

Anthropological Approaches to Cultural Resource Assessment and Conservation: Social Media

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July 22, 2019

National Conservation
Training Center

Crowdsourcing Landscape Assessments

Benefits

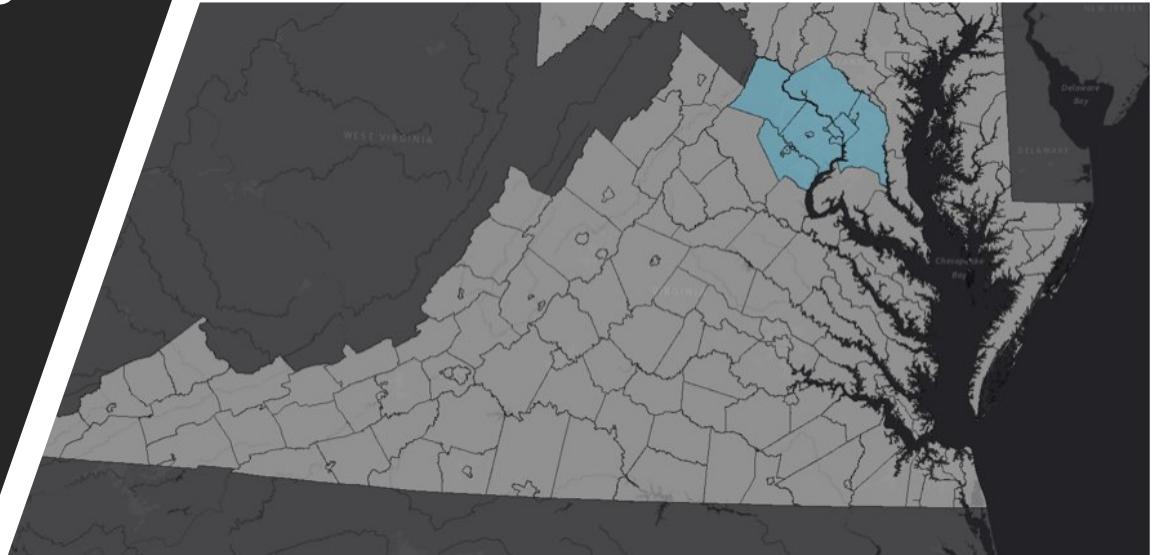
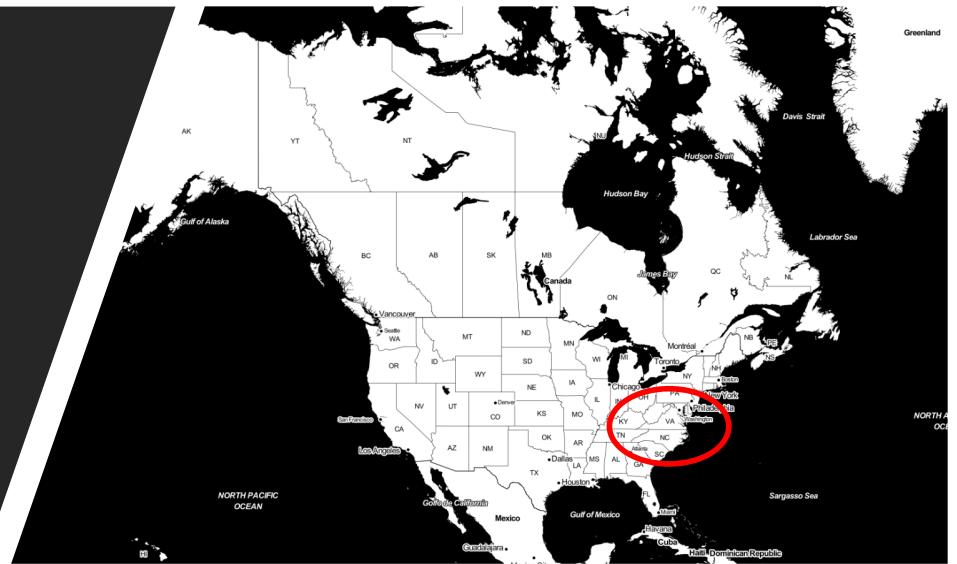
- Rapid data collection
- Large data volume
- Reduced data collection costs
- Global data

Challenges

- Data Quality
- Representativeness
- Underdeveloped methodology

Parks and Twitter

- “one of our great @wvstateparks to enjoy 🇺🇸🦌”
- “just posted a photo @ marco island nature preserve & bird sanctuary”



