SHC Output 10.1: Data and Approaches for Identifying and Mapping Assets and Vulnerabilities

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50 EPA at

Progress for a Stronger Future

Problem Statement

- Community revitalization, resilience, and quality of life successes rely on leveraging existing assets

- Community vulnerabilities hamper ability to revitalize, be resilient, and maximize quality of life

- Communities need data and tools to help them identify and quantify natural, social, and economic assets and vulnerabilities

- These data and tools can help communities propose and implement strategies to help them realize benefits, avoid hazards, and become more resilient.
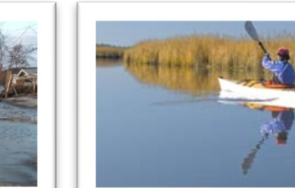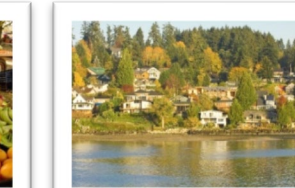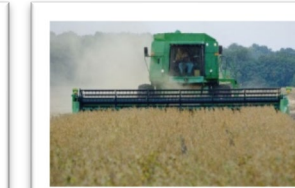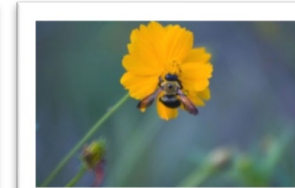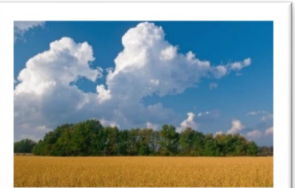
Output 10.1

- Develop data and tools to help partners and stakeholders elucidate current socio-ecological and physical conditions (i.e., assets and vulnerabilities)

- Develop data and tools critical to making decisions regarding redevelopment, revitalization, and resilience planning.

- Primarily involves expansion of existing EPA data and tools (e.g., EnviroAtlas)

- Data and tools will apply to local-scale and targeted decision-making but be applicable across decision contexts and regions to extent possible.

- Provide guidance to communities to develop and use of the data and tools.

- EPA partners serving as advisors, beta-testers, collaborators.

Output 10.1: Products

Product #	Product Title	Product Lead
SHC.10.1.1	**Quantifying ecosystem services and identifying beneficiaries for parks, public / protected lands and community greenspaces**	Nate Merrill
SHC.10.1.2	Assessment of Multidimensional Community Vulnerability and Resilience	Kyle Buck
SHC.10.1.3	Building an Approach and Tool to Estimate Human Health-Related Outcomes from Community Built and Natural Features	Allen Brookes
SHC.10.1.4	**Enhanced EnviroAtlas Functionality and New Tools for Asset and Vulnerability Mapping**	Jeremy Baynes
SHC.10.1.5	**New EnviroAtlas National Geospatial Data Layers for Mapping Assets and Vulnerabilities**	Anne Neale
SHC.10.1.6	Developing novel, collaborative methods to create EnviroAtlas Featured Community Data	Megan VanFossen
SHC.10.1.7	Decision Integration for Strong Communities (DISC)	David Olzyk

SHC and Other Research Program's Products
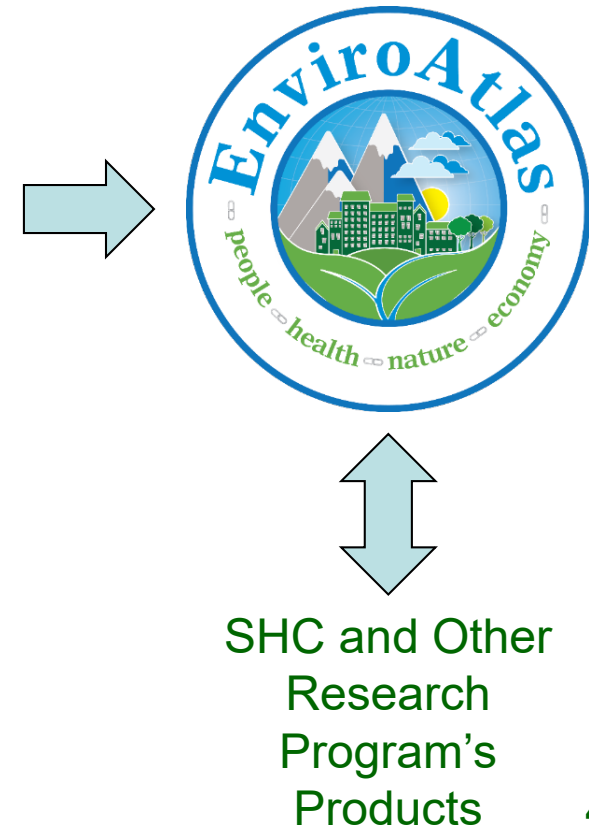
Product 10.1.1

