Unleashing the Power of Where

UN Headquarters • 22 April 2015

How Geographic Information Contributes to Achieving the SDGs

Lawrence Friedl NASA Earth Science

Social

Environmental

Economic

"Everything happens somewhere."

- Nancy Tosta

Forest Cover from Earth-observing Environmental Satellites

GOAL 15

PROTECT, RESTORE AND PROMOTE SUSTAINABLE USE OF TERRESTRIAL ECOSYSTEMS, SUSTAINABLY MANAGE FORESTS, COMBAT DESERTIFICATION, AND HALT AND REVERSE LAND DEGRADATION AND HALT BIODIVERSITY LOSS
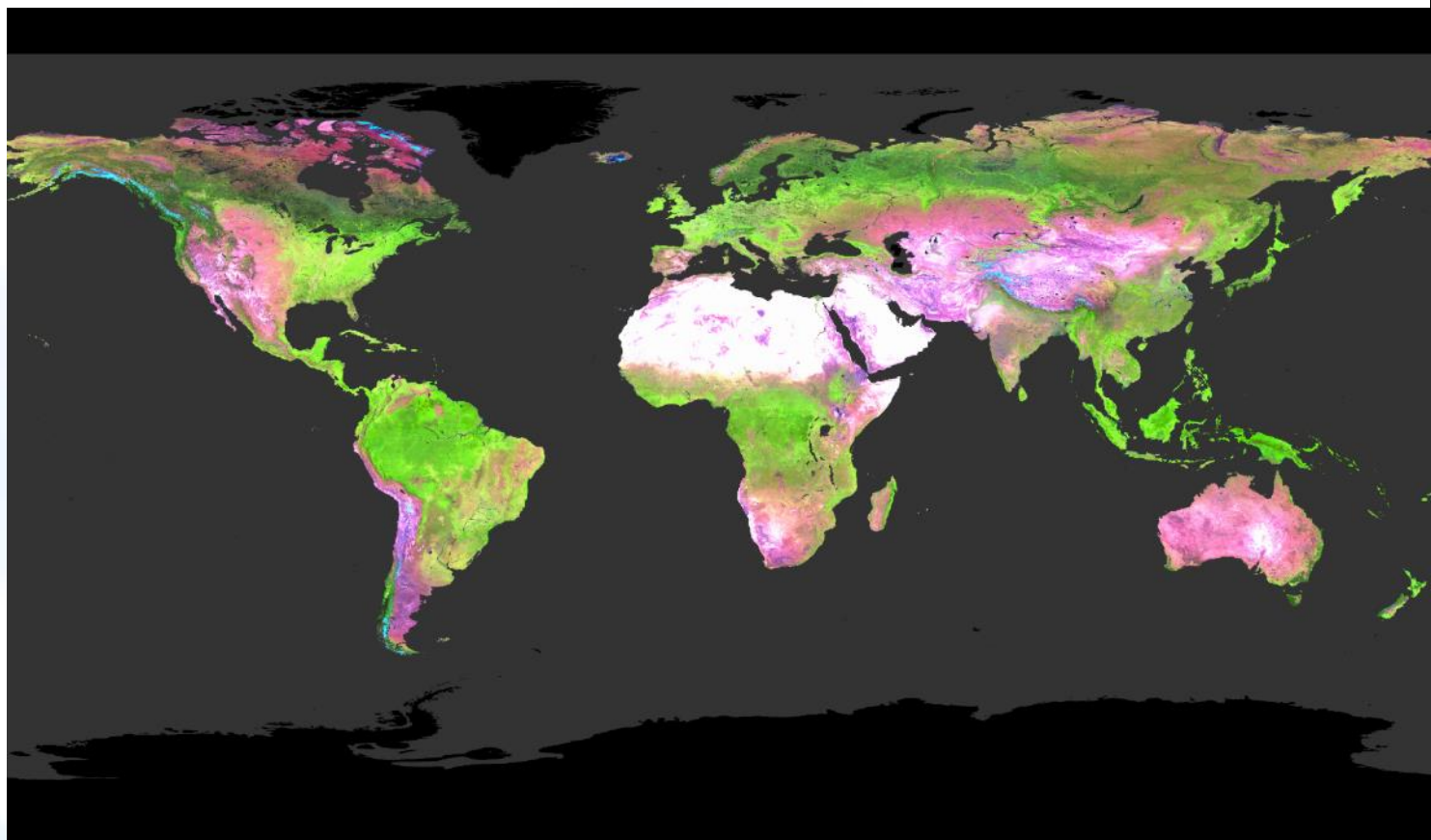
Target 15.1:
By 2020 ensure conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands …

Target 15.2:
By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests, and increase afforestation and reforestation by x% globally.

Vegetation in greens
Soils in mauves

Credit: Matthew C. Hansen, Univ. Maryland, et al.   Image for 2000.