Data Processing Pipeline



Query Twitter



Filter English Tweets



Data Cleaning

Handle stopwords,
punctuation, contractions



Geocode



Filter to study region



Data Analysis

Text analysis
Sentiment analysis
Hashtag analysis

Data Filtering

All tweets
22,853,399

English tweets
19,327,380

Place tweets

217,556

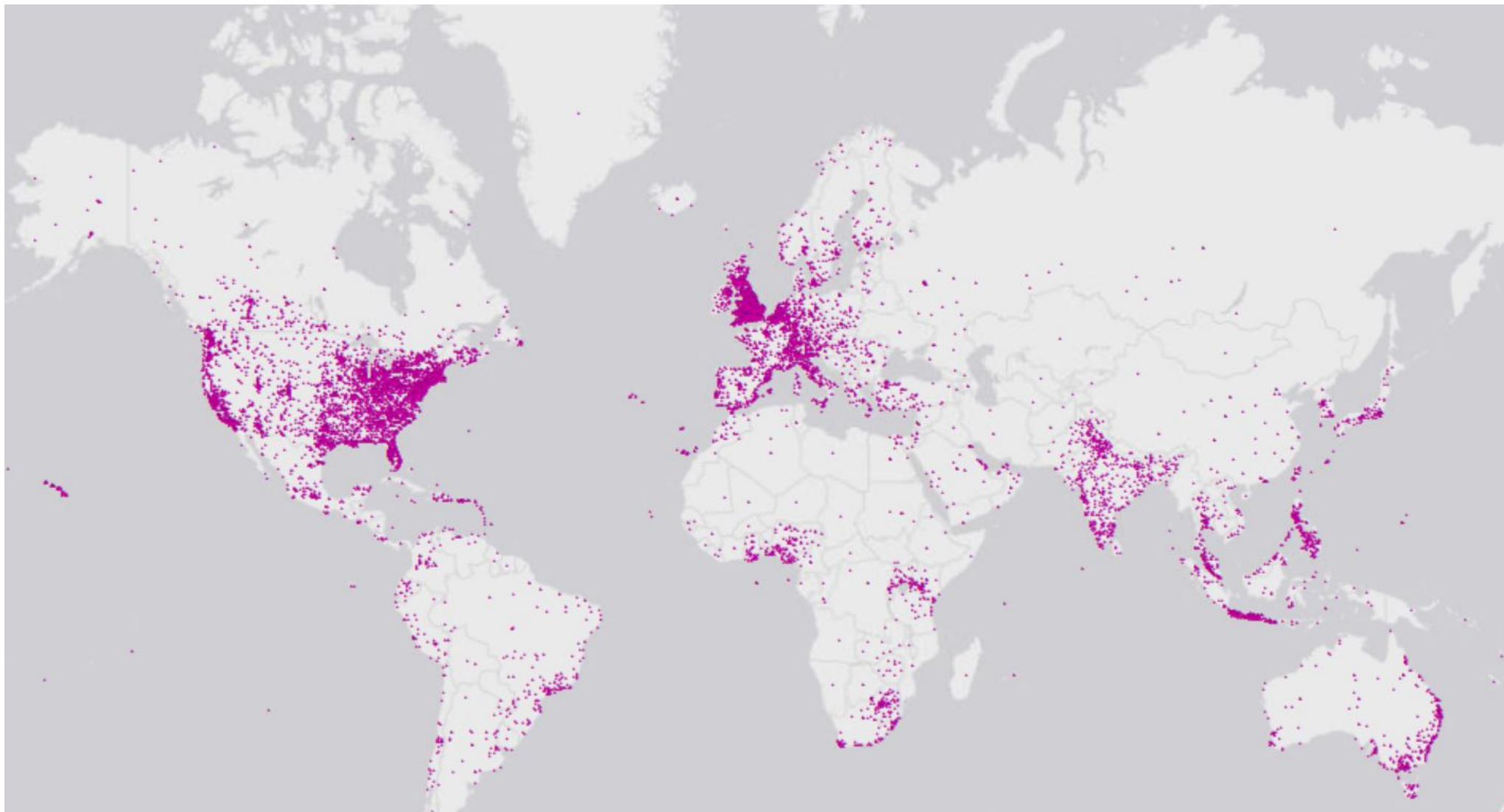
Geocoded
tweets

215,084

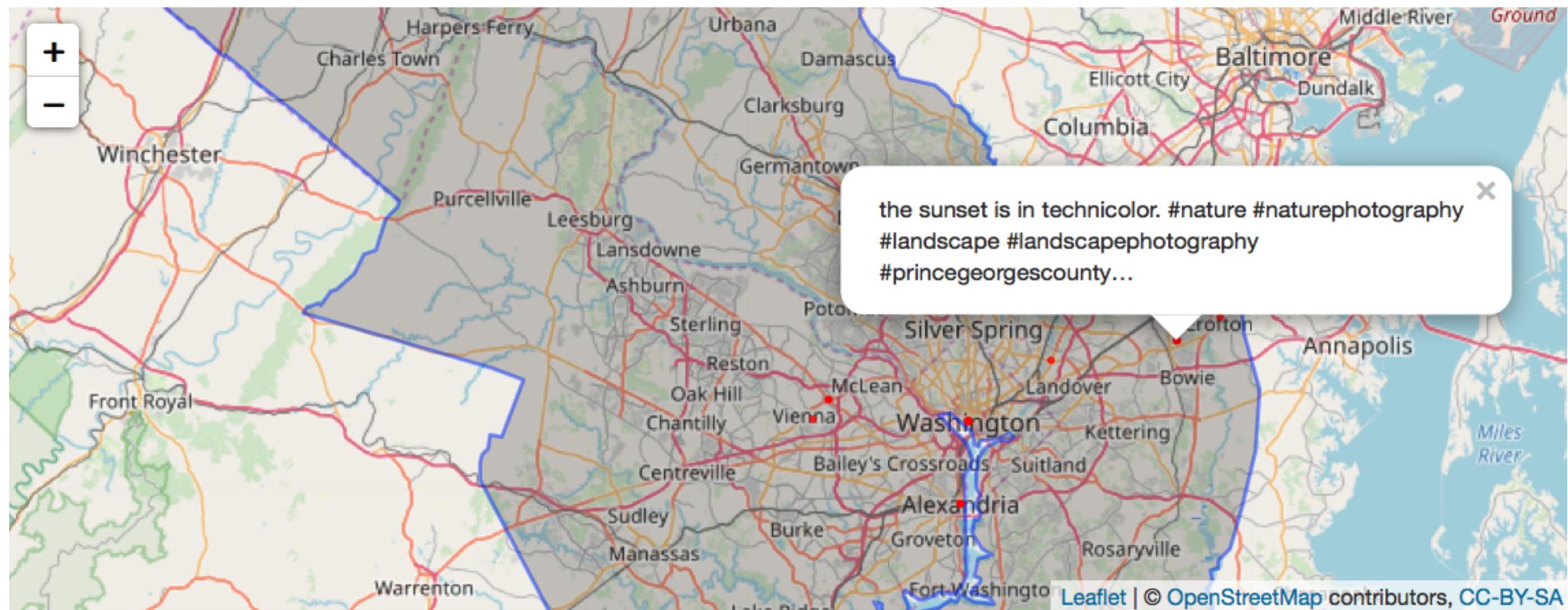
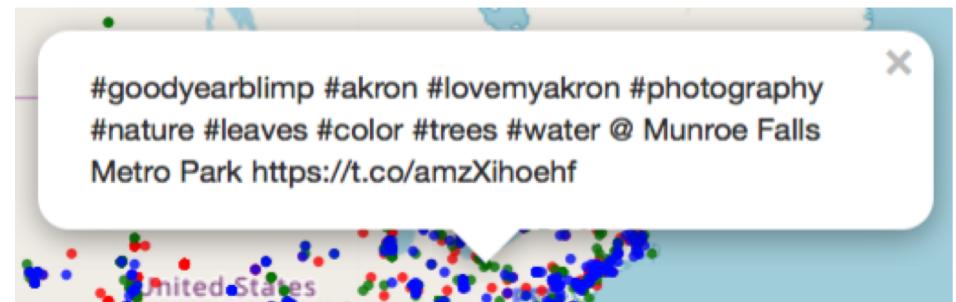
ILTerms Keyword Query