Quantifying ecosystem services and identifying beneficiaries for parks, public / protected lands and community greenspaces (Product Lead: Nate Merrill)

- Communities derive many benefits from parks, protected lands and other community greenspaces
  - public health promoting, social cohesion, economic, hazard buffering
  - benefits/beneficiaries often not well-understood
- Once deemed safe, contaminated sites are often repurposed into parks
- Park creation, improvement, and promotion can be part of community revitalization
- EPA's Office of Community Revitalization (OCR) instituted a grant assistance program to help communities revitalize their Main Streets through outdoor recreation

Research Goal

- Develop and deliver coarse usage data for parks/protected areas across the nation

- Develop a use case highlighting application of the data

- These data will help communities understand usage patterns and where to invest in protected lands/parks or marketing of existing parks

- For each park/protected area, data will include total visitation, origins of visitors (e.g., local versus destination travel), and visit duration

- Include partners in every step to ensure utility of intermediate and final products
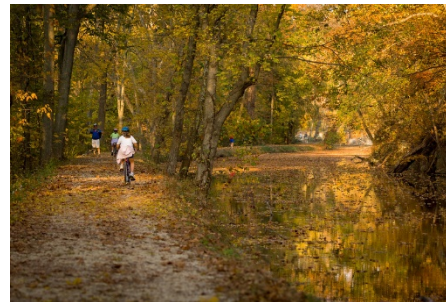
Product 10.1.1

Approach & Progress

- Use commercially-available, aggregated and anonymized human mobility data sets (cell phones as sensors).

- Pilot methodology in collaboration with Office of Community Revitalization (OCR), Regions 1 and 3

- First pilot communities are two of ten first recipients of OCR's **Recreation Economy for Rural Communities** grant assistance program -Thompson Falls, MT & Poultney, VT

- Working with OCR, Thompson Falls, MT and Poultney, VT to ensure initial products meet needs

- Methodology includes validation using on-the-ground visitor counts (e.g., National Park Service data

- The two communities selected recreational/downtown areas of interest

- Initial human mobility data sets have been purchased and initial analysis conducted

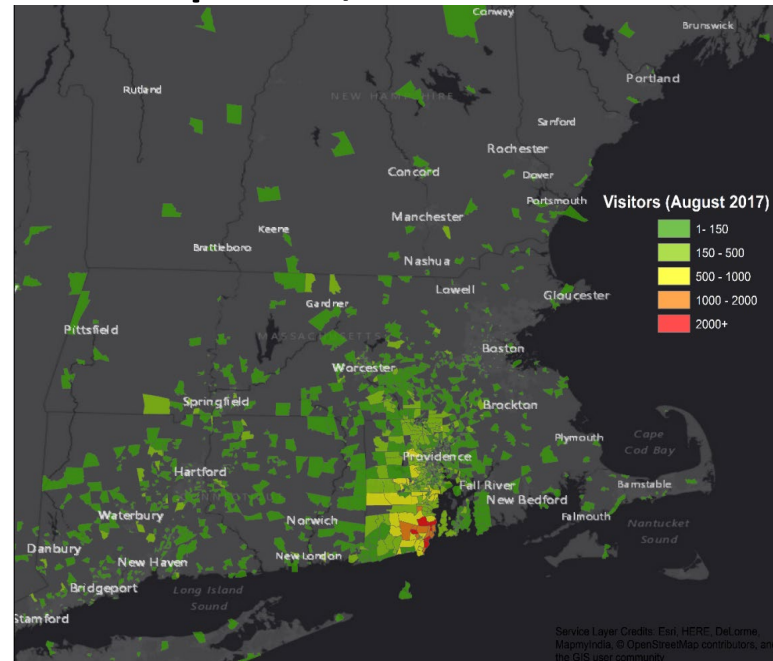- OCR is planning initial workshops with the two communities, feedback will be incorporated into product
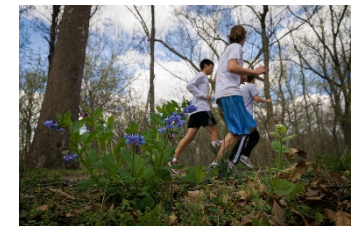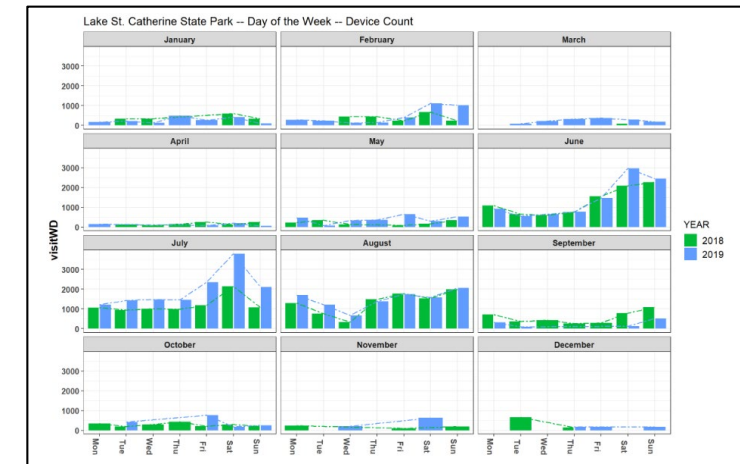
Approach and Progress

