environmental changes (landslides, etc.) and new builds not captured
 - Can require additional field work to clean the sample

Drone-Assisted Sampling

- Data collected on an UAS may be able to augment satellite and Street View
- Development of the drone-assisted sampling method is proceeding in 3 phases
 - Feasibility tests in US in FAA-approved sites to test value of data
 - Field tests with local partners in developing countries to test logistics and practical aspects (policy, equipment, time, expense, safety, etc.)
 - Pilot tests for live studies in developing countries as part of larger data collection efforts

Drone Assisted Sampling – Feasibility Test #1



Photo Taken from the Ground



Satellite Image (from Google Maps)



Image from Drone (100 feet above ground)



Test Results

Benefits

- Typically higher quality and more recent images than satellite
- Video is more effective than satellite still images
- Detected objects in front of DU, details of DU, # residences per DU
- Google Street View better in established neighborhoods but UAS captures entire property and areas without GSV
- Could identify additional DUs on property
- Could identify usable information for field (dog in yard, etc.)

Implications

- Should be able to conduct count and list more quickly

Challenges

- Room for improvement with different aircraft and camera

Next Steps

- Feasibility Tests
 - We will continue to conduct feasibility tests with other aircraft and higher resolution cameras
- Field Tests
 - Will be conducted once feasibility tests are complete, target is fall 2015
- Continue to refine the sample techniques using data from satellite, Google Street View, and UAS

More Information

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