abatement • acid rain • air pollution • air quality • alternative energy • atmosphere • biodegradable • biodiversity • bioenergy • biofuels • biomass • biosphere • carbon count • carbon credit • carbon dioxide • carbon emissions • carbon footprint • carbon neutral • carbon offset • carbon tax • carpooling • cfcs • cfl bulbs • climate • climate change • compost • compostable • composting • conservation • deforestation • domestic waste • draught proofing • dumping • ecosystem • ecotourism • effluent • electric vehicle • emissions • emissions projections • end-of-life vehicle • energy efficiency • energy rating • energy star • fossil fuels • fuel poverty • global warming • green design • greenhouse effect • greenhouse gases • ground water • habitat • hazardous waste • household waste • incinerator • insulation • kyoto protocol • kyoto agreement • landfill • litter • municipal waste • noise pollution • noxious gases • oil spill • organic food • organic • ozone layer • pesticides • plastic bag tax • post-consumer waste • radiation • radioactive • recycle • reforestation • refuse • renewable energy • renewable resource • reuse • river basin • sewage • smog • smokeless fuel • solar panel • surface water • sustainable development • sustainable tourism • world heritage site • waste prevention • water vapour • wind energy • wind turbine • zero emissions • abiotic • acidification • adaptation • aichi biodiversity targets • algal bloom • alien invasive species • alien species • anthropogenic impacts • ballast • baseline • baseline study • best environmental practice • best management practice • biodiversity action plan • biodiversity metric • biodiversity offsets • biofuel • biogeographic classification • biogeographic realm • biome • bioremediation • biosecurity • biotechnology • biotope • capacity development • carbon • carbon pool • carbon sequestration • carbon sink • carrying capacity • cartagena protocol • cbd • ccas • cites • climate adaptation • connectivity • convention on biological diversity • critical habitat • critically endangered • cultural services • data deficient • degazettement • desertification • diversity • ecosystem based adaptation • ecological character • ecology • ecoregion • ecosystem approach • ecosystem asset • ecosystem based management • ecosystem engineer • ecosystem function • ecosystem integrity • ecosystem process • ecosystem services • ecosystem structure • endangered • endangered species • endemic species • endemism • environment • environmental descriptors • environmental externalities • eutrophication • ex-situ conservation • extinct • extinct in the wild • extinction • rio earth summit • feral • flagship species • flyway • forest • fragmentation • freshwater • functional group • gene pool • genetically modified organism • genetic diversity • genetic resources • geoengineering • gmo • green economy • green infrastructure • habitat banking • habitat conversion • habitat degradation • habitat destruction • habitat fragmentation • ifc ps6 • indicator species • indigenous species • in-situ conservation • intensive farming • intrinsic value • invasive alien species • invasive species • ipcc • intergovernmental panel on climate change • itpgrfa • red list • keystone species • landscape • landscape approach • landscape connectivity • migration • migratory species • minimization • mitigation • multiple use areas • nagoya protocol • native species • natural capital • natural habitats • natural heritage • naturalness • natural resources • nbsap • non-renewable natural resources • ocean acidification • oprc • ouv • overexploitation • phenology • overpopulation • population trend • protected area • provisioning services • redd+ • regulating services • rehabilitation • resilience • restoration • rio +20 • rio convention • sdgs • shifting baselines • soil erosion • soil salinization • species diversity • species richness • subsistence • supporting services • sustainability • sustainable use • synthetic biology • tek • threatened species • traditional ecological knowledge • umbrella species • unccd • unclos • uncsd • undafs • unfccc • vulnerable • wilderness • wildlife trade • wssd • environmentalism • zero waste • wildlife • solar energy • poaching • nature • anthropocene • bycatch • illegal fishing • overfishing • pollution • soil degradation • water scarcity • wildlife trade • infrastructure • oil and gas development • coral reefs • sedimentation • erosion • green building • greenwash • global warming • sbstta • co2