Total Visitation
Cape Cod, MA
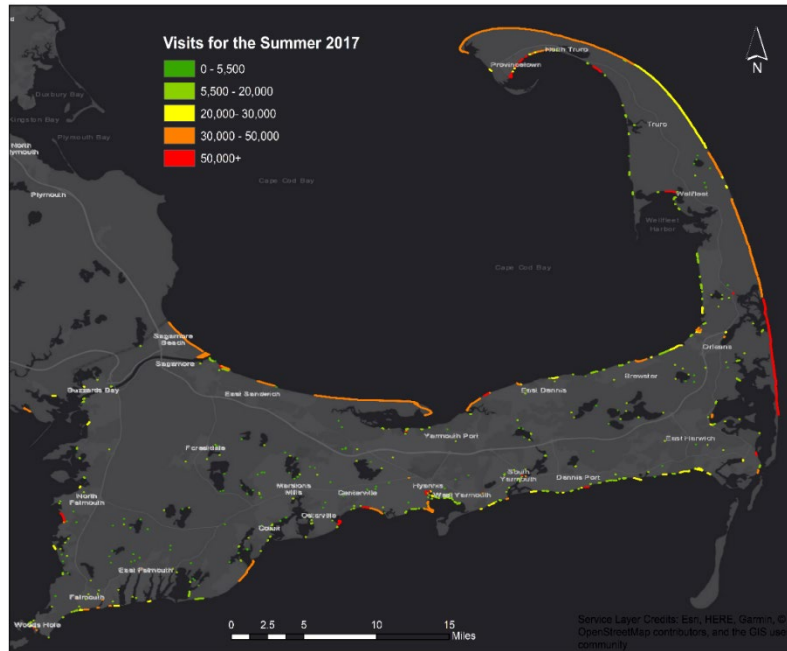
Total Visitation By
Visitors' Home Locations
Cape Cod, MA

Device Count by Year,
Month, and Day of Week
Poultney, VT

Merrill, N., Atkinson, S. F., Mulvaney, K. K., Mazzotta, M. J., & Bousquin, J. (2019). Using Data Derived from Cellular Phone Locations to Estimate Visitation to Natural Areas: An Application to Water Recreation in New England, USA. https://doi.org/10.31235/osf.io/3nx2v
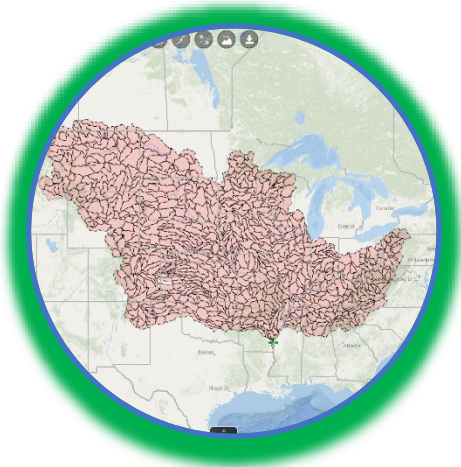
Product 10.1.4

