

Responsible Land Governance: Towards an Evidence Based Approach

ANNUAL WORLD BANK CONFERENCE ON LAND AND POVERTY
WASHINGTON DC, MARCH 20-24, 2017



AUTOMOTIVE



DIGITAL ASSURANCE



MOBILITY, ENERGY &
ENVIRONMENT



AERONAUTICS



SPACE



DEFENCE & SECURITY

UNDERSTANDING THE URBAN STORY USING EARTH OBSERVATION

Elke Krätzschar, Rainer Malmberg

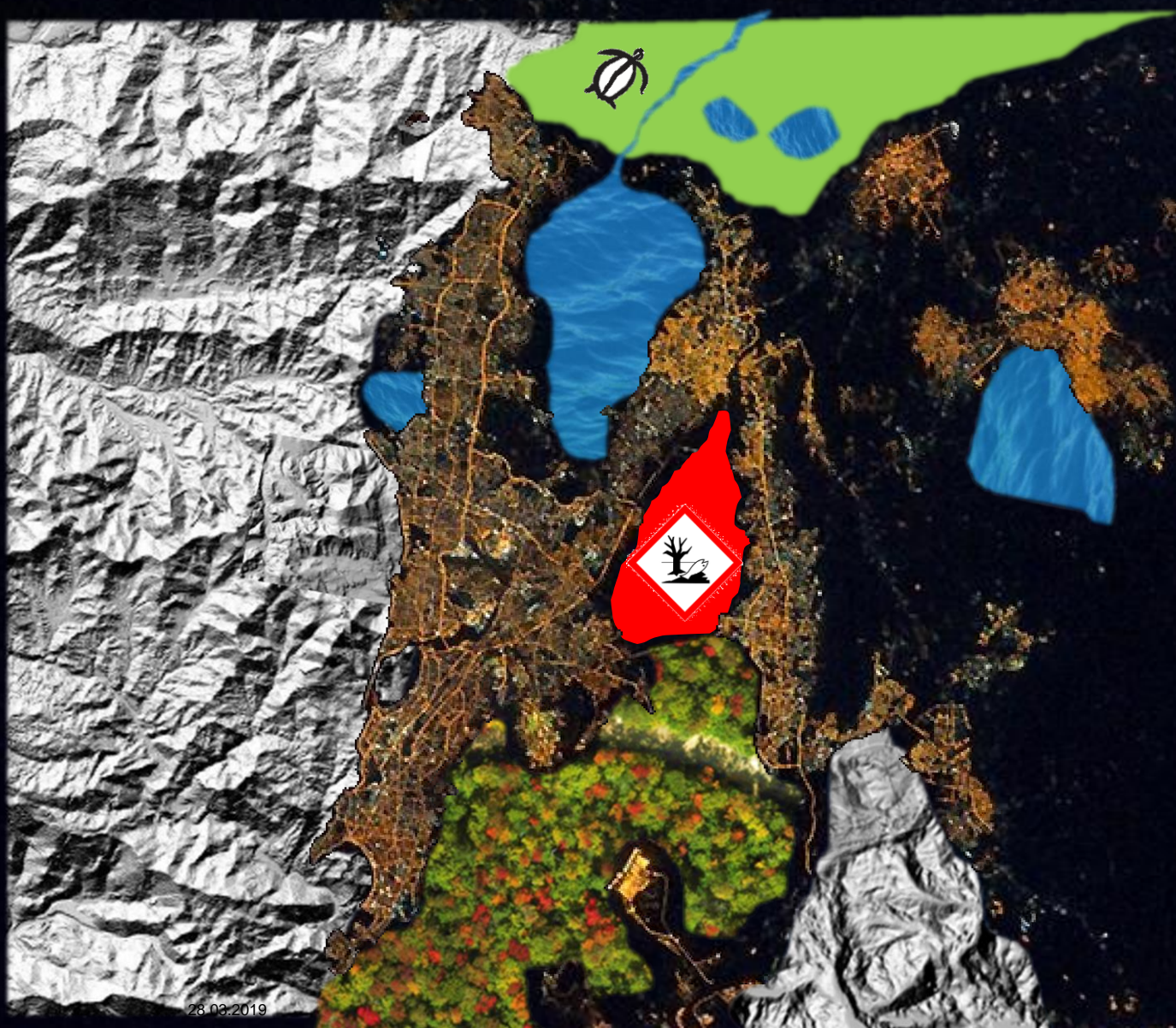
Washington DC, 2017/03/23



Mapping Examples of Lima are related to a project, funded by ESA
„Monitoring Urbanization in Latin American Metropolitan Areas (ESRIN/AO/1-7663/13/I-AM)“

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Mumbai

... need to consider the surroundings (options & constrains)

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INFORMATION ⇒

City ...

⇒ GOALS

What is the Status?

Where are the Changes?

Why?

Which Risks?

Which Circumstances?