Tree cover extent and forest loss and gain 2000 to 2013

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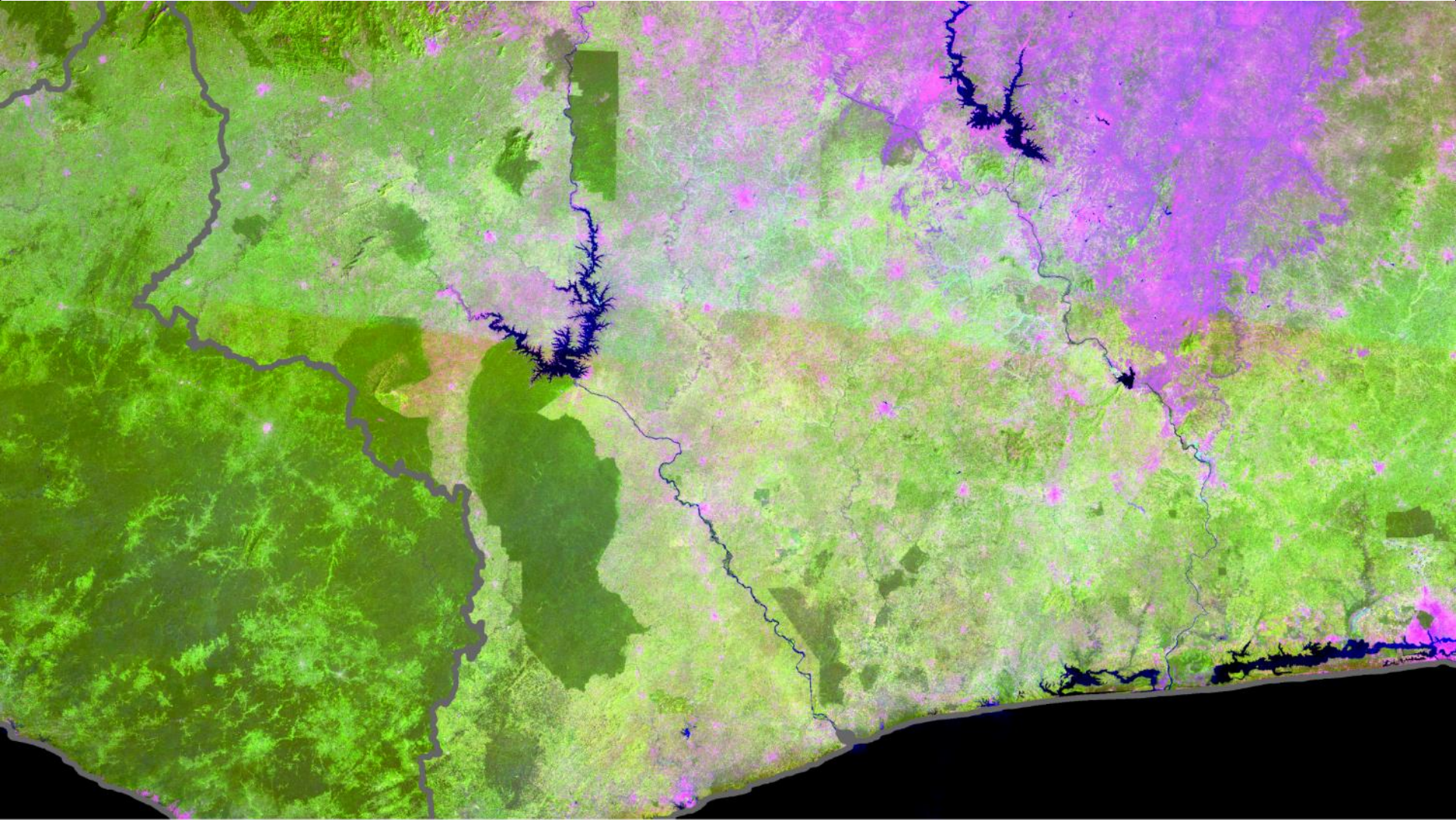
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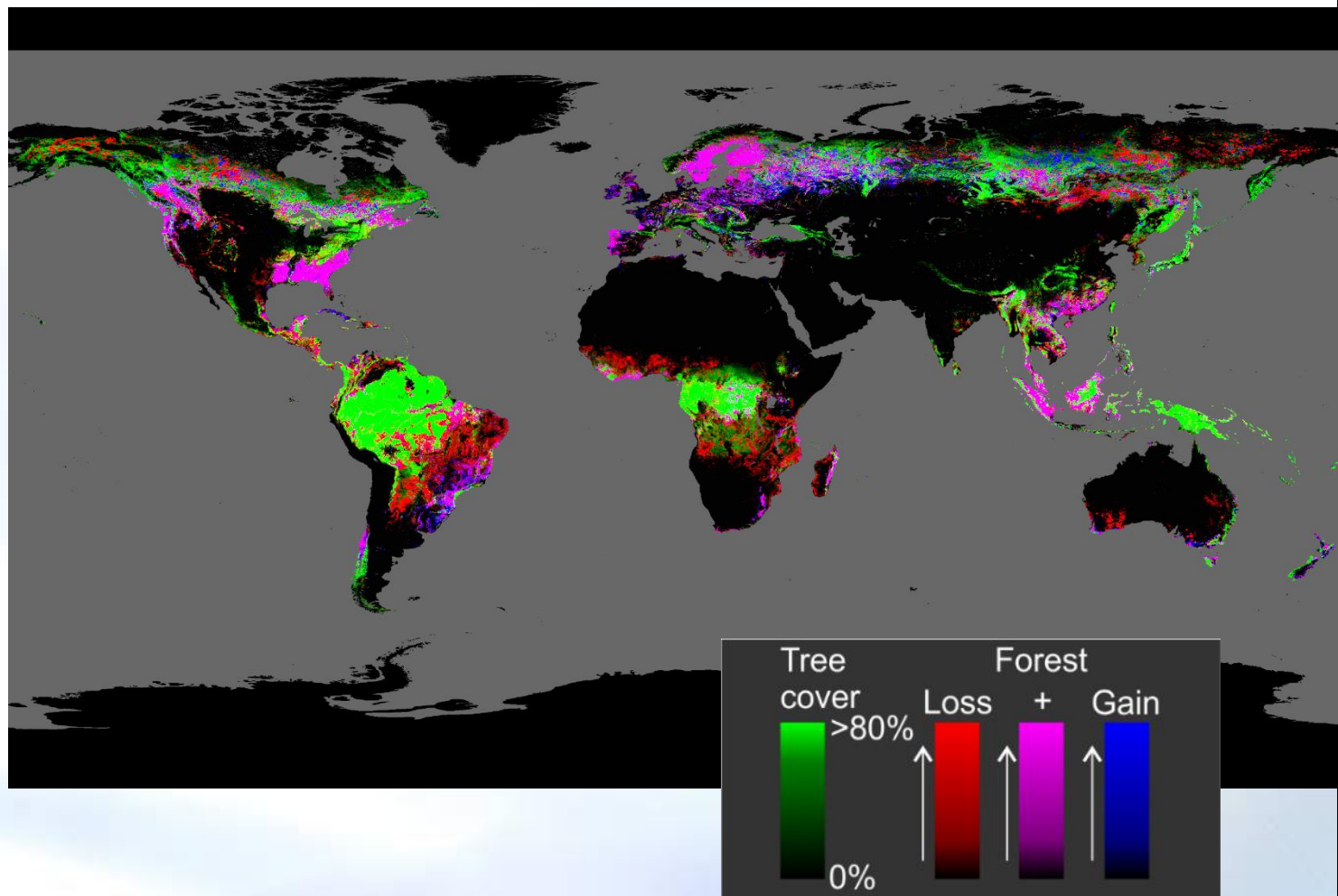
Credit: Matthew C. Hansen, Univ. Maryland, et al.

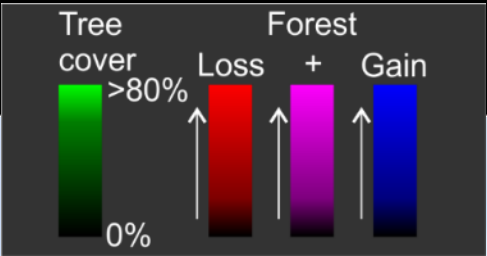# Cote d'Ivoire/Liberia
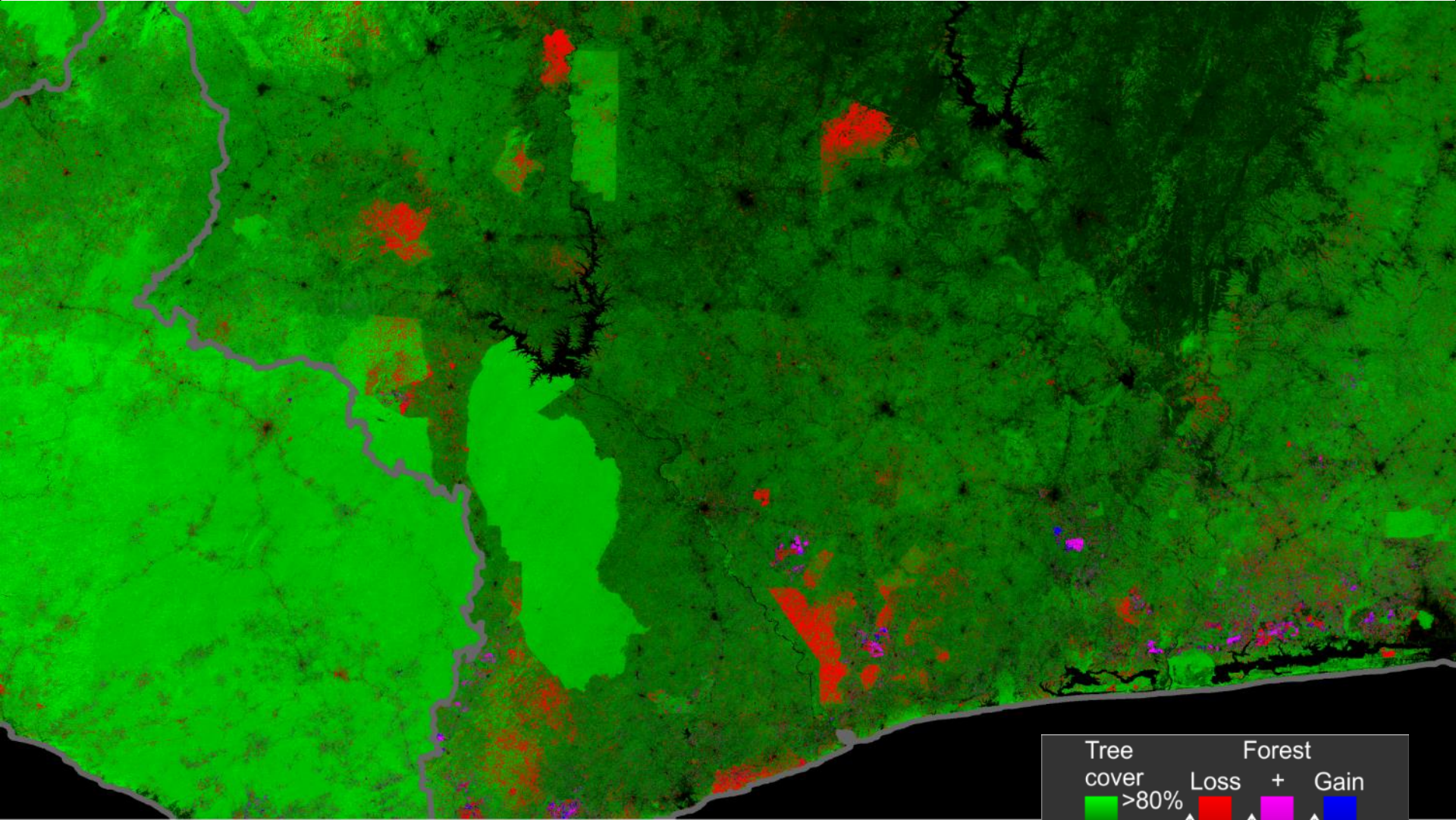
Landsat 5-4-3
2000 best pixel composite