Enhanced EnviroAtlas Functionality and New Tools for Asset and Vulnerability Mapping (Product Lead: Jeremy Baynes)
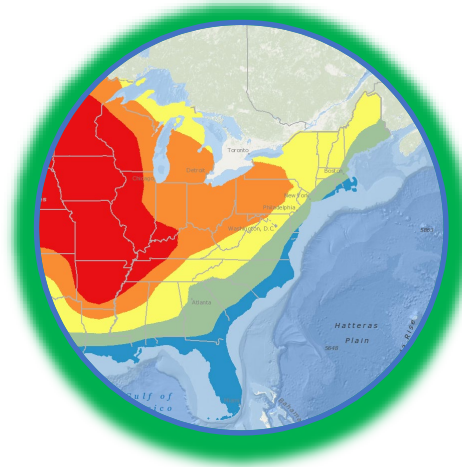
Research Goal

- Add functionality to EnviroAtlas to expand its capability to a broader array of decision contexts
- Improve the ability of EnviroAtlas to map community assets and vulnerabilities
- Include partners in every step to ensure utility of intermediate and final products
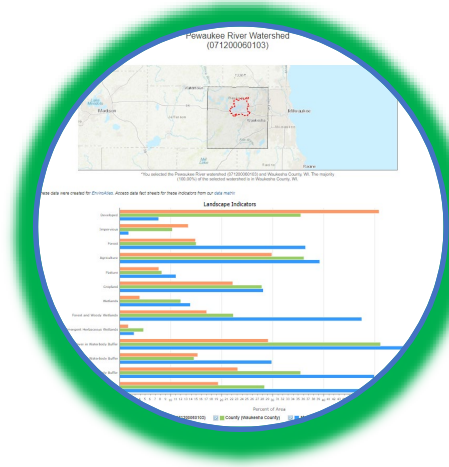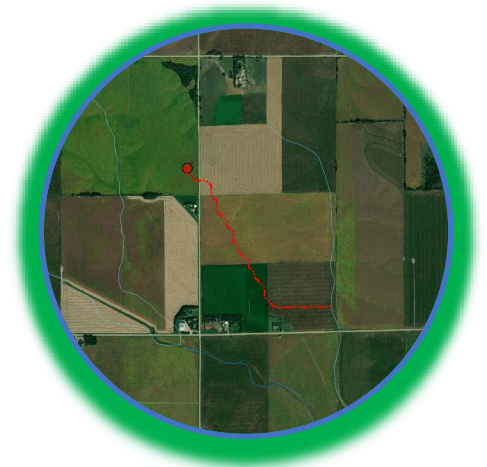
Watershed Navigator

Change Analysis & Time series Viewer

Compare My Area

Follow a Rain Drop
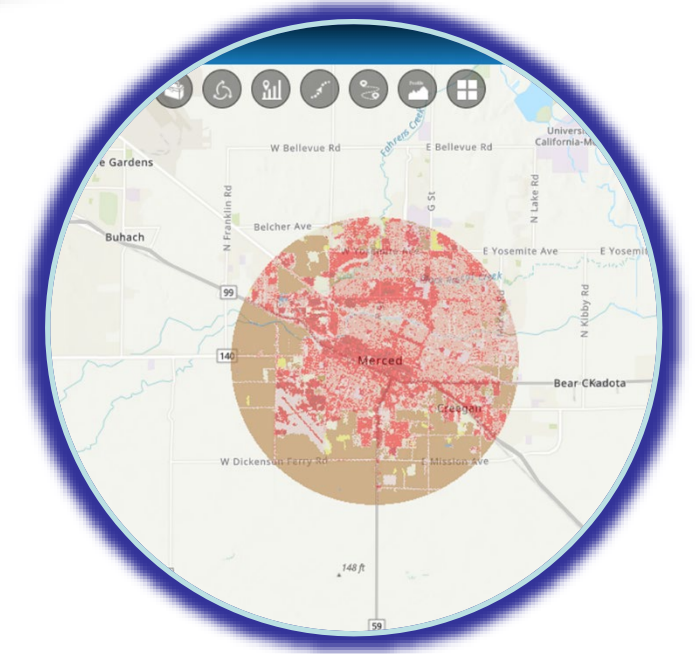
Product 10.1.4

Approach and Progress

- Provide open source scripts and GIS toolboxes of the processes we develop to produce the community extent metrics for EnviroAtlas
- Add functionality to EnviroAtlas to provide national and community extent grid-cell data layers and develop tool to allow users to calculate metrics for their own areas of interest
- Add functionality to allow users to create decision-relevant indices by statistically combining multiple data layers into a hierarchical suite of indices.
- Update the dasymetric population mapping tool (i.e., GIS toolbox)
- Add functionality to incorporate more options for projections and scenarios (e.g., land use, population)
- Others as requested by Program Offices/Regions
- Program Office/Regional engagement focusing on both the functionality and the user-experience

Product 10.1.4

Progress - Gridded Analysis Tool

- First version of New tool will soon be released

- User can select watershed, county, congressional district, or

- create a varying-size buffer around a selected point or polygon, or

- draw a custom area.