2 weeks of ILTerms data



Example Tweets



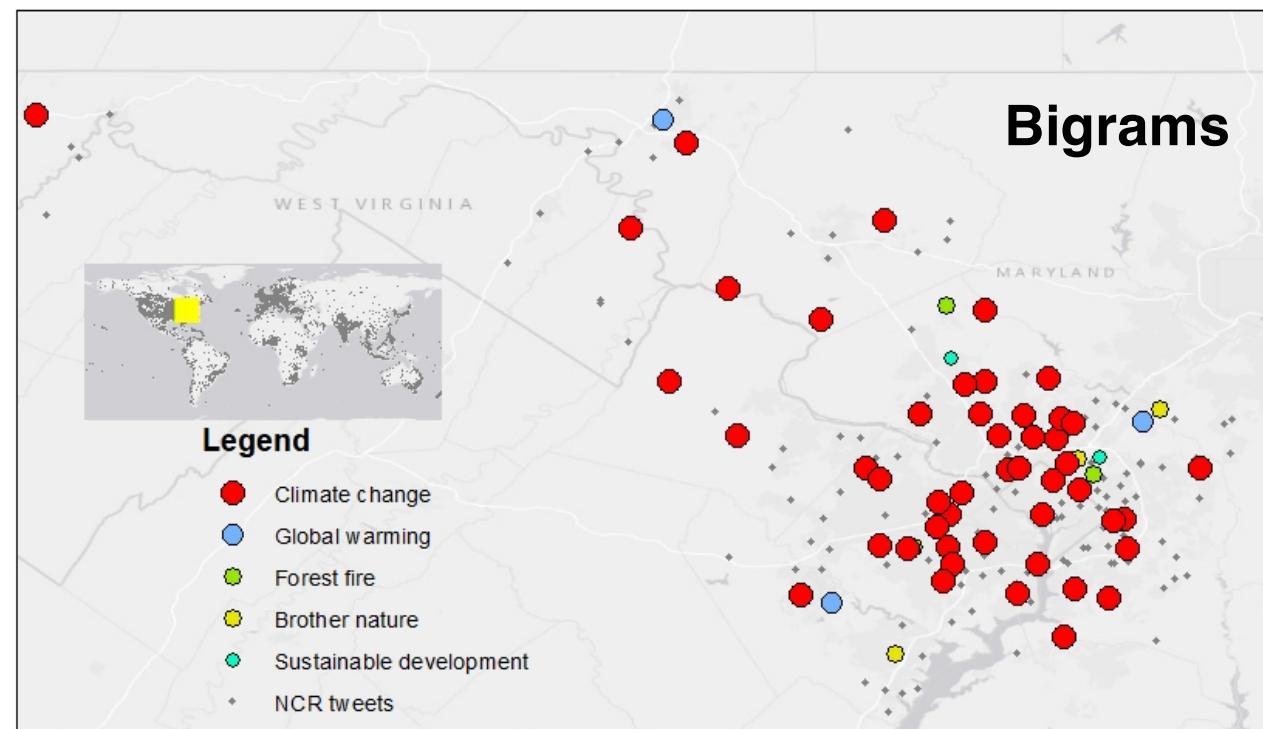
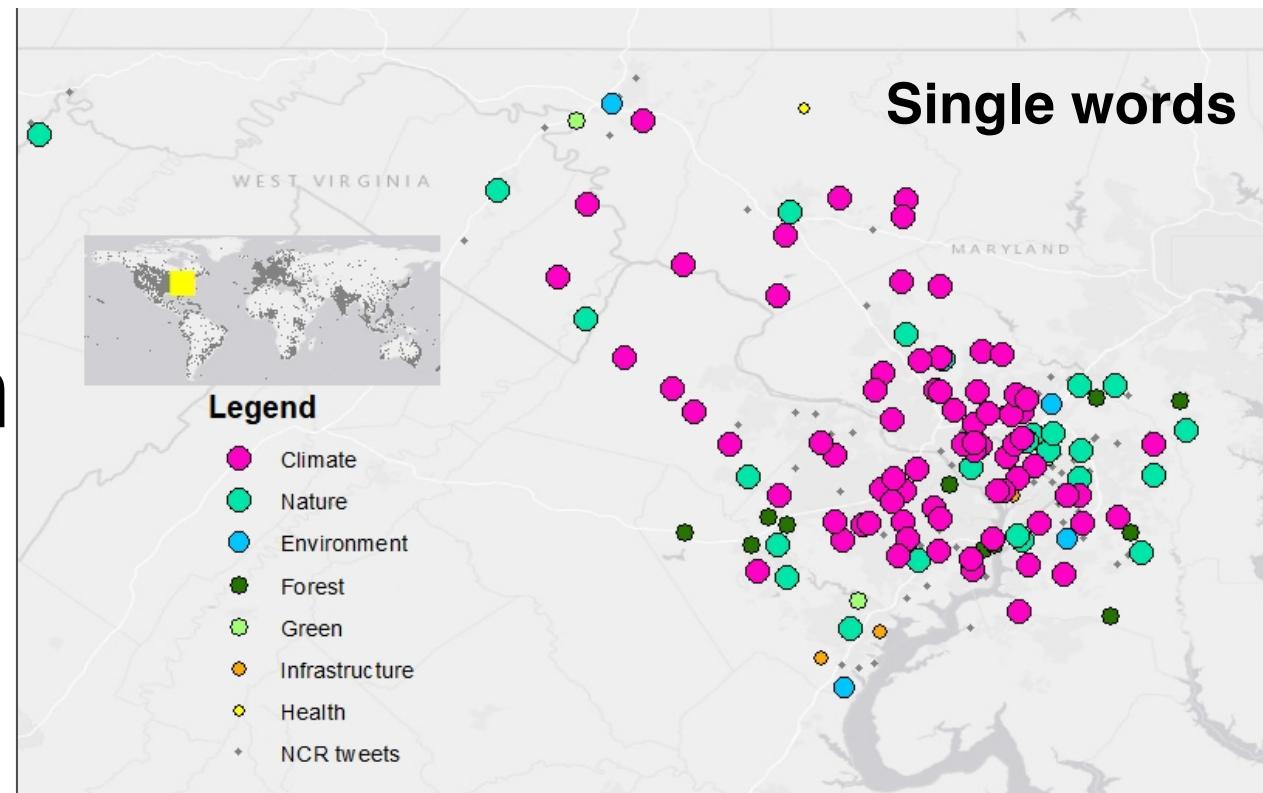
RANK	WORD	N
1	Nature	16,815
2	Climate	16,223
3	Forest	11,210
4	Change	11,064
5	Environment	9,170
6	People	7,286
7	Refuse	7,272
8	Time	4,884
9	Diversity	4,475
10	Love	4,447