Credit: Matthew C. Hansen,
Univ. Maryland, et al.

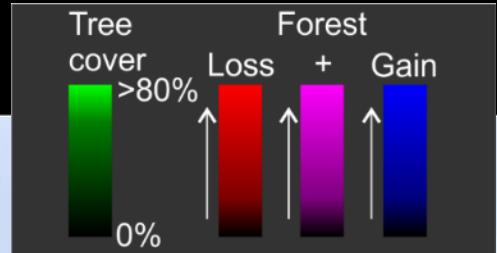**Vegetation in greens**
Soils in mauves

Cote d'Ivoire/Liberia

2000 to 2013 tree cover extent and forest loss and gain

Credit: Matthew C. Hansen, Univ. Maryland, et al.

Tree cover
Forest
Loss + Gain
>80%
0%

Cote d'Ivoire/Liberia

White = all protected areas.
2000 to 2013 tree cover extent
and forest loss and gain
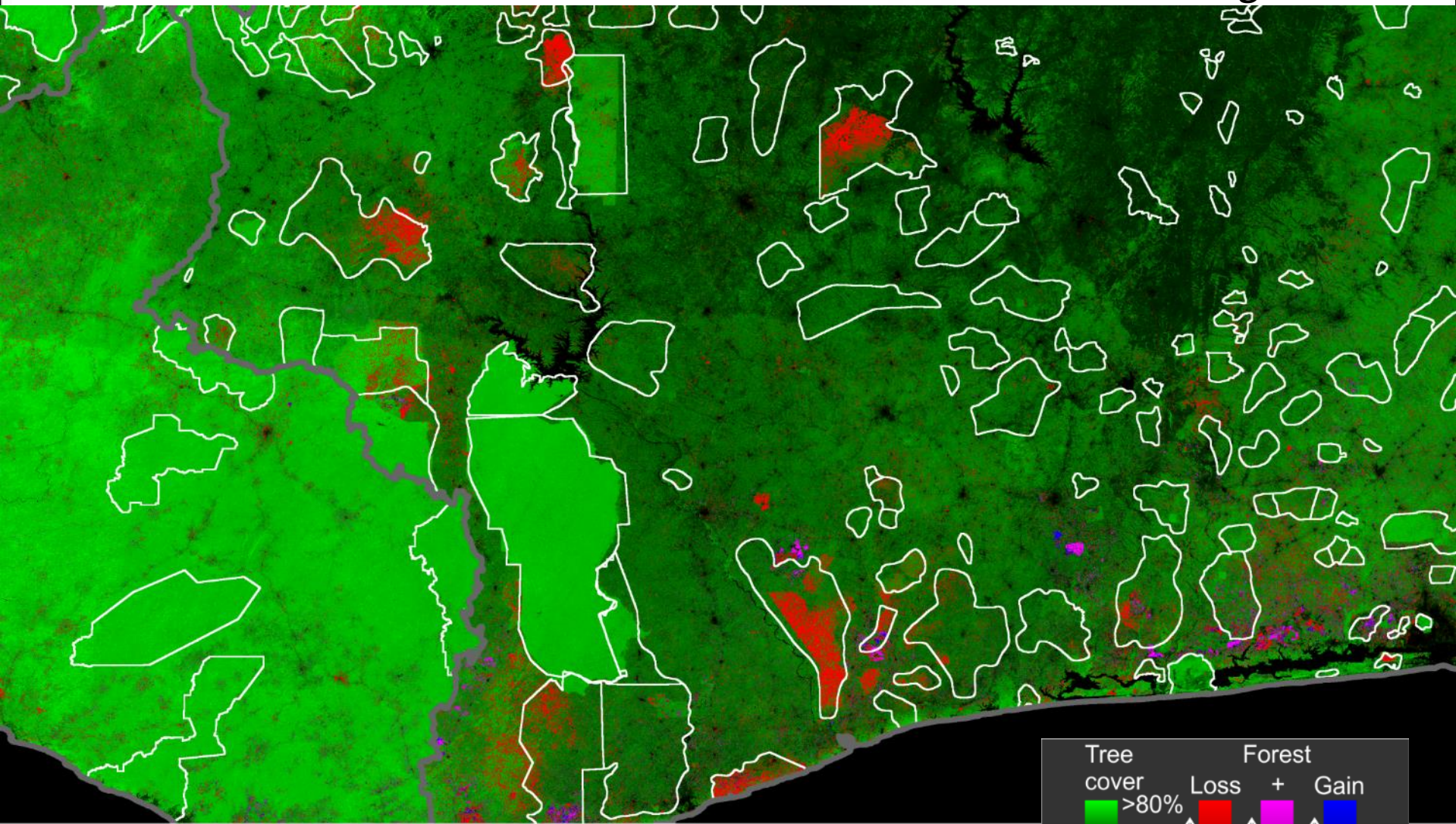
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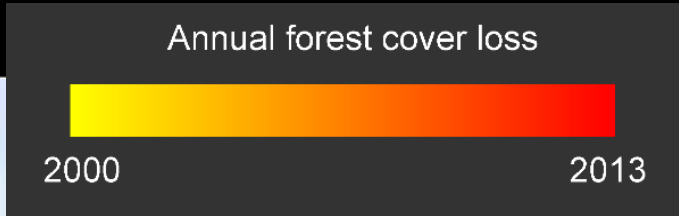Forest loss mapped by year.