*... addressing different Scale,
independent & reliable*



Inventory

Monitoring
Planning
Addressing
Guidance

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Transportation Network

Urban Extent

Urban Structures – **URBAN ATLAS (Land USE)**

Historic Urban Layers

Urban Vegetation Layer (tree level)

Land Cover Classifications

Terrain Analysis

Climate Layer
(e.g. Urban Heat Islands, Air pollution)



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Population distribution

Cities and infrastructure mapping

Elevation and topography

Land cover and use mapping

Oceanographic observations

Hydrological and water quality observations

Atmospheric and air quality monitoring

Biodiversity and ecosystem observations

Agricultural monitoring

Hazards, disasters and environmental impact monitoring

	1 NO POVERTY	2 ZERO HUNGER	3 GOOD HEALTH AND WELL-BEING	4 QUALITY EDUCATION	5 GENDER EQUALITY	6 CLEAN WATER AND SANITATION	7 AFFORDABLE AND CLEAN ENERGY	8 DECENT WORK AND ECONOMIC GROWTH	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	10 REDUCED INEQUALITIES	11 SUSTAINABLE CITIES AND COMMUNITIES	12 RESPONSIBLE CONSUMPTION AND PRODUCTION	13 CLIMATE ACTION	14 LIFE BELOW WATER	15 LIFE ON LAND	16 PEACE, JUSTICE AND STRONG INSTITUTIONS	17 PARTNERSHIPS FOR THE GOALS
Population distribution																	
Cities and infrastructure mapping																	
Elevation and topography																	
Land cover and use mapping																	
Oceanographic observations																	
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Contribution of EO

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2017/03/17: News of Peru

„More than 70 people have died after heavy rainfalls and mud slides in Peru. They are the worst for over 30 years, also caused by the effect of El Niño“

It has severe effect on more than half of the country;
10,000s of buildings are damaged

800 cities have declared the state of emergency

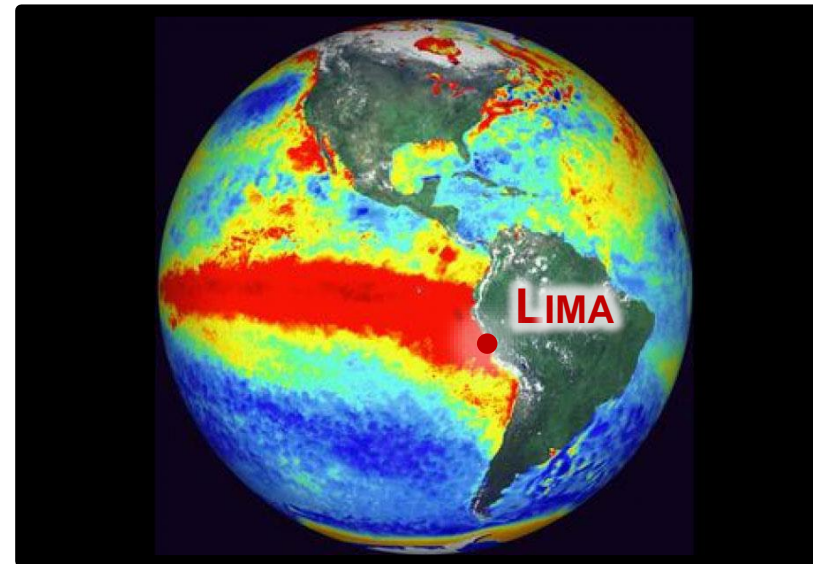
Armed forces had been called to support the police to control law and order over the contry.“

WOW CAN EO CONTRIBUTE TO THIS?