RANK	BIGRAM	N
1	Climate change	9,010
2	Global warming	2,060
3	Air quality	1,784
4	Mother nature	1,295
5	Nature conservancy	907
6	Cancer protecting	658
7	Brother nature	630
8	Hiring careerarc	529
9	Fast paced	522
10	Forest fires	466

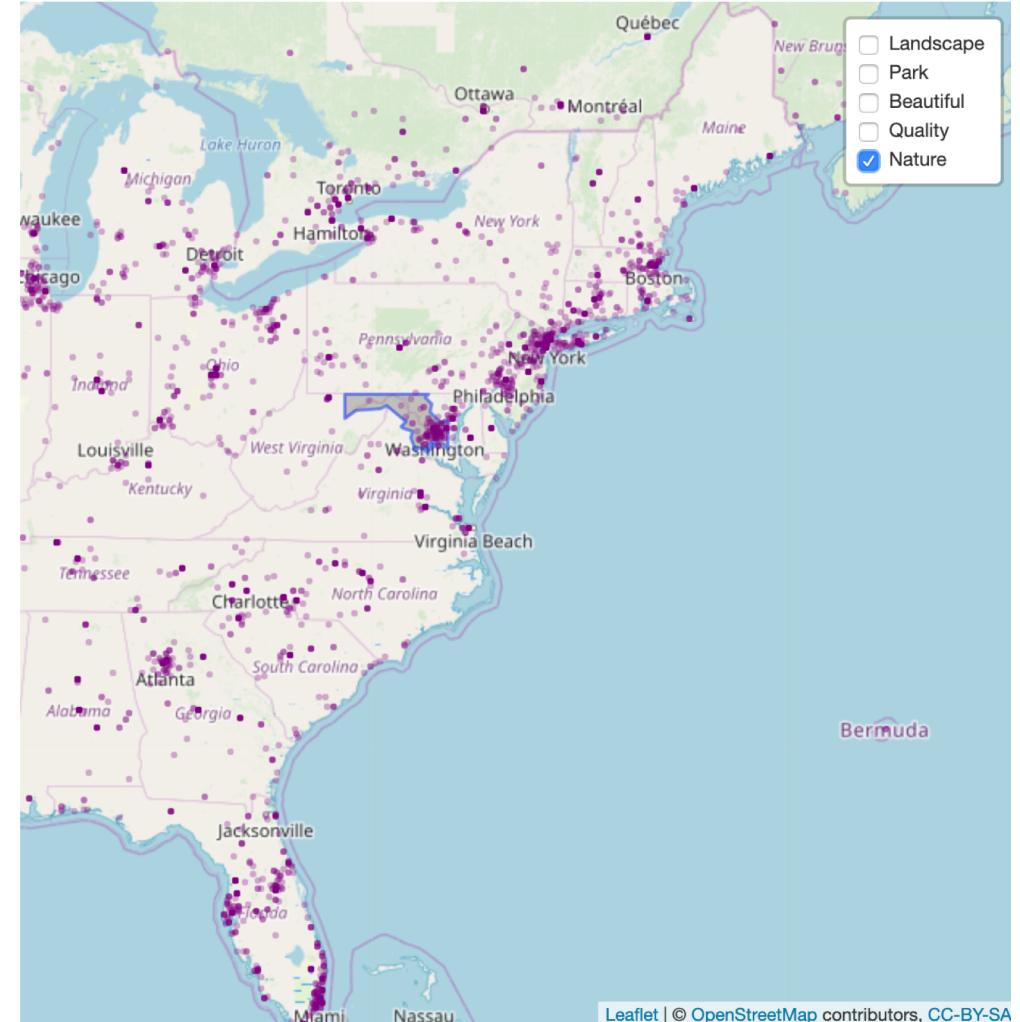
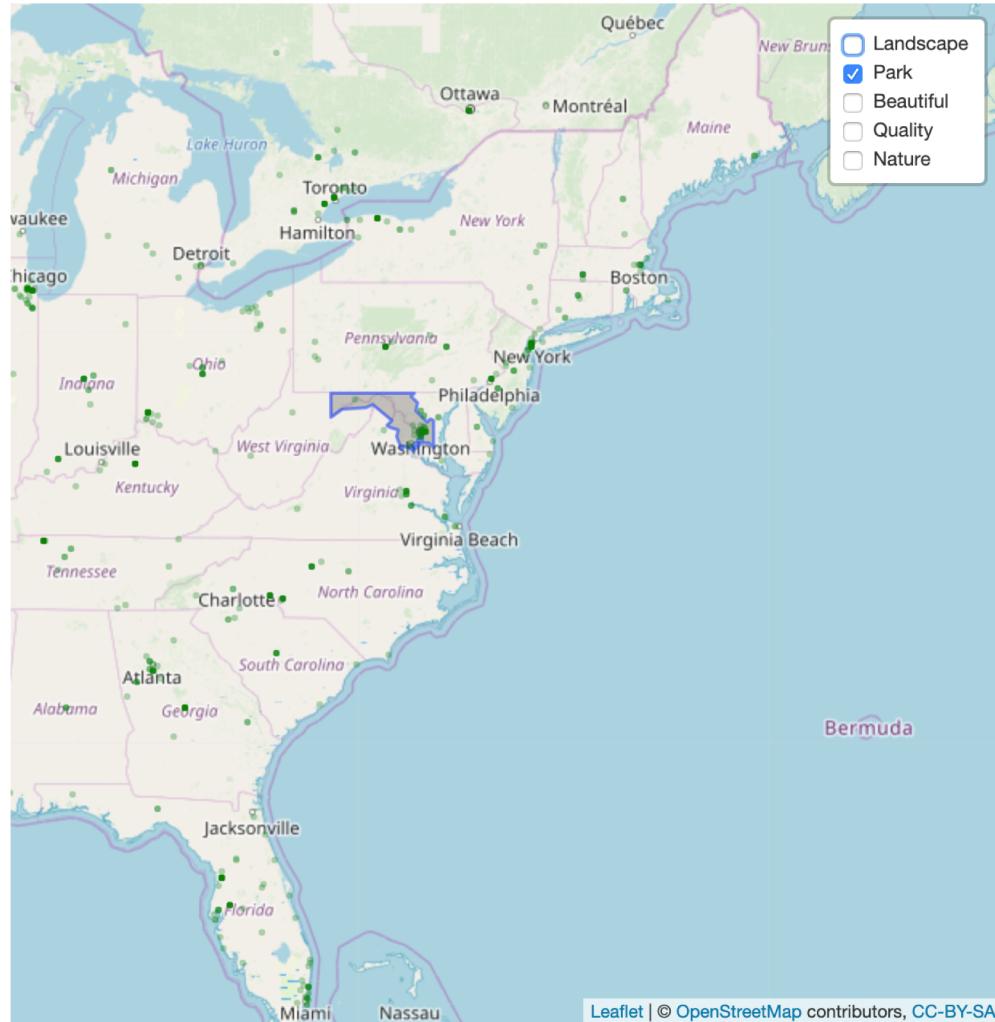
Words paired with landscape terms