Annual forest cover loss
2000   2013
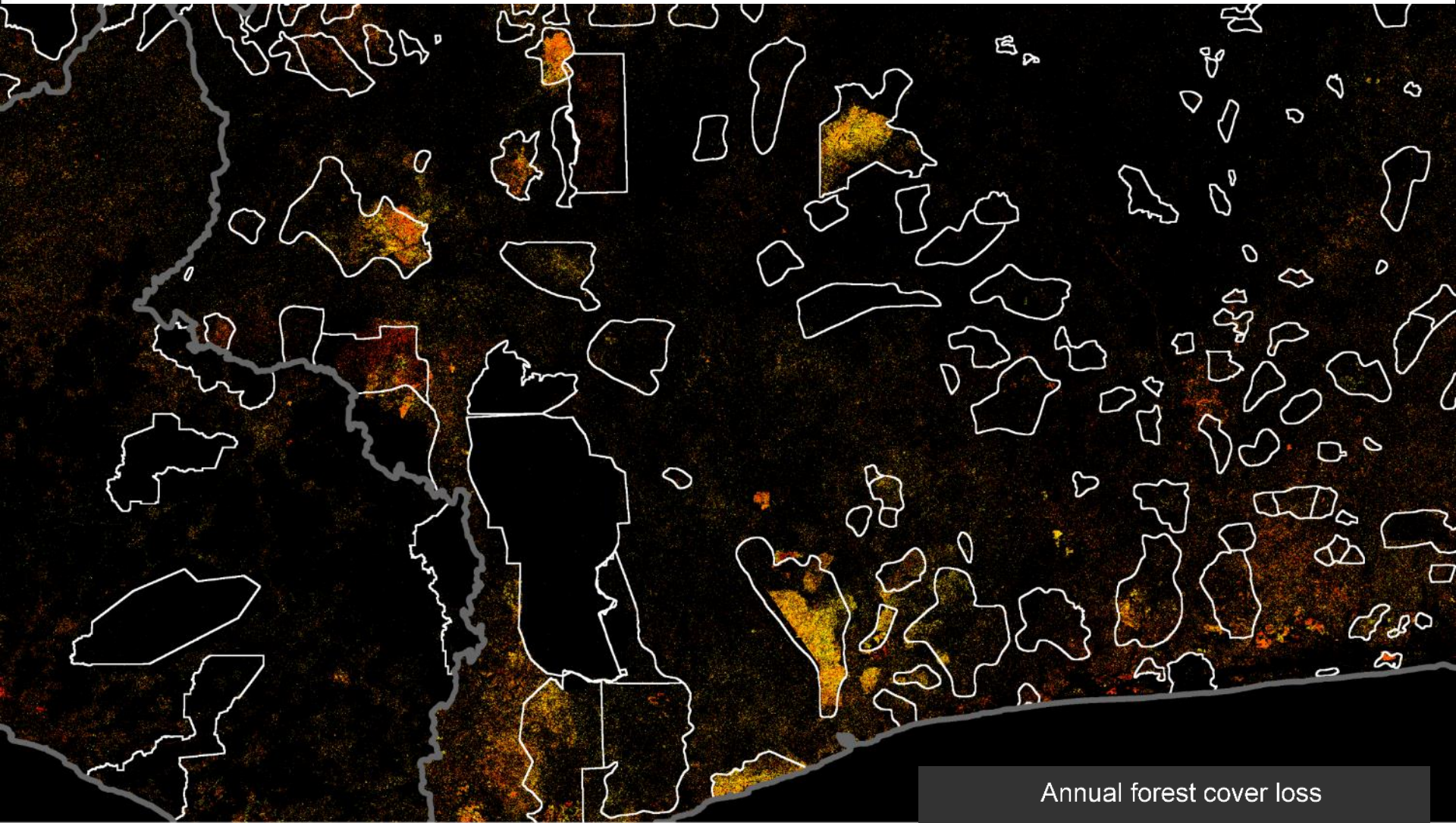
Credit: Matthew C. Hansen,
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Global annual forest cover loss
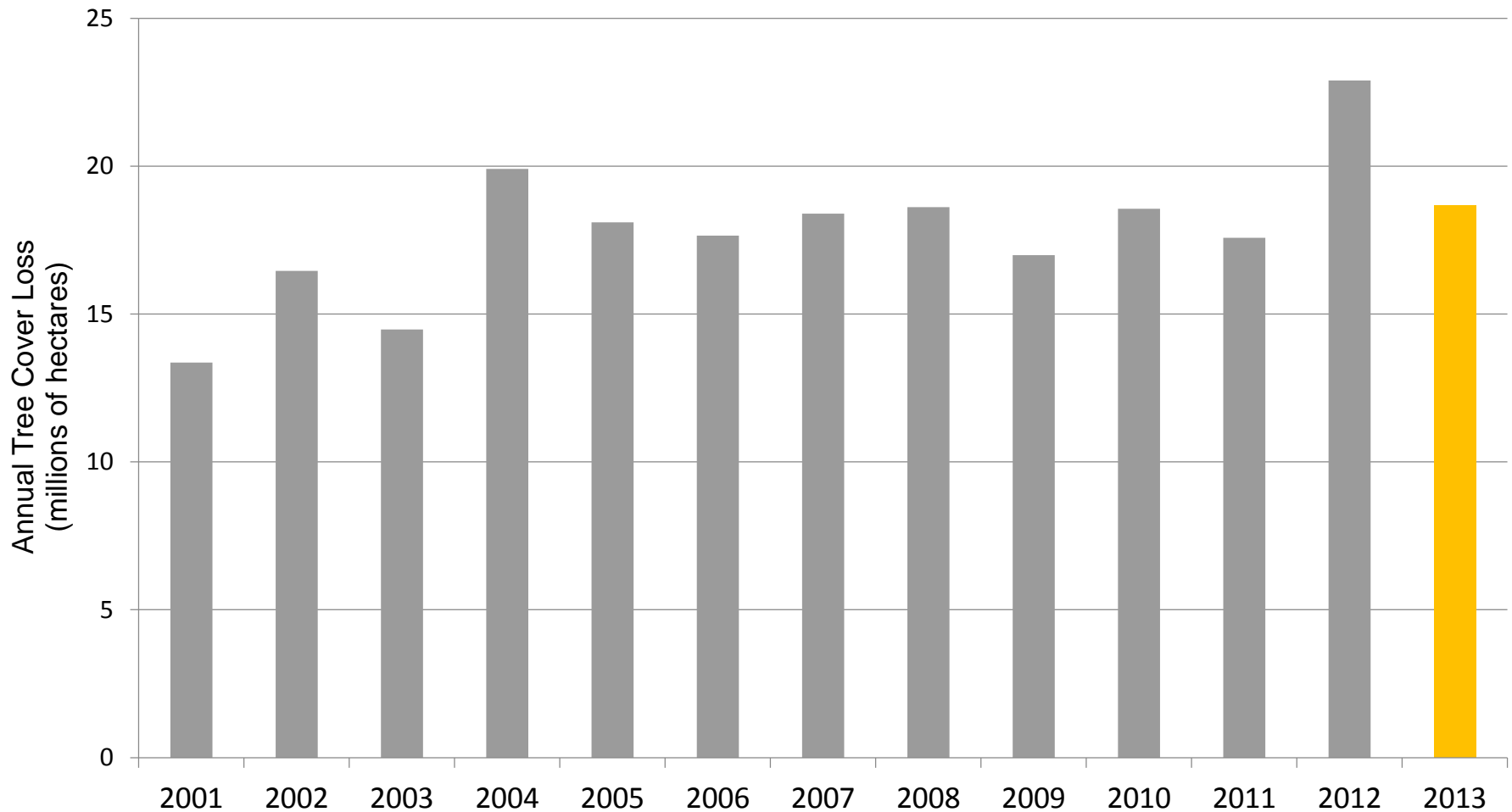
Credit: Matthew C. Hansen, Univ. Maryland, et al.