FAST TRACK MAPPING

RISK IDENTIFICATION,

PREVENTION & PREPAREDNESS

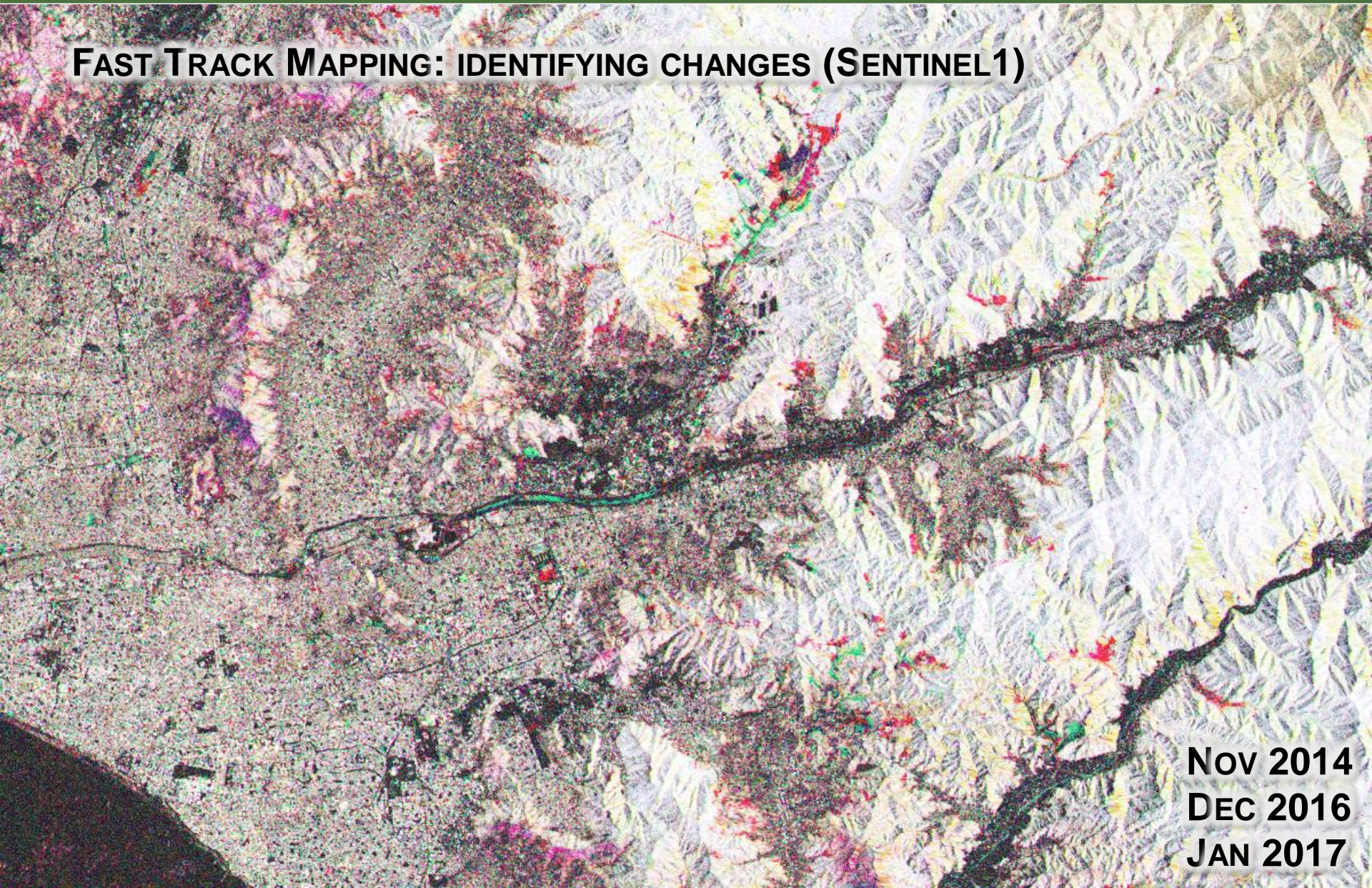


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FAST TRACK MAPPING: IDENTIFYING CHANGES (SENTINEL1)



Nov 2014
DEC 2016
JAN 2017

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FAST TRACK MAPPING: IDENTIFYING CHANGES (SENTINEL1)



Image © 2016 DigitalGlobe

Google Earth

DEC 2016
JAN 2017

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FAST TRACK MAPPING: IDENTIFYING CHANGES (SENTINEL1)