Word 1	Word 2	Word 1	Word 2
Social	Environment	Healthcare	Landscape
Collaborative	Environment	Landscape	Landscapephotography
Hostile	Environment	Beautiful	Landscape
Diverse	Environment	Landscape	Photography
Learning	Environment	Nature	Landscape
Forest	Park	Air	Quality
National	Park	Quality	Index
Park	Forest	Quality	Health
Wildlife	Park	Unique	Quality
WY	Park	Quality	Drinks

Topic Distribution



Spatial Analysis

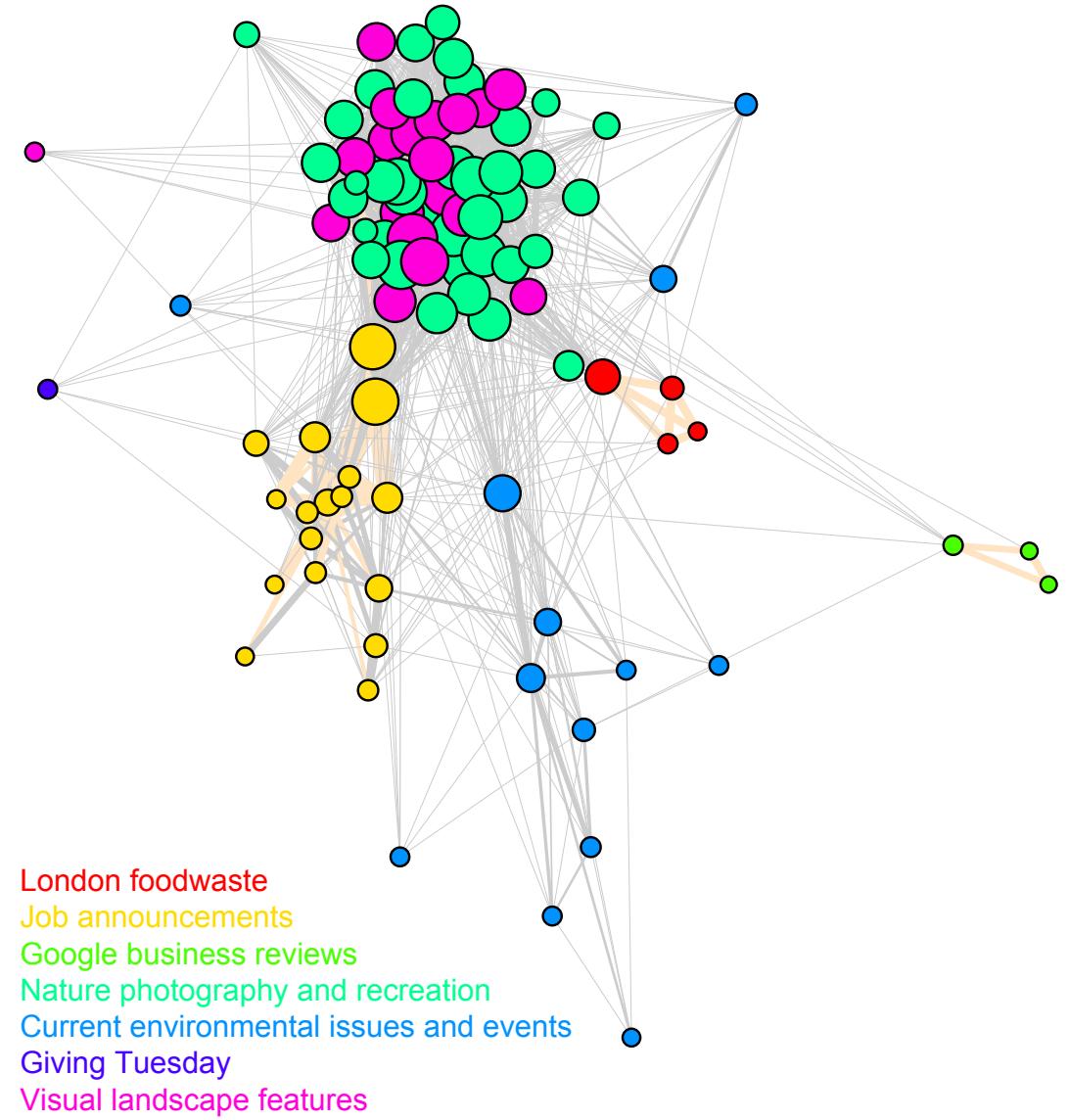


Rank	Hashtag	N
1	Nature	3439
2	Job	2424
3	Hiring	1045
4	Landscape	938
5	Photography	907
6	Hiring!	891
7	Careerarc	833
