Impacts and Conclusions of NASA DEVELOP's Environmental Justice Landscape Analyses and Feasibility Studies

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Julianne Bo-Heen Liu[1,2] (julianne.liu515@gmail.com), Lauren M. Childs-Gleason[1,4] (lauren.m.childs@nasa.gov), Kenton W. Ross[1,4] (kenton.w.ross@nasa.gov), Amanda Clayton[1,3] (amanda.l.clayton@nasa.gov), Karen N. Allsbrook[1,4] (karen.n.allsbrook@nasa.gov), Stephanie L. Burke[1,2] (stephanie.burke@ssaihq.com), Laramie Plott[1,3] (laramie.d.plott@nasa.gov) [1] NASA DEVELOP National Program, [2] Science Systems and Applications, Inc., [3] Analytical Mechanics Associates Inc., [4] NASA Langley Research Center

ABSTRACT

The NASA DEVELOP National Program builds dual capacity in their partner organizations and participants (students and early or transitioning career professionals) to apply Earth science and remote sensing for decision making about environmental and policy issues. The first iteration of projects at DEVELOP's Environmental Justice (EJ) node conducted landscape analyses to identify geospatial understandings and needs of organizations working at the intersection of EJ and disasters and air quality. Their findings about collaboration, community engagement, networking, and holistic approaches to justice informed the planning and structures of the EJ node's successive feasibility projects, which leverage NASA Earth observations and sociodemographic and economic data to provide geospatial analyses tailored to partner concerns. This poster provides an overview of DEVELOP's approach to conducting EJ feasibility projects, use of Earth observations, end products, project outcomes, challenges, and impacts.

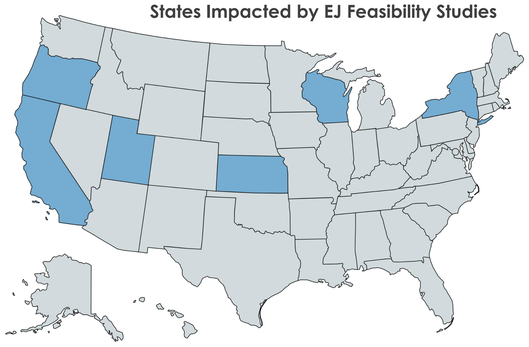
ENVIRONMENTAL JUSTICE AT DEVELOP

History

Over its 25 years, DEVELOP has conducted over 1,200 projects. While some of these have worked with EJ organizations or addressed inequities and injustices in subject focus, DEVELOP launched its EJ node in 2022 to more concentratedly expand and strengthen its efforts in supporting EJ. As these efforts continue, DEVELOP has shifted its model to re-integrate EJ projects across the program rather than having a separate EJ node.

A Year in Review: 2022 – 2023

States Impacted by EJ Feasibility Studies



10 Projects

15 Unique Partners

42 Participants

LANDSCAPE ANALYSES

Objectives

- To understand priorities, needs, and challenges of organizations working in EJ and disasters or health and air quality
- To strategize how DEVELOP could address organizations' EJ needs and strengthen its approach to EJ in projects and programming
- To identify potential organizations and project ideas for future DEVELOP partnerships
- To increase public awareness of open-source geospatial data, tools, and software trainings

TRANSLATING THEMES INTO ACTION

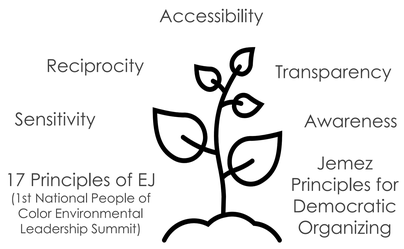
Priorities

Community Involvement	Engage community members in the planning, execution, and/or decision-making processes of organizational work; remove barriers which prevent engagement
Holistic Justice	Address social and/or economic justice alongside EJ; mitigate harms from any source of injustice; dedicate work towards dismantling current oppressive systems and practices from those previous
Sustainability	Center concern about lasting impacts of their work and/or staff workload; consider feasibility of workload, scope, and/or partnership longevity in the present and future
Collaboration/ Networking	Seek opportunities to connect with other organizations and individuals; cultivate and maintain relationships with collaborators/partners; value on sharing knowledge

Methodology

- Literature Review
- Search for Organizations
- Questionnaires & Interviews
- Inductive & Deductive Analyses

Guiding Values



EPA Senior Policy Advisor Charles Lee's revised, expanded definition of EJ

Project Reach

Identified 82 organizations
Engaged 11 organizations
Impacted 9 states

Focus examples: floods, hurricanes, drought, wildfires, extreme heat, volcanoes

Identified 90 organizations
Engaged 22 organizations
Impacted 10 states

Focus examples: air pollution linked to transportation, agriculture, industry, wildfires

Challenges

Human Power	Struggle to engage in and/or pursue the work they would like due to limited staff, volunteers, or energy
Time Constraints	Struggle to engage in and/or pursue the work they would like due to limited amount of time
Funding for Organizations	Struggle to engage in and/or pursue the work they would like due to a lack of available funds
Funding through Policy	Encounter barriers to accessing mainstream funding sources; seek alternative avenues for funding
Strained Relationships	(May) hold distrust towards government agencies due to historic and present harms inflicted on communities, corruption, lack of concern, and political infighting

Geospatial Needs

Data (Access & Usability)	Lack access to relevant data (mismatch in spatial or temporal resolution, privatized, nonexistent) and/or understanding(s) of its applications
Software (Access & Usability)	Lack access to software and/or understanding of its applications
Quantifying/ Visualizing	Seek compelling and easily comprehensible visual representations of EJ concerns and/or organizational impact
Changes Over Time	Seek visual representations and/or data about how community and/or landscape has changed over time, such as before, during, and after a disaster or hazardous air quality events

"If an organization is an **expert** in something… it's best to **collaborate** with them and let them take the lead on that part of the project… **Everybody** has their own **niche** and **gifts** to **contribute** to a project. Projects come out **stronger when we work together**."