Nov 2014
DEC 2016

Google Earth

**AUTOMATIC IDENTIFICATION OF CHANGES
ON OPEN ESA RADAR DATA,
THAT HELPS US TO IDENTIFY HOT-SPOTS**

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URBAN ATLAS

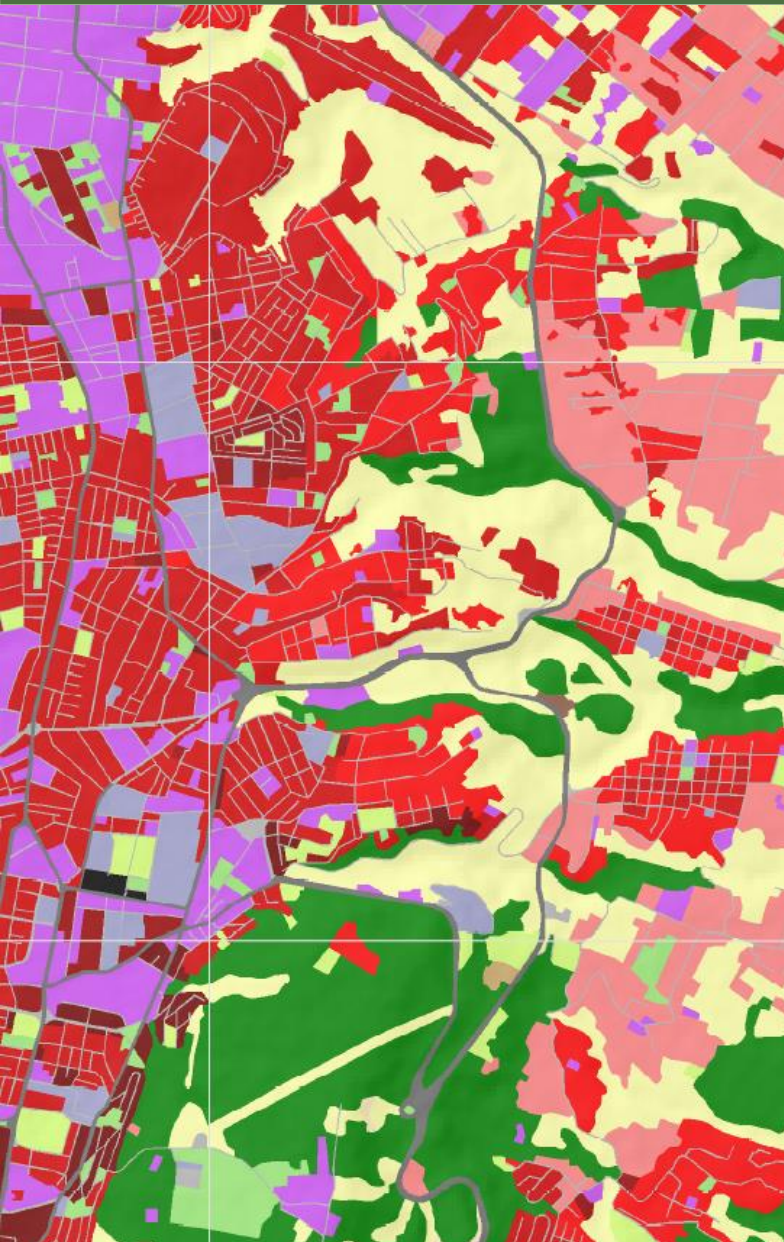


■ 1.1.1.1. - Continuous dense urban fabric	■ 1.2.3. - Port area
■ 1.1.1.2. - Continuous medium dense urban fabric	■ 1.2.4. - Airport
■ 1.1.2.1. - Discontinuous dense urban fabric	■ 1.3.1. - Mineral extraction and dump site
■ 1.1.2.2. - Discontinuous medium dense urban fabric	■ 1.3.3. - Construction sites
■ 1.1.2.3. - Discontinuous sparse urban fabric	■ 1.4.1. - Green urban areas
■ 1.1.3. - Informal transition	■ 1.4.2. - Sports and leisure facilities
■ 1.1.4. - Informal settlement	■ 2.1. - Acriculture and natural vegetation
■ 1.2.1. - Industrial and Commercial	■ 2.2. - Bare ground
■ 1.2.1.3. - Public and Private	■ 3. - Forest
■ 1.2.2.1. - Fast transit road	■ 5.1. - Inland water
■ 1.2.2.2. - Other road	■ 5.2. - Marine water
■ 1.2.2.3. - Railway	

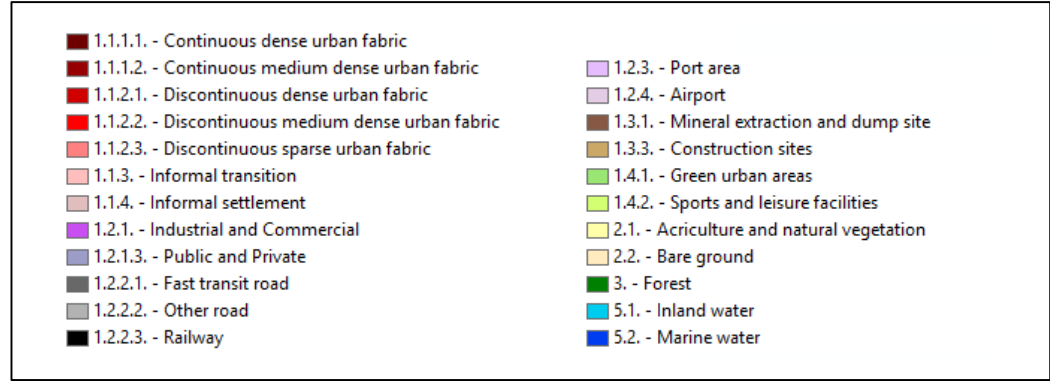
- Applied onto Lima, Quito and Bogota
- European Standard (over 500 Cities) giving a pan-European statistical overview serving a set of over 300 indicators
.... Cities become comparable
- successfully transferred to Cities worldwide
- up to 18 Artificial Land Cover/ Land Use Classes
- MMU 0,25ha/ 10m

