Policy Relevant Indicators of Air Quality

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HAQAST4 Meeting
17 July 2018

Center for International Earth Science Information Network
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What is SEDAC’s purpose?

- SEDAC data provide the ground level context for NASA’s remote sensing data
- Focus on human dimensions of environmental change
- Big emphasis on data integration
- Direct support to scientists, applied and operational users, decision makers, and policy communities
- Strong links to geospatial data community
Lessons from the EPI and Indicator Research

• Country comparative indices can set up a competitive dynamic among peer groups
• Decision makers are interested in pressure and impact measures
• Indicators are most successful when they have the following characteristics:
  – Credible: high perceived technical quality that is provided by a reputable source
  – Salient: relevant technical information provided to decision makers in a timely manner (does the information resonate with the audience?)
  – Legitimate: the producers have engaged various actors in indicator design, resulting in “buy-in”

The Benefit of Satellite Data for Indicator Development

- Satellite remote sensing data have the potential to fill persistent data gaps in *in situ* monitoring networks
- Satellite data provide wall to wall coverage and consistent time series
- Satellite data are not dependent on the vicissitudes of funding or political situations in countries that are being monitored
- Satellite data can measure environmental conditions and change in hard-to-reach areas
Satellite Derived Indicators

• SEDAC has been exploring how to meet the needs of high level policy audiences by providing value added “level 4” remote sensing-derived indicators
  – **Level 0**: raw instrument data; **Level 1**: geo-located and calibrated; **Level 2**: geophysical data product; **Level 3**: Composites of level 2 products; **Level 4**: model-derived data product

• This work builds on:
  – Two decades experience working on country level environmental indictors - the **ESI and EPI**

* NASA Research Opportunities in Space and Earth Sciences (ROSES)
Using satellite data to develop environmental indicators

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Received 25 October 2013, revised 17 June 2014
Accepted for publication 23 June 2014
Published 19 August 2014

Abstract
Environmental indicators are increasingly being used in policy decisions to identify areas needing attention. However, data deficiencies exist for many parameters of interest. Remote sensing has the potential to fill some of these gaps, yet the challenge is to develop satellite-derived indicators that are robust and reliable. This paper presents an overview of current indicators and identifies areas for improvement. A multi-disciplinary team of remote sensing scientists and indicators experts conducted a literature review to identify existing indicators and gaps in the current indicators.

Keywords: remote sensing, environmental indicators, biomass burning

Toward the next generation of air quality monitoring indicators

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HIGHLIGHTS
- Our initiative bridges science and policy to design the next generation of air quality indicators.
- Cross-cutting themes address knowledge gaps and persistent organic pollutants are considered.
- Regional considerations of air pollution and global emissions are addressed.
- Recommendations are made for what is needed to develop improved air quality indicators.

ERL 2014

Atmospheric Environment 2013
Special Issue Section: Toward the Next Generation of Air Pollutant Monitoring and Indicators. Guest Editors: A. Hsu, H. Hung, N. Pirrone, J. Engel-Cox and K.W. Bowman

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Original research article
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Nicola Pirrone, Wenche Aas, Sergio Cinnirella, Ralf Ebinghaus, ... Elsie M. Sunderland
Global Annual PM2.5 Grids from MODIS, MISR and SeaWiFS Aerosol Optical Depth (AOD) with GWR, 2016

Satellite-Derived Environmental Indicators

The Global Annual PM2.5 Grids from MODIS, MISR and SeaWiFS (micrograms per cubic meter) of ground-level fine particulate matter satellite instruments including NASA’s Moderate Resolution Imaging Viewing Wide Field of View Sensor (SeaWiFS), The GEOS-Chem PM2.5 concentration. Geographically Weighted Regression (GWR), bias per grid cell in the initial satellite-derived values. The spatial fine particulate matter, with and sea-salt removed in the year 2016.

Trend in Average Annual PM2.5 Concentrations

Trends in Proportion of Population Exposed to PM2.5 in Exceedance of 25 ug/m$^3$

Air Pollution

Beijing’s Bad Air Would Be Step Up for Smoggy Delhi

February 1st, 2012, 7:19 by The Economist online

“PM2.5” seems an odd and wonky term for the size of particles in the atmosphere—those less than 2.5 microns diameter. This is smaller than that which can be seen by the human eye, or even by a microscope. Particles this small can easily penetrate the respiratory system and get into people’s lungs; far deeper than that reached by a typical dust particle. From December 2011, authorities have revealed measurements of air pollution in Beijing and the surrounding province of Hebei. PM2.5 data are now being published for Beijing. From December 2011, authorities have revealed measurements of air pollution in Beijing and the surrounding province of Hebei. PM2.5 data are now being published for Beijing.
POPGRID – Population and Settlement Layer Intercomparison

- Information on available datasets provided by POPGRID participants
- Access to consistent metadata and documentation
- Comparison tools
- Access to user support (via SEDAC)

Spatially accurate and up-to-date population and settlement data are widely used in planning and decision making in both the public and private sectors to improve the effectiveness and efficiency of decisions, monitor impacts, and identify those who might otherwise be left behind. Understanding where people live and work, and the type and condition of their housing and other infrastructure, is critical in times of disaster, enabling emergency responders to reach those most in need more quickly with appropriate assistance. Such data can help improve access to public and private services, increase the sustainability of natural resources, and facilitate progress towards meeting the internationally accepted Sustainable Development Goals (SDGs).

www.popgrid.org
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