"When we talk about **who's first and worst impacted** by **climate issues**, we are also looking at **who's first and worst** impacted by **social issues**… environmental justice as an understanding of **cumulative** and **disproportionate** impact **isn't just looking at where** pollution is. **It's looking at why** certain pollution is happening in communities…"

"Our work is what it is because **we do work at the full cycle** and because **we do it very intentionally**. And the realities are that that requires staffing **more than what we've had**…"

"It's easy to get people **excited over a short-term**…but this is going to be at least three to five years. **Probably longer**… So how can we **sustain engagement?"**

"**Certain communities are left out of maps**, meaning certain communities get left **out of planning processes**, too. And they're the ones that are, **again**, going to be **bearing the brunt** of this. But **if they're not at the table** helping to decide how these different processes happen, then we're going to **continue to exacerbate the inequities that are, by definition, environmental racism**."

"[It is important to] gather the **data** and make it **accessible** in a format that folks are able to use because, so much of the time, the **data might be there**, but it **takes six months to figure out** what it actually means. And **we don't get that kind of time**."

Earth Observations & Technical Approach

Urban Heat

- Landsat 8 OLI & TIRS
- Landsat 9 TIRS-2
- ISS ECOSTRESS

Health & Air Quality

- Aqua & Terra MODIS
- CALIPSO CALIOP
- Sentinel-5P TROPOMI
- Suomi NPP VIIRS

Flooding

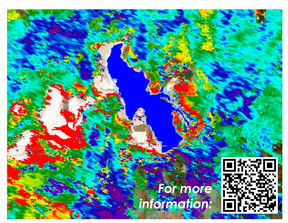
- Landsat 7 ETM+
- GPM IMERG

Ancillary Data Sources

- EPA EJ Screen
- CDC PLACES
- Health Departments
- US Census Bureau
- Partner site data

Processes & Analyses

- Vulnerability Index
- Principal Component Analysis (PCA)
- InVEST Models
- Data Validation
- Redlining Comparisons



Great Salt Lake Health & Air Quality: Monitoring Lakebed Exposure and its Impact on Air Quality and Environmental Hazards in the Great Salt Lake Watershed

Recognizing the importance of interdisciplinary collaboration, as well as the potential for DEVELOP to serve as a space to bring together groups from different sectors, this project engaged seven partners: two state agencies, two academic groups, and three non-profits. This coalition building showcased perspectives in land management, air quality, dust transport, ecology, public health, political advocacy, and community voice from the areas experiencing the majority of EJ issues in the Valley.



Portland Urban Development: Quantifying and Visualizing Urban Heat with Compounding Vulnerabilities to Support Community Depaving Initiatives

At the time of the project, the community partner had only two full-time staff members. This project helped tell the story of depaving and provided data to contextualize their impact in a a new way through an urban heat framework, both of which can support them in grant applications. Also, this project discussed the limitations of language concerning vulnerability and ultimately used the partner-preferred term of "frontline communities."



San Joaquin Valley Health & Air Quality: Evaluating the Overlap of Social Vulnerabilities and Air Quality in the San Joaquin Valley Air Pollution Control District

The project partner played a crucial role in ensuring the DEVELOP team's maps were accessible and meaningful to the community. In addition to conversations about defining terms, waypoints, and metrics important to partners, the team also researched the rich history of EJ in the area, as well as other EJ issues, to better understand the lived experiences of and compounding injustices against community members to conduct the project in an informed approach. The team also created video tutorials about the GIS methods involved in their air quality analyses so partners could replicate the process and apply them in future projects.

CONCLUSIONS

- **Value lived experiences:** While there are general best practices or procedures that can be standardized to ensure partners are centered in establishing partnerships and conducting projects, EJ is hyperlocal and requires tailored approaches. It is crucial that researchers dedicate time and resources to engage with the community, practice reciprocity, and educate themselves about lived experiences in ways that are meaningful, intentional, and non-extractive.
- **Virtual EJ work**: DEVELOP's EJ node was virtual. While this allowed for greater program accessibility for participants, it also presented challenges to community engagement and led to internal conversations about defining DEVELOP's role in EJ.
- **Translate data into action:** Academic studies about EJ issues are numerous, and while continuing to expand the canon of literature is important, it is also important to ensure data is being used to advance action and policy towards EJ. DEVELOP's applied science approach to partnerships and project design supports this notion.

What is DEVELOP?

Since 1998, DEVELOP has fostered the use of Earth observation data and geospatial information to better inform environmental decision making. As a dual capacity building program, DEVELOP builds skills to access and apply satellite data in both its participants (students, recent graduates, and transitioning career professionals) and project partners (federal, state, and local governments; non-profits and for-profits; and international organizations). Projects are conducted in rapid, 10-week terms (spring, summer, & fall), by small teams of participants under the guidance of NASA and partner Science Advisors.

Visit the DEVELOP website for more information for how to get involved!

NASA Earth Action DEVELOP National Program

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