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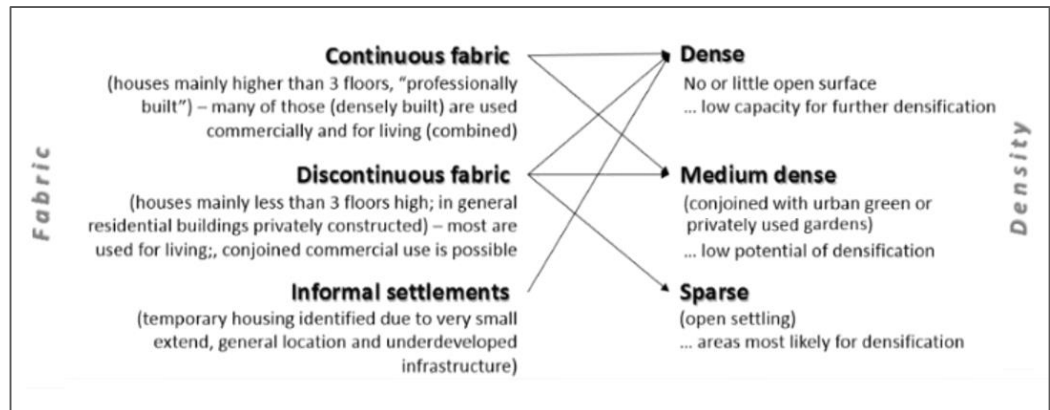
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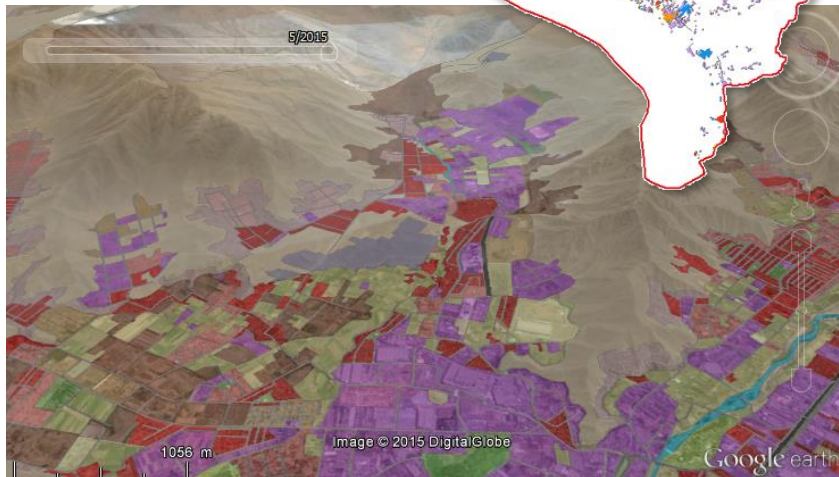
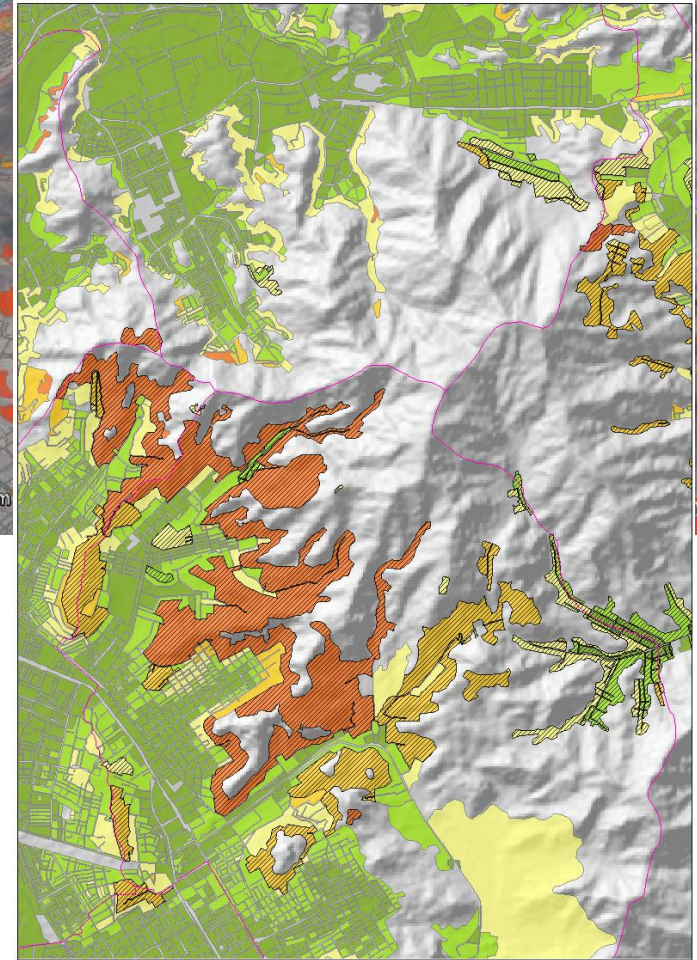
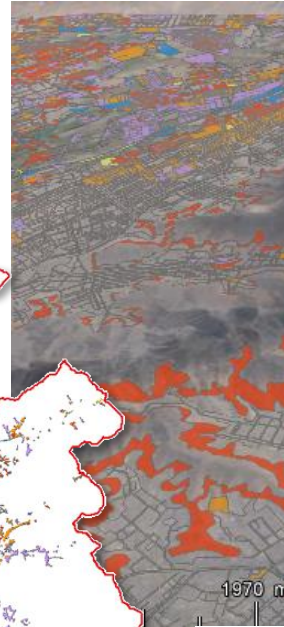
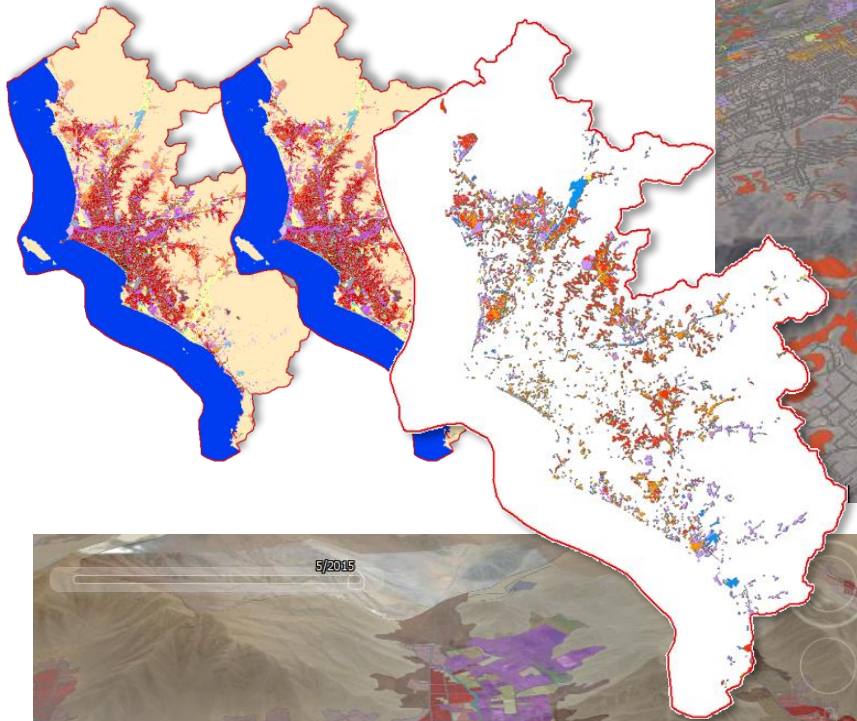
Advantage for modelling issues:



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URBAN ATLAS



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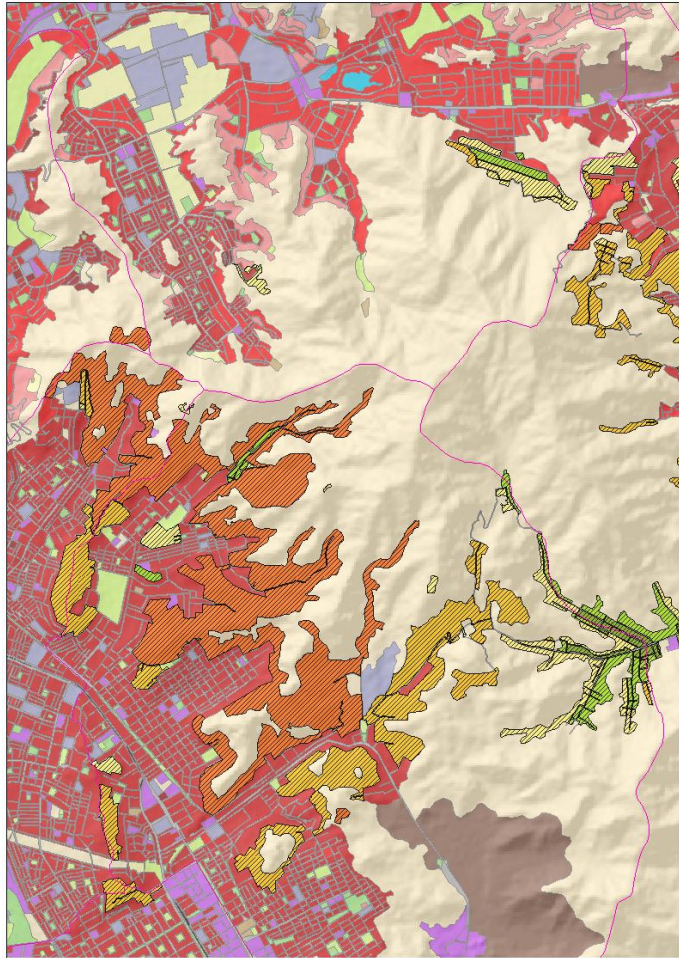


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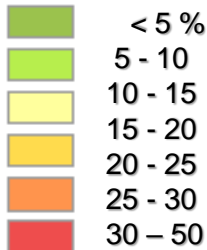


URBAN ATLAS

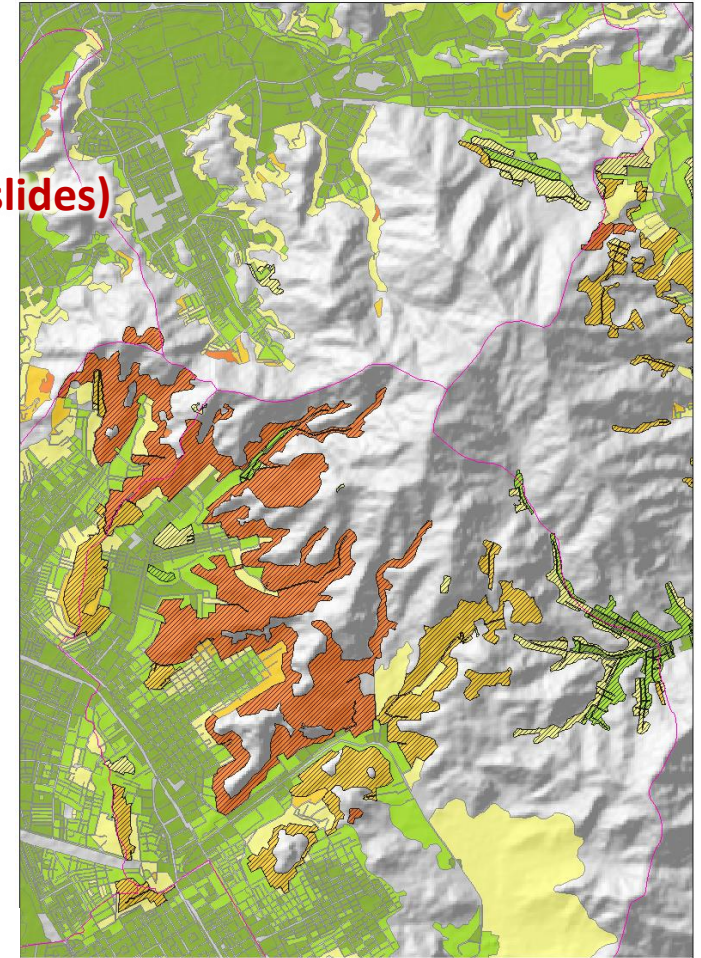
... new settlement areas: exposed to higher risk

... identify areas,
exposed to Risk/
course Risks (land slides)