8	Climatechange	752
9	Sustainability	655
10	Green	628
11	Travel	628
12	Diversity	521
13	Autumn	479
14	Sunset	465
15	Naturephotography	464

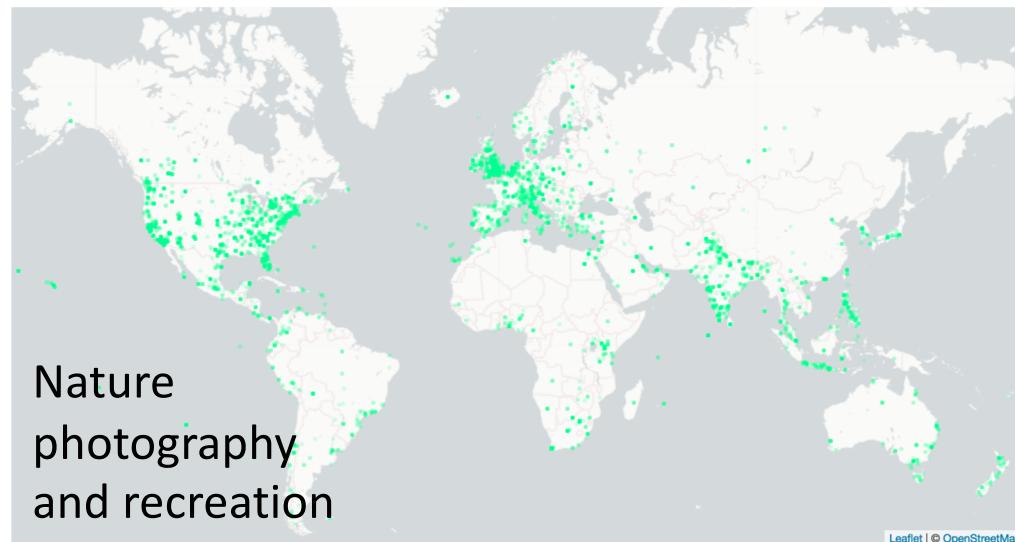
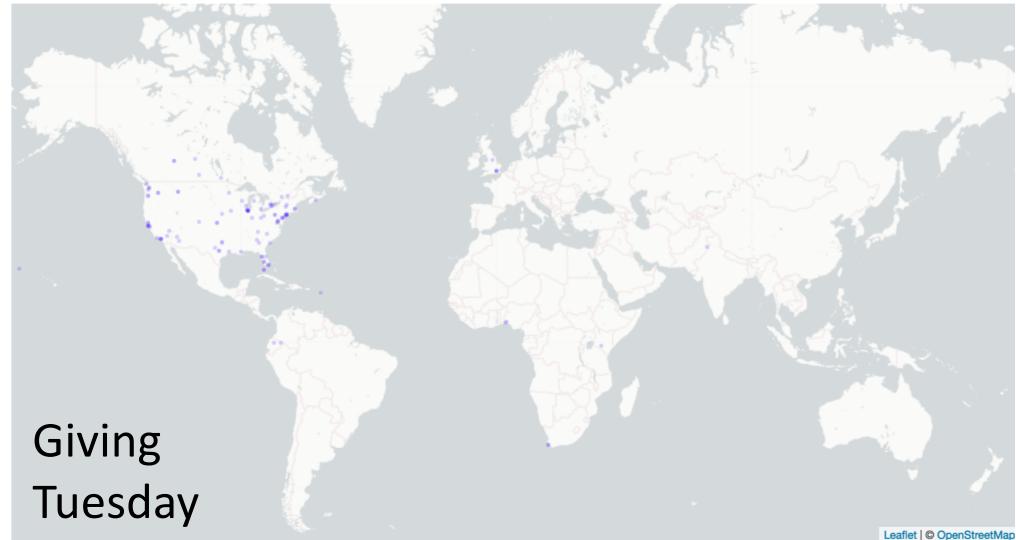
Hashtag Analysis

“taking it all in
#nofilter
#nofiltersneeded
#sunset #sky #clouds
#beautiful #nature
#lake #lakeview @
south lake ta[hoe]”

Hashtag Community Detection



Cluster Distributions



Sentiment Analysis

- Common method used in Twitter analysis
- NRC Word-Emotion Association Lexicon
- Emotions vs. perceptions
- Aesthetic experiences?