GOAL 2

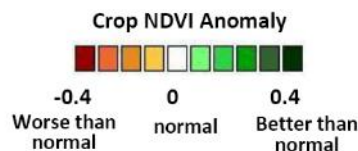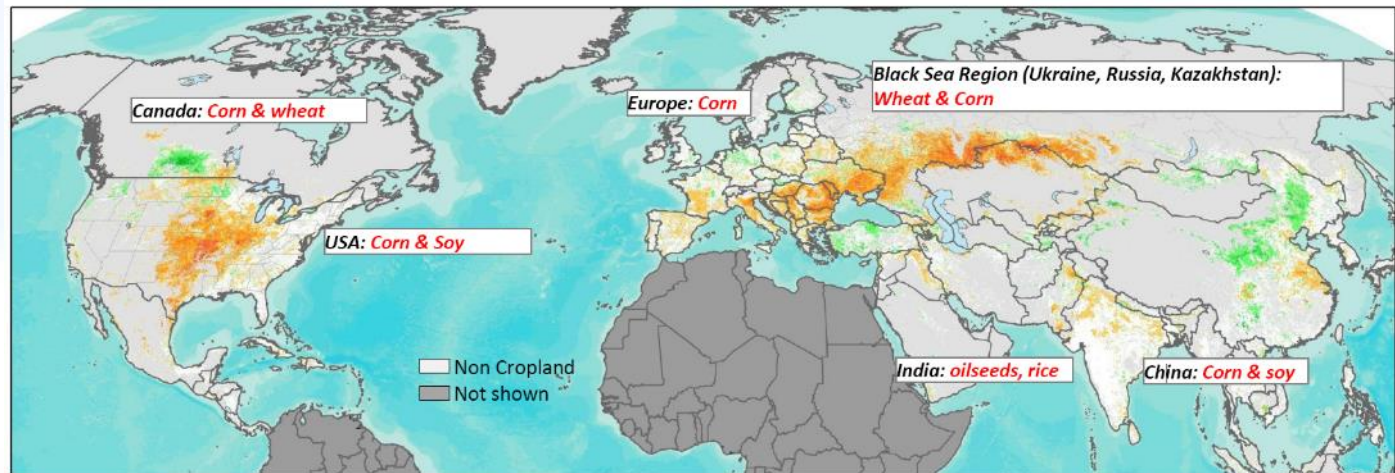END HUNGER, ACHIEVE FOOD SECURITY AND IMPROVED NUTRITION AND PROMOTE SUSTAINABLE AGRICULTURE

Global observations routinely provide early insights on anomalies in crop condition and aid food supply and production forecasts.

The Agricultural Market Information System includes monthly crop health estimates in the *Market Monitor*.

Market Monitor

Target 2.4:
By 2030 ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production …

Target 2.c:
Adopt measures to ensure the proper functioning of food commodity markets and their derivatives, and facilitate timely access to market information, including on food reserves, in order to help limit extreme food price volatility.

Northern Hemisphere: August 2012 Crop Conditions

Canada: *Corn & wheat*
Europe: *Corn*
Black Sea Region (Ukraine, Russia, Kazakhstan): *Wheat & Corn*
USA: *Corn & Soy*
India: *oilseeds, rice*
China: *Corn & soy*
Non Cropland
Not shown

Crop NDVI Anomaly

-0.4 Worse than normal | 0 normal | 0.4 Better than normal

Observed highlights:
- Drought conditions persist in US, south eastern Ukraine, Russia, and Kazakhstan, with slight improvement in some areas in northern Kazakhstan
- Rains in India mitigate dry conditions

GEOGLAM Global Agricultural Monitoring   GEO   CEOS

Crop NDVI Anomalies from 2000-2013 average (13.Aug.2012)

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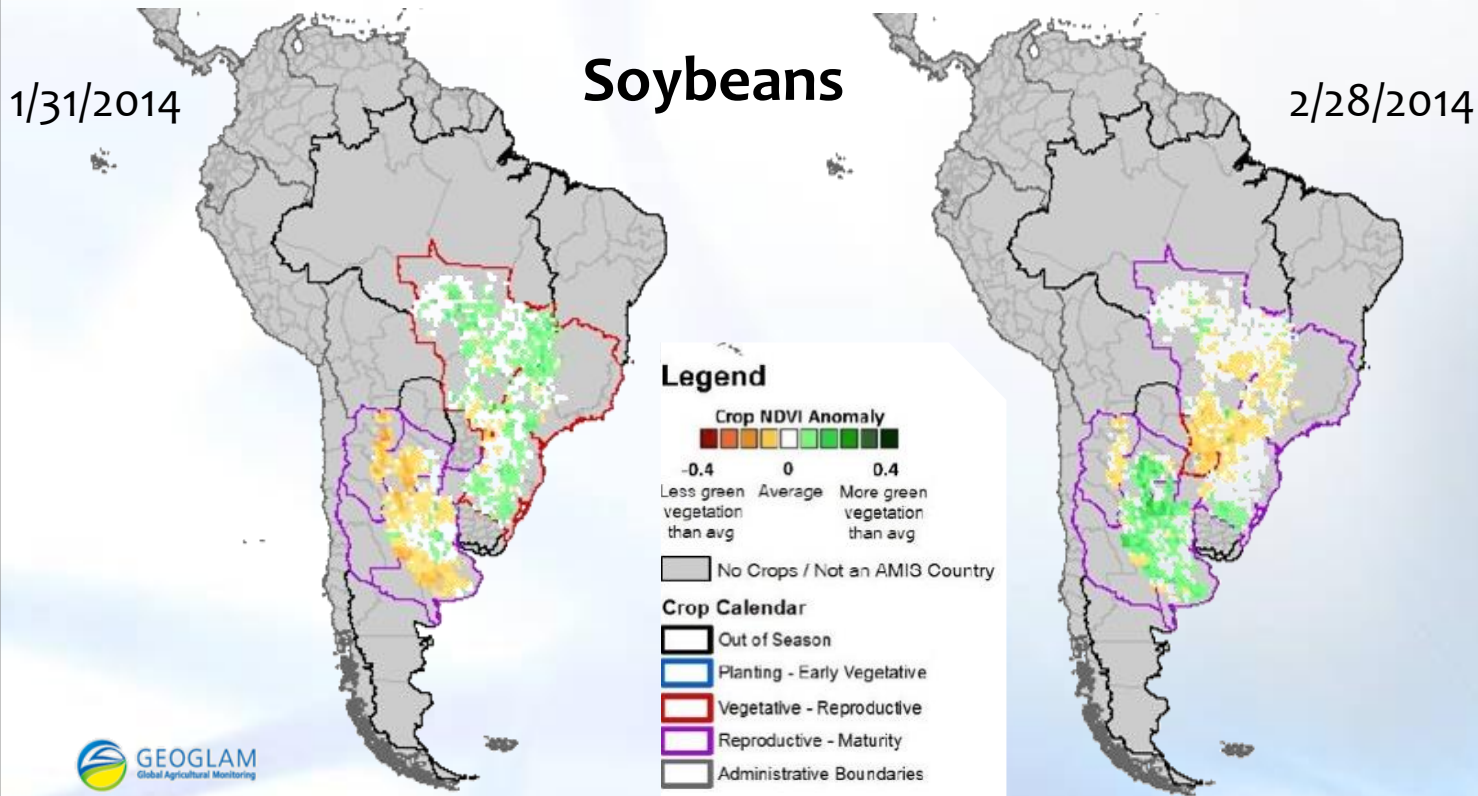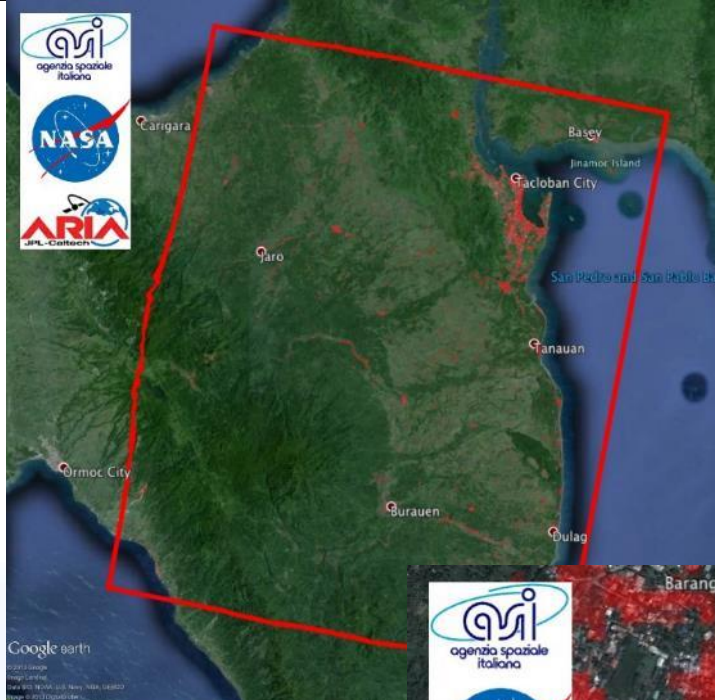
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Market Monitor