Slope degree



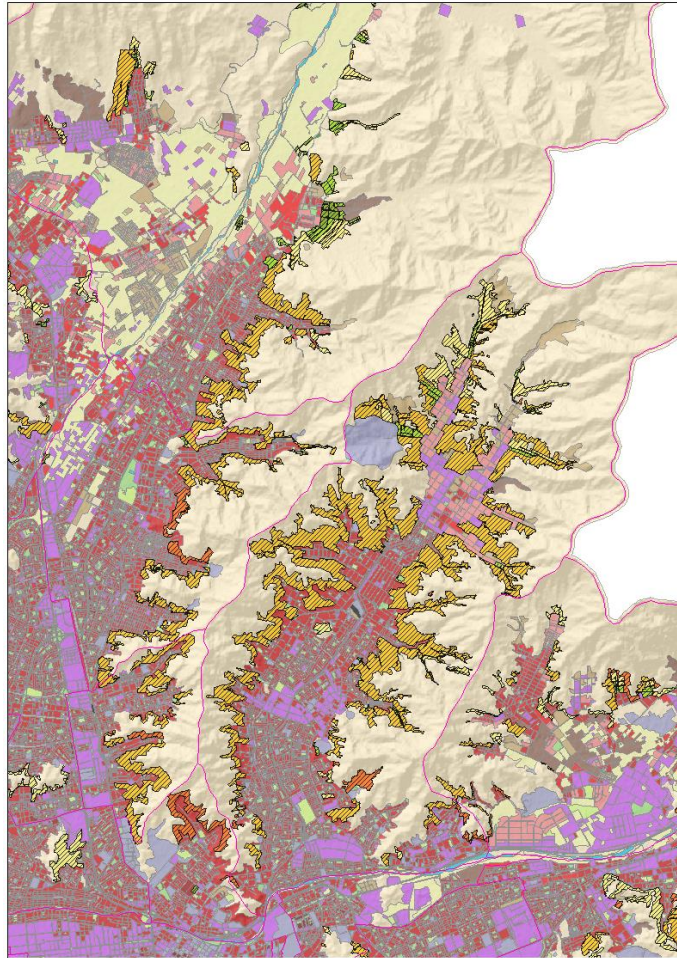
 Informal Transition



(slope > 30% is steep terrain), **SRTM PLUS**

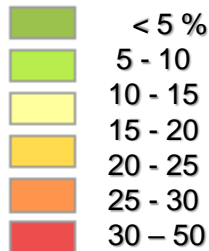
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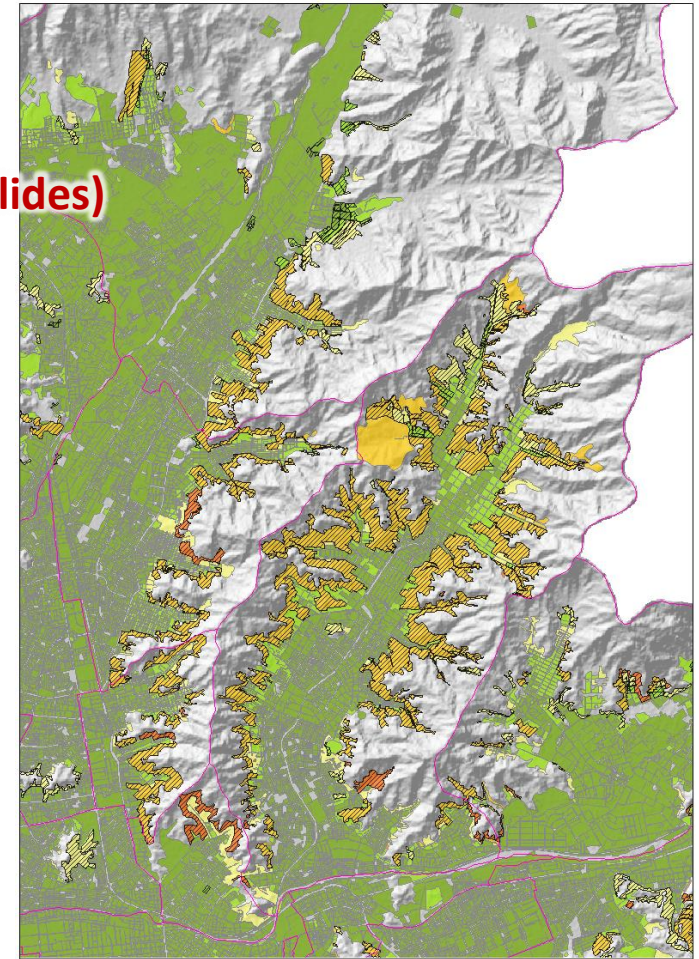


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(slope > 30% is steep terrain), SRTM PLUS

URBAN ATLAS

... new settlement areas: exposed to higher risk

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serve by providing Info, thematic Details + Statistics