- User can then calculate land cover proportions for area selected, initially land cover proportions.

- Next steps will include expanding to include many other calculations (e.g., people, floodplains, land cover in floodplains etc).

- Chesapeake Bay Program Office, Region 1 engaged in providing feedback.

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New EnviroAtlas National Geospatial Data Layers for Mapping Assets and Vulnerabilities (Product Lead: Anne Neale)

Research Goal

- Identify, prioritize, research, and develop new national data layers

Approach and Progress

- Conduct needs assessment
- Research existing data sources & external activities
- Methods development
- Internal review
- Iterative versioning with partner feedback
- Conduct peer review and publish (if warranted)
- Data documentation (metadata and fact sheets)
- Submit for data publication in EnviroAtlas
- Publish on development server
- Data review
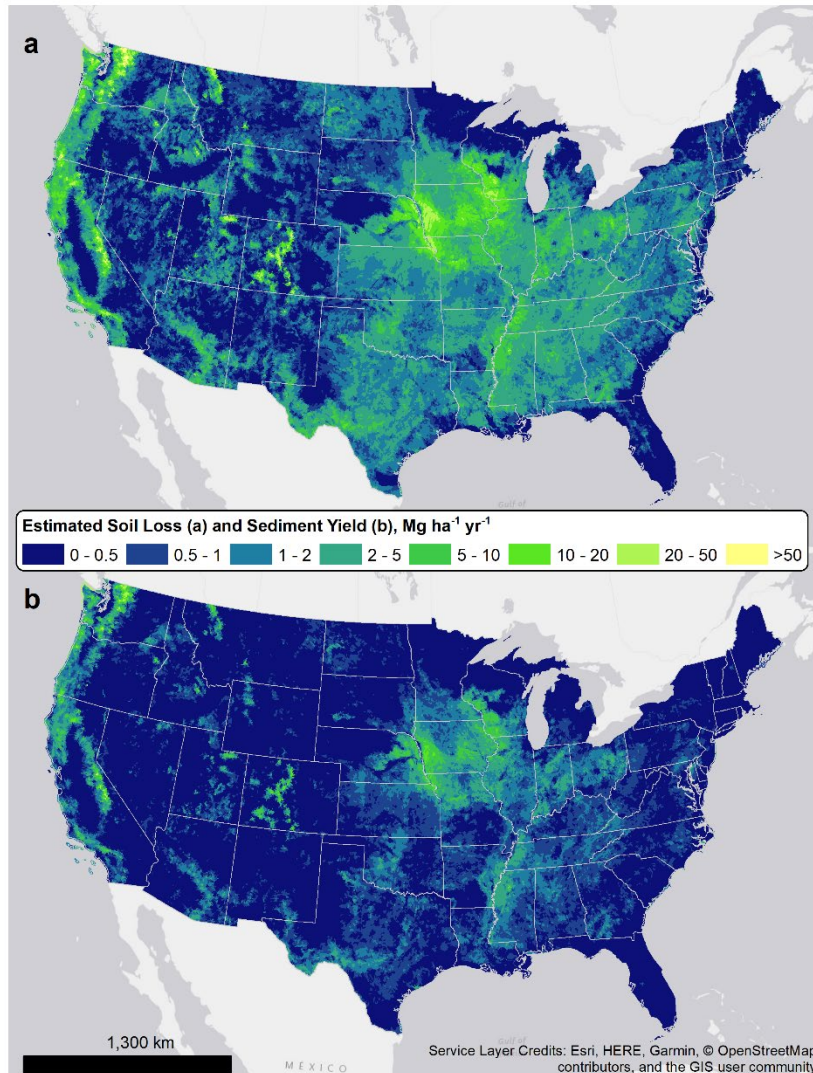- Publish on public-facing server
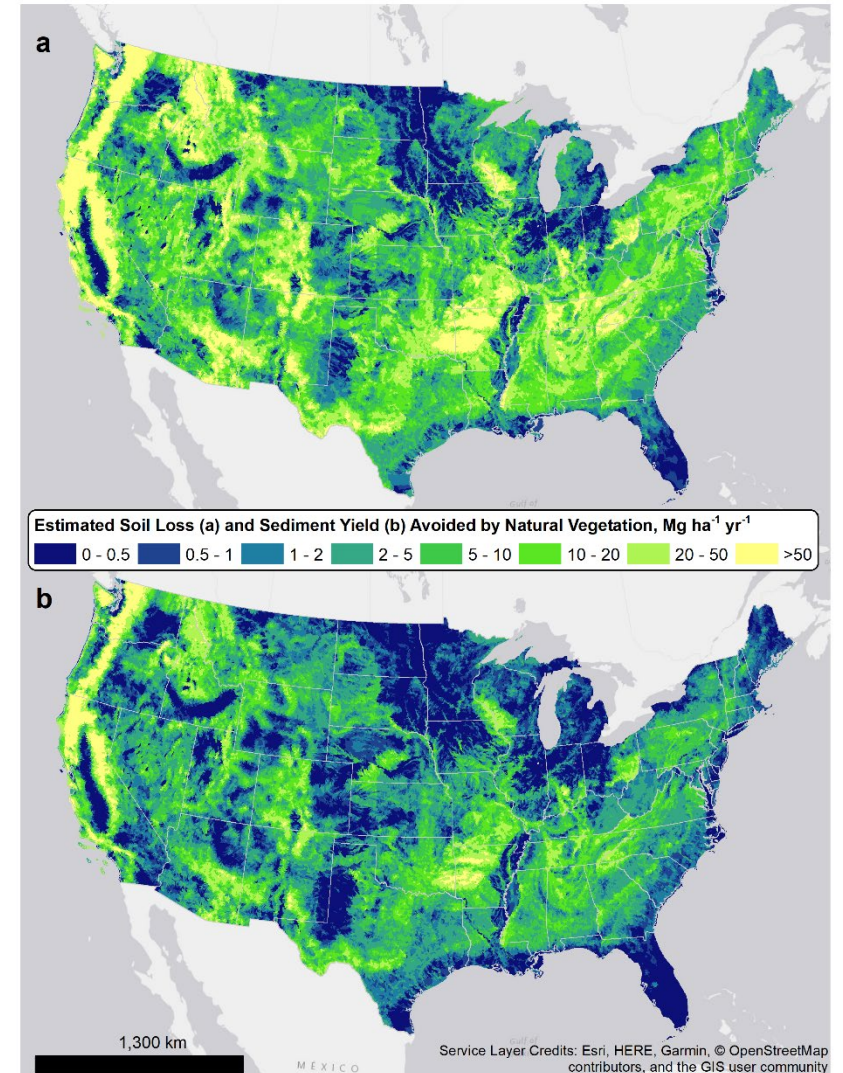
Product 10.1.5