Soybeans

1/31/2014   2/28/2014

Legend

Crop NDVI Anomaly

-0.4   0   0.4

Less green vegetation than avg   Average   More green vegetation than avg

No Crops / Not an AMIS Country

Crop Calendar
- Out of Season
- Planting - Early Vegetative
- Vegetative - Reproductive
- Reproductive - Maturity
- Administrative Boundaries

GEOGLAM
Global Agricultural Monitoring

GEO   CEOS

Crop NDVI Anomalies from 2000-2013 average

GOAL 11

MAKE CITIES AND HUMAN SETTLEMENTS INCLUSIVE, SAFE, RESILIENT AND SUSTAINABLE

Target 11.5:
By 2030 significantly reduce the number of deaths and the number of affected people and decrease by [x] per cent the economic losses relative to GDP caused by disasters, including water-related disasters, with the focus on protecting the poor and people in vulnerable situations.
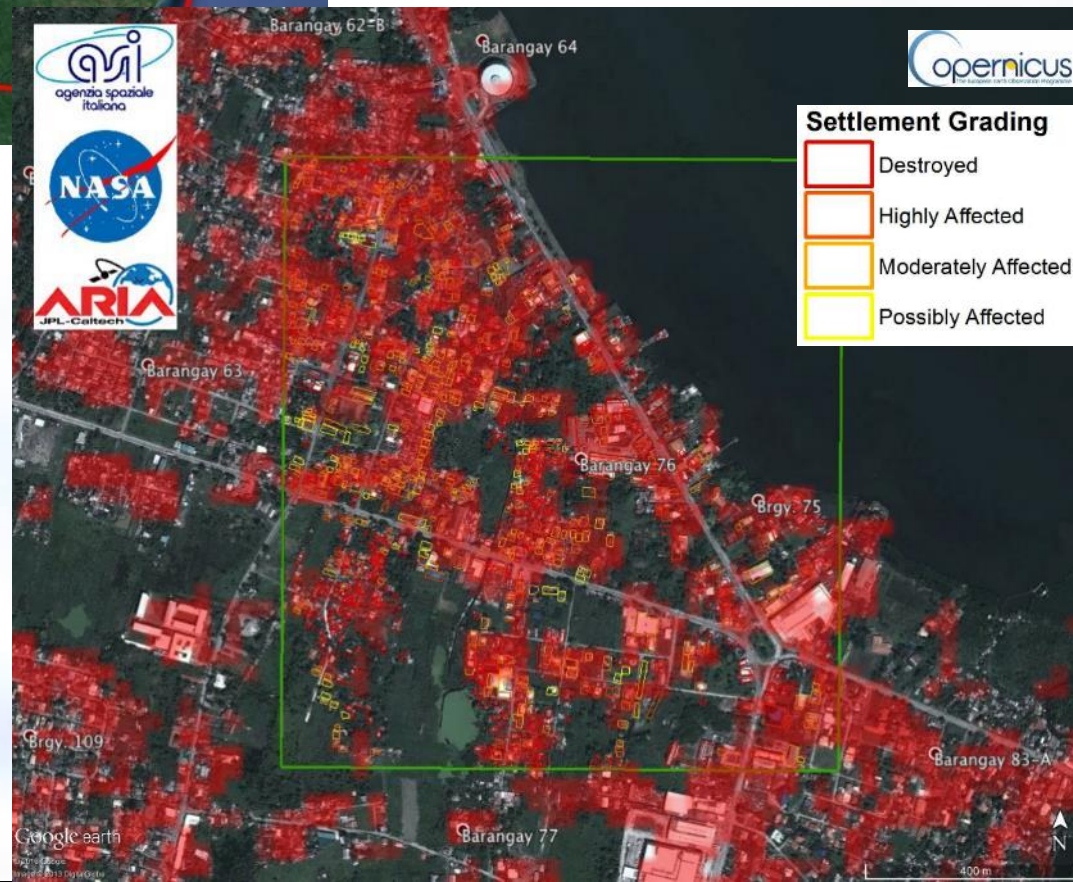
Proposed Indicator 2:
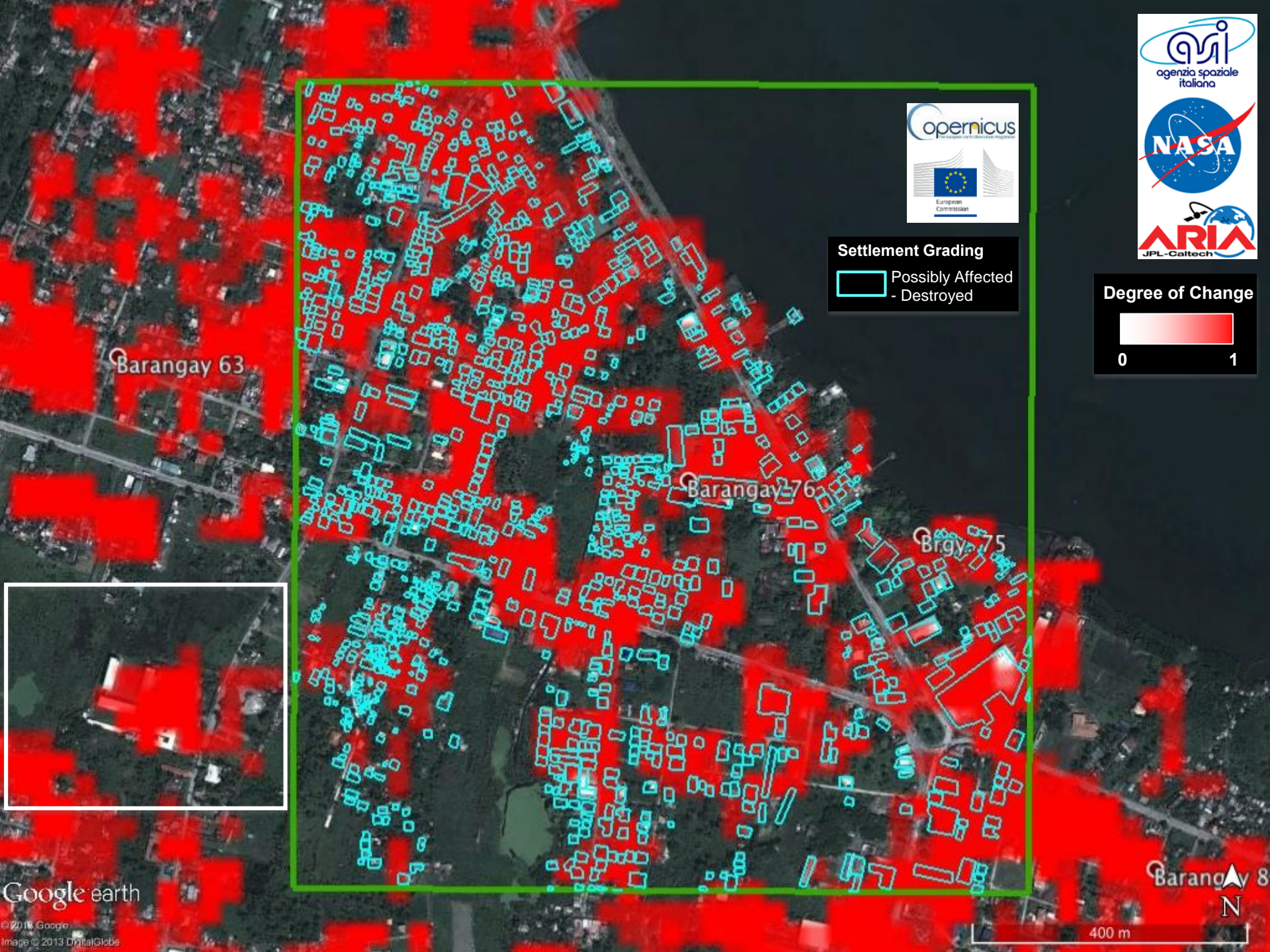Number of housing units damaged and destroyed [by disasters]