Text Analysis

- Stanford CoreNLP

1 President Xi Jinping of China, on his first state visit to the United States, showed off his familiarity with American history and pop culture on Tuesday night.

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graph TD; President[President] --> Xi[Xi Jinping]; President --> of1(of); of1 --> China[China]; China --> United[United States]; United --> United2[the United States]; United2 --> first[first]; first --> state[state visit]; state --> United3[United States]; state --> showed[showed off]; showed --> familiarity[familiarity with]; familiarity --> American[American]; American --> history[history]; history --> culture[culture]; culture --> on[on]; on --> Tuesday[Tuesday]; Tuesday --> night[night];
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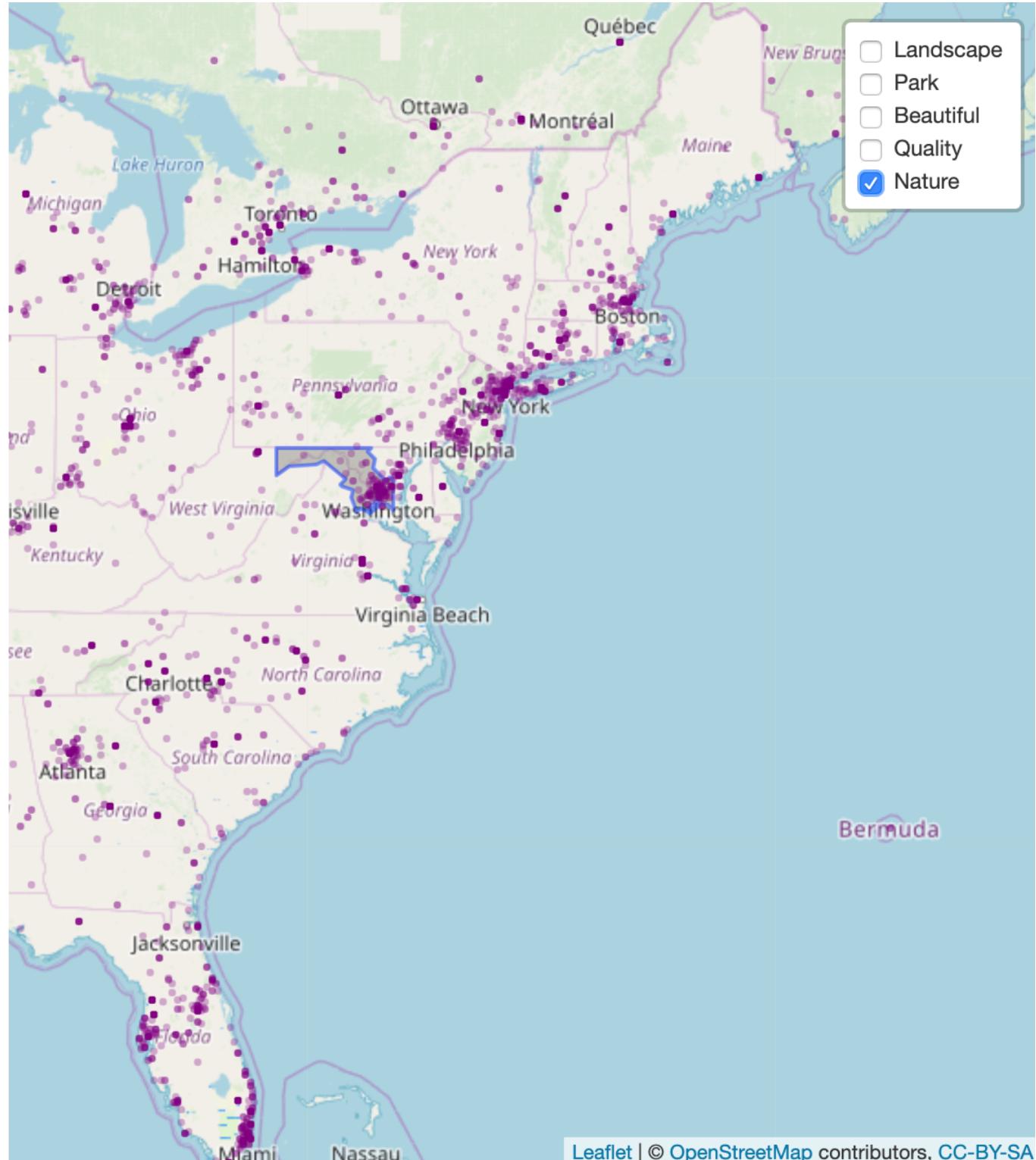
<https://stanfordnlp.github.io/CoreNLP/#citing-stanford-corenlp-in-papers>

Conclusions

- Twitter data have potential to inform landscape assessment and planning
- Methodology requires further development
- Areas for future exploration:
 - Sentiment analysis
 - Time sensitivity
 - Query content
 - Linking activity, aesthetics, and place

Outlook

- Upcoming results from 6-month data collection
- Interactive maps and data-driven dashboards



Thank you!

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