Approach and Progress

- Abandoned mines and mine attributes
- Population living in X proximity to contaminated sites, busy roads, walkable roads, freight road network, railroads, railyards, airports, ports, etc.
- Erosion-related metrics (30 m product), including soil retained on the landscape due to current land cover/land management practices, soil loss, and yield to streams.
- Concentrated animal feeding operations (CAFO's)
- 10-meter flow direction/flow accumulation grids and river/stream confluences for the nation
- Outdoor recreational resources
- Social Vulnerability Index
- Others as requested by Program Offices/Regions

Progress - Erosion-related metrics (30 m product)

Estimated Soil Loss (a) and Sediment Yield (b), Mg ha^{-1} yr^{-1}

Legend: 0 - 0.5 | 0.5 - 1 | 1 - 2 | 2 - 5 | 5 - 10 | 10 - 20 | 20 - 50 | >50

- Used RUSLE soil loss equation
- Incorporated rainfall-runoff erosivity factor, soil erodibility factor, slope length and steepness factor, cover-management factor
- Modeled for each 30 square meter pixel

Estimated Soil Loss (a) and Sediment Yield (b) Avoided by Natural Vegetation, Mg ha^{-1} yr^{-1}

Legend: 0 - 0.5 | 0.5 - 1 | 1 - 2 | 2 - 5 | 5 - 10 | 10 - 20 | 20 - 50 | >50

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Thank You!