Super Typhoon Haiyan Damage in Tacloban, Philippines

December 2013

Imaged with COSMO-SkyMed radar satellite constellation

Settlement Grading

- Destroyed
- Highly Affected
- Moderately Affected
- Possibly Affected

Barangay 63

Barangay 76

Brgy. 75

Barangay 8

Settlement Grading

Possibly Affected
- Destroyed

Degree of Change

0   1

Google earth

© 2013 Google
Image © 2013 DigitalGlobe

400 m

N

Coral Reef Watch

Ecosystem-Based Management of Tropical Coral Reef Environments

Target 14.2:
By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration, to achieve healthy and productive oceans
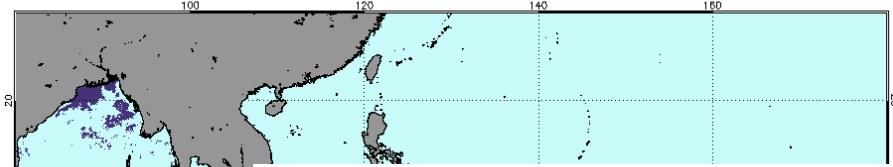
Target 14.3:
Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels

NOAA Coral Reef Watch Daily 5-km Blended Geo-Polar Night-Only Sea Surface Temperatures   20 Apr 2015
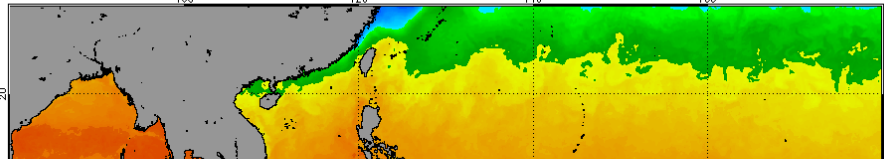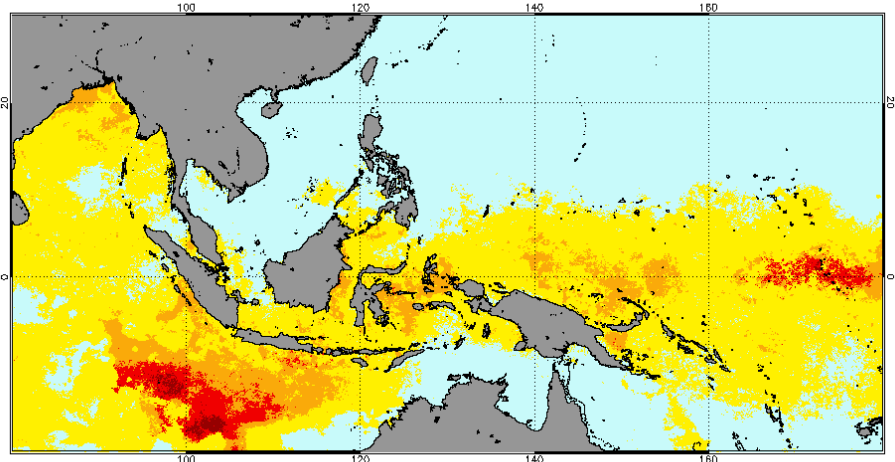
Sea Surface Temperature

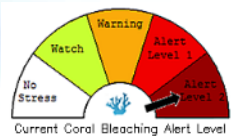NOAA Coral Reef Watch Daily 5-km Blended Geo-Polar Night-Only Degree Heating Weeks   20 Apr 2015

Degree Heating Weeks

NOAA Coral Reef Watch Daily 5-km Blended Geo-Polar Night-Only Bleaching Alert Area 7d Max 20 Apr 2015

Bleaching Alert

No Stress   Watch   Warning   Alert Level 1   Alert Level 2

Source: NOAA/NESDIS

http://coralreefwatch.noaa.gov/satellite/bleaching5km/index.php

Air Quality: Particulate Matter

Based on Measurements from Space-based Sensors

GOAL 3

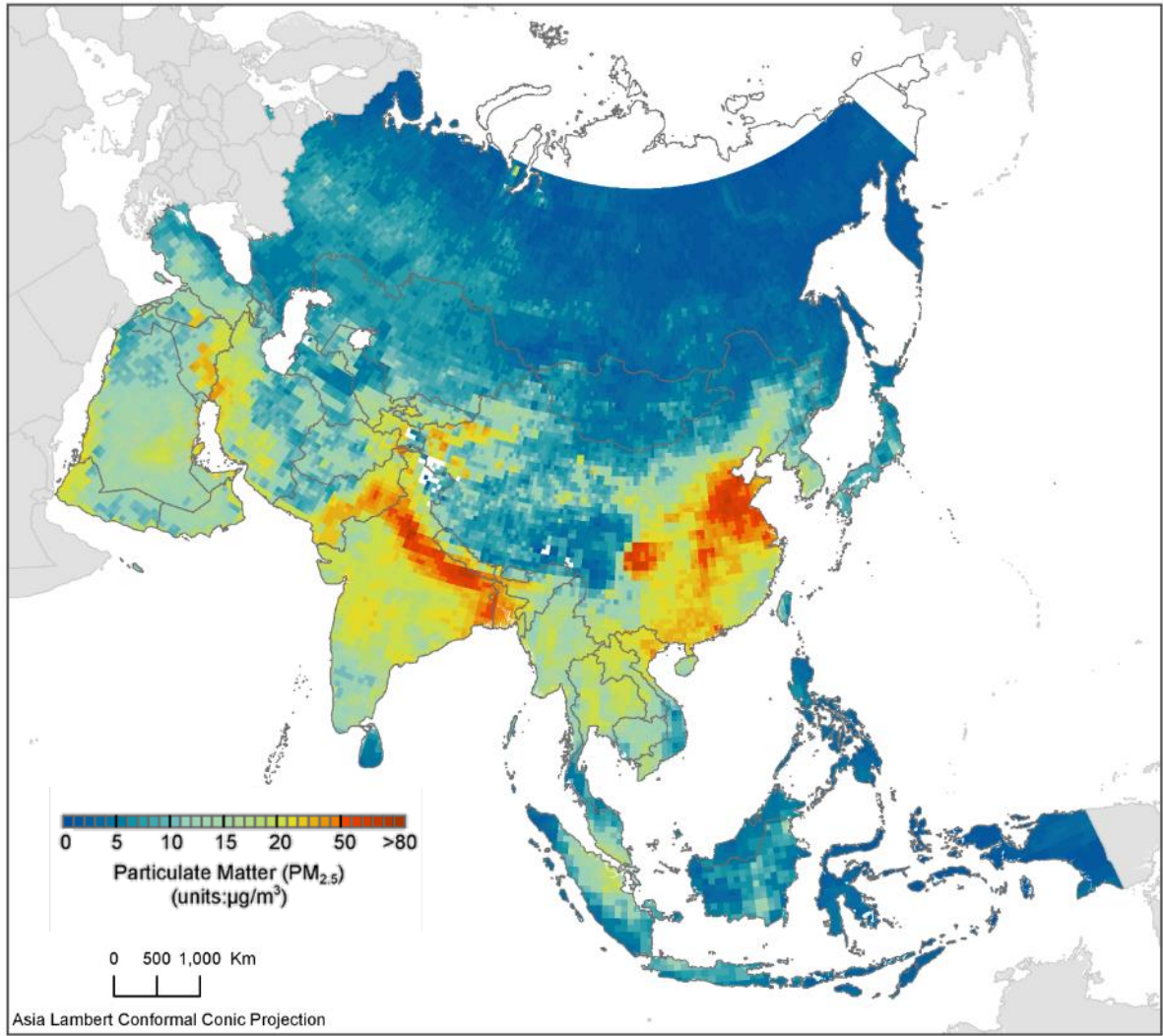ENSURE HEALTHY LIVES AND PROMOTE WELL-BEING FOR ALL AT ALL AGES

Target 3.9:
By 2030 substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water, and soil pollution and contamination

GOAL 11

MAKE CITIES AND HUMAN SETTLEMENTS INCLUSIVE, SAFE, RESILIENT AND SUSTAINABLE

Target 11.6:
Reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality, municipal and other waste mngmnt.