... start Analysis

improve Quality

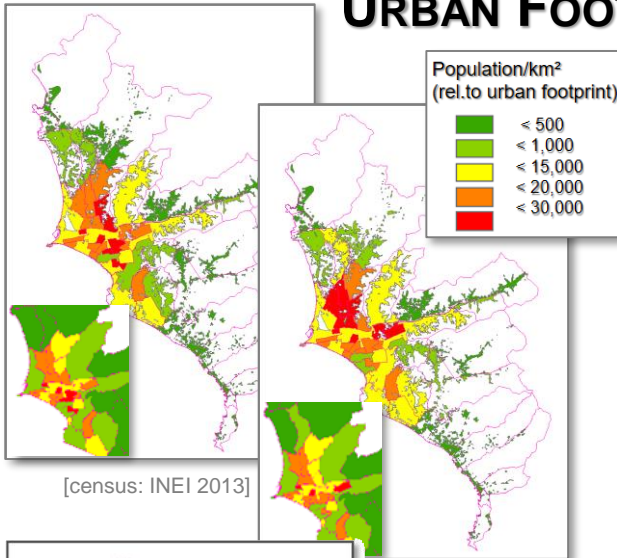
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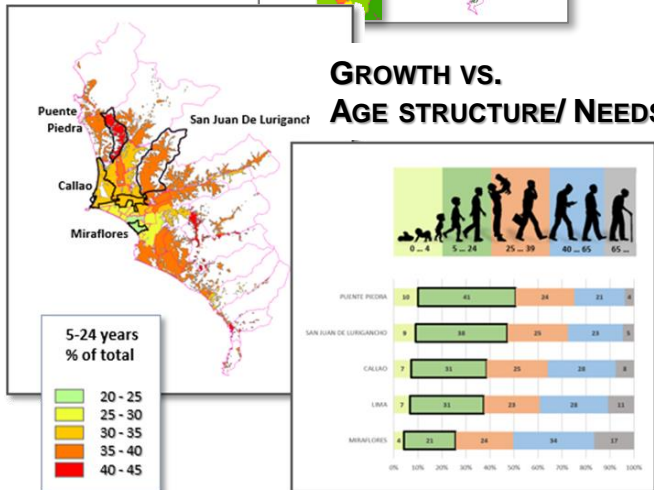
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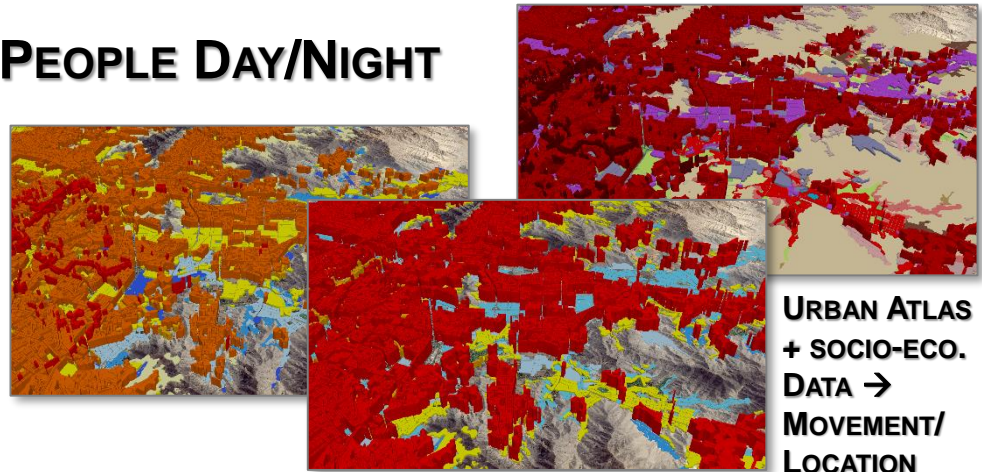
BRINGING STATISTICS TO THE URBAN FOOTPRINT



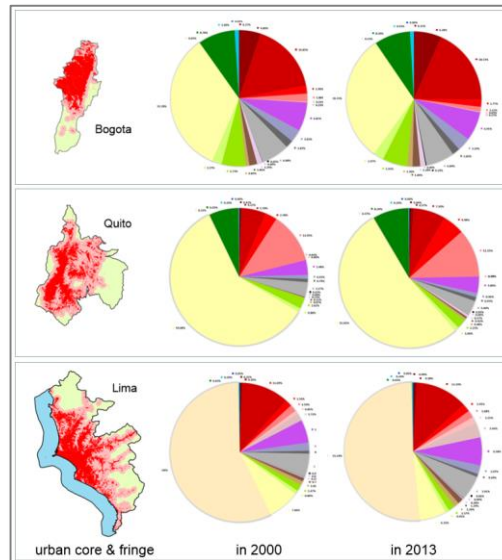
GROWTH VS. AGE STRUCTURE/ NEEDS



PEOPLE DAY/NIGHT



COMPARE WITH OTHER



THEMATIC ANALYSIS



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CONCLUSIONS

- **EARTH OBSERVATION (EO) BRINGS NEW QUALITY TO THE URBAN MODEL**
 - ... DATA, TECHNIQUES, INFORMATION SERVICES: ABLE TO SERVE DIFFERENT REQUIREMENTS
- **URBAN ISSUES REQUIRE LARGE SCALE & HIGH PRECISION – FAST CHANGES**
 - WITH EO INFORMATION WE CAN COVER LARGE EXTENT – 1 TIME STAMP!
 - ... CLEVER COMBINATION IS THE KEY TO SOLUTIONS
- **RETURN OF INVESTMENT IS THERE (MEASURABLE)**
 - ... GOOD INFORMATION BASE IS ESSENTIAL FOR MANAGEMENT & CONTROLLING
- **QUESTION OF AWARENESS & ACCEPTANCE**
 - ... NEED CAPACITY BUILDING
 - ... NEED ENCOURAGEMENT & SUPPORT FOR THE STAKEHOLDERS TO APPLY ON THE SERVICES FOR DOING FIRST STEPS



© <http://www.paxgaea.com/images/Lima.jpg>

IT IS ESSENTIAL TO INCREASE PROGRAMS FOR FURTHER IMPLEMENTATIONS OF EO-SERVICES INTO AN “OPERATIONAL PROCESS”.

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... LETS CREATE THE WHOLE PICTURE

THANK YOU FOR YOUR ATTENTION



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Elke Kraetzschmar

Senior Specialist in
Image Analysis & Remote Sensing

Hermann-Reichelt-Str.3
D-01109 Dresden
Germany

Tel +49 351 8923 145

Fax +49 351 8923 2355

E-Mail kraetzschmar@iabg.de

Web www.iabg.de

Dr. Rainer Malmberg

Business Development

Einsteinstraße 20
D-85503 Ottobrunn
Germany

Tel +49 89 6088 2823

Fax +49 351 8923 2355

E-Mail malmberg@iabg.de

Web www.iabg.de