Particulate Matter (PM2.5)
(units:µg/m³)

0   5   10   15   20   50   >80

0   500 1,000 Km

Asia Lambert Conformal Conic Projection

Map Credit: CIESIN Columbia University, April 2013.

Global Annual Average PM2.5 Grids, 2010

Source: CIESIN

Land Use and Land Cover Mapping
Borneo Island

Forest and land cover map featuring 18 classes

Legend (18 classes):

- Lowland forest
- Riverine forest
- Swamp forest
- Mangrove forest
- *Nipah* mangrove forest
- Peat swamp pole forest
- Peat swamp / Riverine shrub
- Forest mosaics
- High shrub
- Medium shrub
- Ferns / grass
- Grasslands
- Cropland (upland)
- Cropland (irrigated)
- Plantations
- Tree cover, burnt
- Water bodies
- Layover /Shadow
- No strip coverage
- Mountain forest

SDG Goals and Geospatial Data

Goal 1 | End Poverty
- Proposed indicator on losses from natural disasters
- Poverty maps

Goal 2 | Hunger and Food Security
- Crop yield estimates, soil characteristics, crop water productivity, irrigation
- Nutritional status maps

Goal 3 | Health and Well-being
- Health facility maps
- Disease incidence and risk maps

Goal 4 | Education
- School facility maps
- Literacy and educational achievement maps

Goal 6 | Water and Sanitation
- Water resources
- Water and sanitation access maps

Goal 9 | Access to Infrastructure
- Roads, Public transportation
- Mobility maps
- Facilities inventories

Source: Center for International Earth Science Information Network

SDG Goals and Geospatial Data

Goal 11 | Cities
- Access to public green space
- Substandard housing maps

Goal 12 | Sustainable Consumption
- Energy productivity maps
- Pollution maps

Goal 13 | Combating Climate Change
- CO_2 emissions
- Exposure to extreme storms and droughts

Goal 14 | Marine and coastal ecosystems
- Coastal/Marine protected areas
- Harmful algal blooms
- Eutrophication

Goal 15 | Terrestrial ecosystems
- Land cover, land degradation, bio-diversity
- Protected areas

Goal 16 | Peaceful and inclusive societies
- Maps of political violence
- Crime maps
- Refugee and IDP movement

Source: Center for International Earth Science Information Network

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UN-GGIM
UNITED NATIONS INITIATIVE ON
GLOBAL GEOSPATIAL
INFORMATION MANAGEMENT

PERMANENT MISSION OF DENMARK
TO THE UNITED NATIONS

GEO GROUP ON
EARTH OBSERVATIONS

Thank You

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Washington, DC
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**NASA Earth Science
Applied Sciences Program**

http://AppliedSciences.NASA.gov

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Backup Materials

Geospatial Data Prominent within Sustainable Development Monitoring Framework

Development planning and SDG outcomes can be visualized with maps.

Mapping SDG related data will improve planning, evaluation and communication of the results.

Technological innovations are increasing our measuring abilities and cost-reductions are making it feasible.

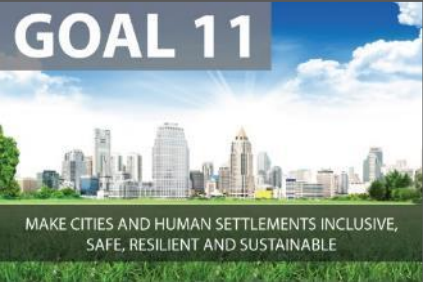The SDGs arrive at a prime convergence moment for seizing the power of spatial data and information.

Source: Center for International Earth Science Information Network

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Concentrations of NO2 for Jan. 1-8, 2013

Data from Ozone Monitoring Instrument on Aura satellite
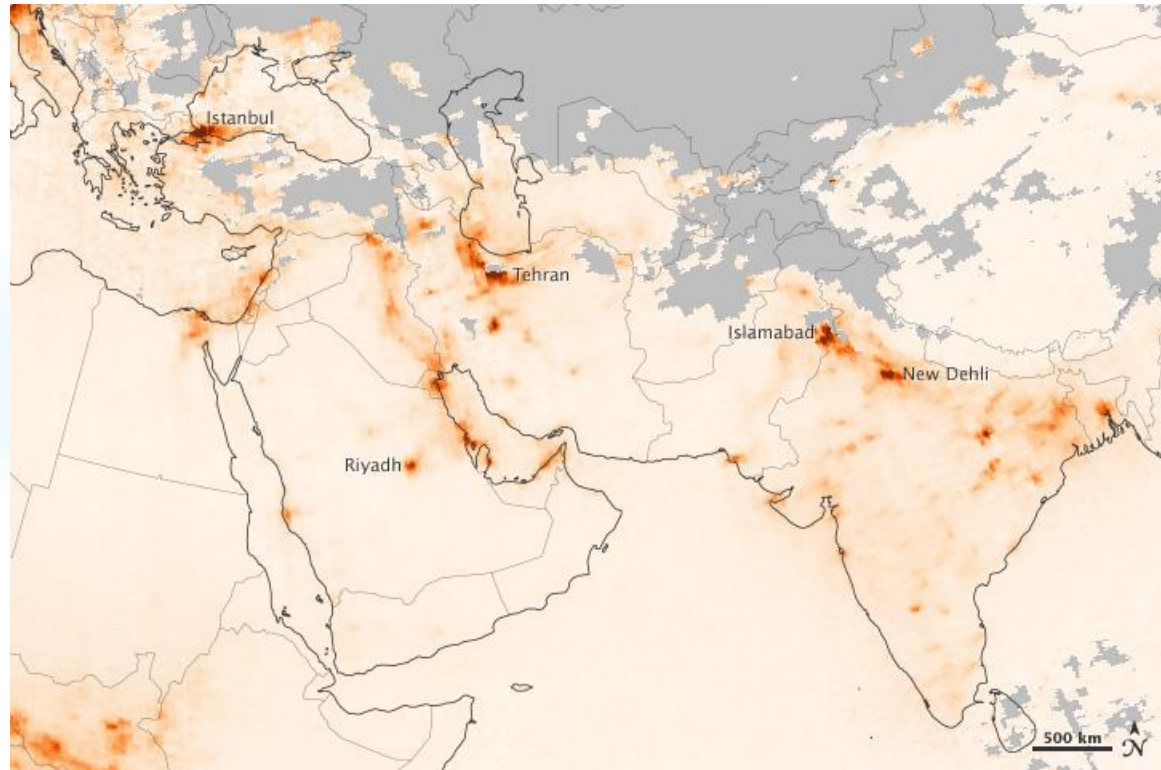
Shades of orange reflect the relative abundance of NO_2. Grays show areas without usable data (e.g., cloud cover)

Source: NASA Earth Observatory

Coral Reef Watch

Ecosystem-Based Management of Tropical Coral Reef Environments

GOAL 14

CONSERVE AND SUSTAINABLY USE THE OCEANS, SEAS AND MARINE RESOURCES FOR SUSTAINABLE DEVELOPMENT

Target 14.2:
By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration, to achieve healthy and productive oceans

Target 14.3:
Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels

2015 Apr 21 NOAA Coral Reef Watch 60% Probability Coral Bleaching Thermal Stress for May–Aug 2015
Experimental, v3.0, CFSv2–based, 28–member Ensemble Forecast

Potential Stress Level: Watch | Warning | Alert Level 1 | Alert Level 2

Source: NOAA/NESDIS

http://coralreefwatch.noaa.gov/satellite/bleaching5km/index.php