

Climate Resilience in Central Appalachia: Impacts and Opportunities

An analysis of projected climate crisis impacts and its implications for community and economic development in the Central Appalachian region





Invest Appalachia (IA) is a regional social investment fund built by and for the people of Central Appalachia. IA uses a participatory, bottom-up, systems-level approach to transforming impact investing in Central Appalachia.

IMPACT THEMES



EQUITY, JUSTICE, & INCLUSIVITY



SUSTAINABILITY &
CLIMATE RESILIENCE



COMMUNITY WEALTH-
BUILDING & QUALITY JOBS

PRIORITY SECTORS



COMMUNITY HEALTH



CLEAN ENERGY



CREATIVE PLACEMAKING



FOOD & AGRICULTURE

CATALYZING COMMUNITY INVESTMENT FROM THE GROUND UP



Social Capital Investment Ecosystem

Appalachia's regionally networked ecosystem of place-based capacity, anchor organizations, and collaborations supporting community identified priorities, aligned sector strategies, impact data & storytelling, and regionally defined narratives.

Catalytic (Philanthropic) Capital \$17M Grant Pool - IA 501(c)3

Philanthropic grant pool providing a mix of flexible capital tools including TA, credit enhancements, and other tools to accelerate and offset risk for equitable and innovative community projects.

Intermediary Capital Loans & TA from Regional Partners

Partnership-based pipeline integrates opportunities from partners, coordinates strategies, leverages community & technical capacity, accelerates existing place-based industry sector clusters.

Investment Capital \$40M IA Fund - LLC Affiliate

Impact investment fund providing patient, flexible, and often subordinated loan capital to underserved communities.

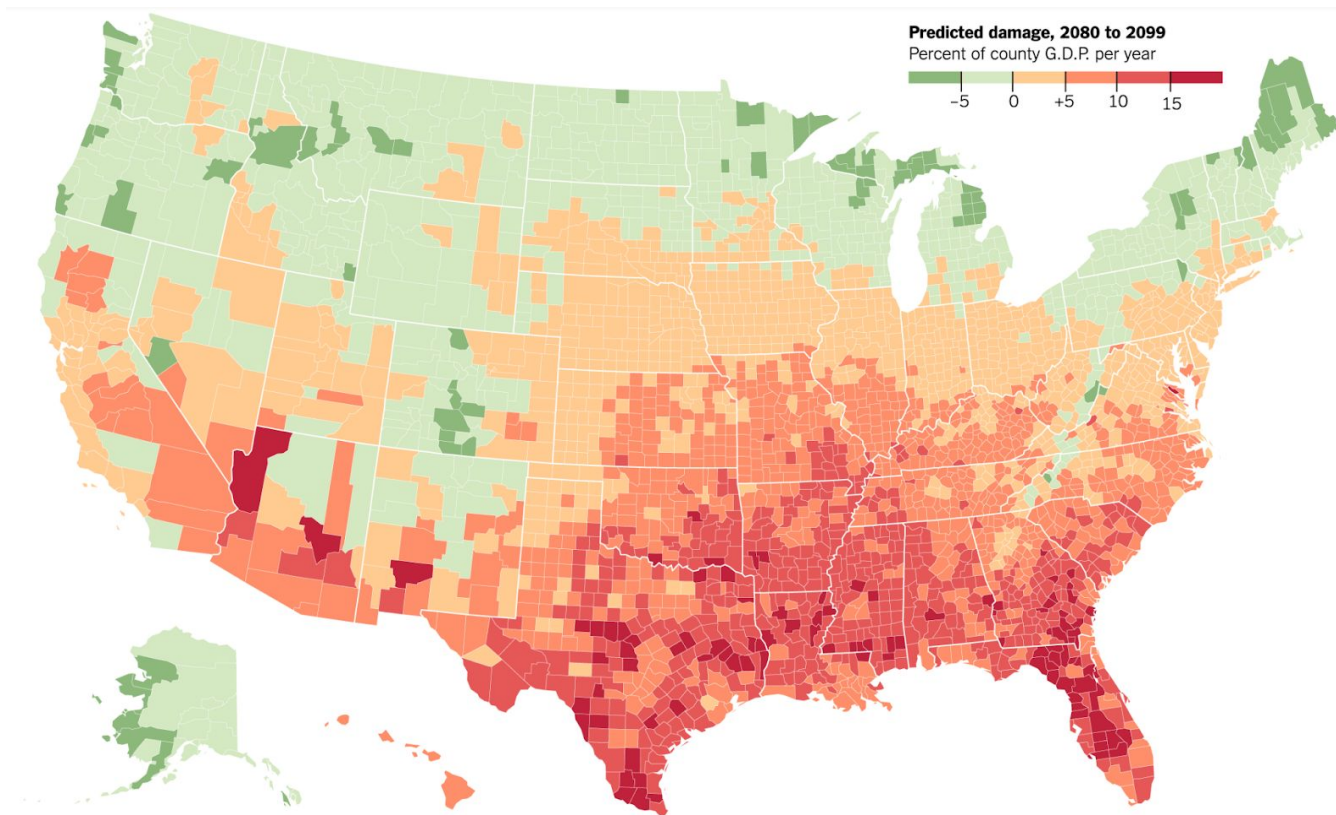
Managed by LOCUS Capital, Inc

Physical Climate Impacts in the Mountain South

- Direct impacts are unevenly distributed across geographies, no place is immune to climate change.
- Increased frequency and severity of flooding events are the most immediate threat to the region.
- Wildfire risk is also increasing, largely due to rising temperatures and drought/flood cycles.
- Heat stress and related air quality issues pose challenges for public health.



Projected Economic Damage Related to Climate Change



(Hsiang et al. 2017)



Climate as a Key Determinant Shaping Internal Migration Patterns in the US

- Rural vs. Urban Divide in climate policy, philanthropy, and investment
- Nearly 1/3 of Americans who moved in 2022 cited climate change as a reason.
- Represents seismic shift in national demographics, against historical trend
- Great Lakes region most commonly discussed as ideal for climate in-migration.
- Appalachia's crucial importance overlooked, should be a priority for investment and sustainable development efforts across the region.



Heading for the Hills

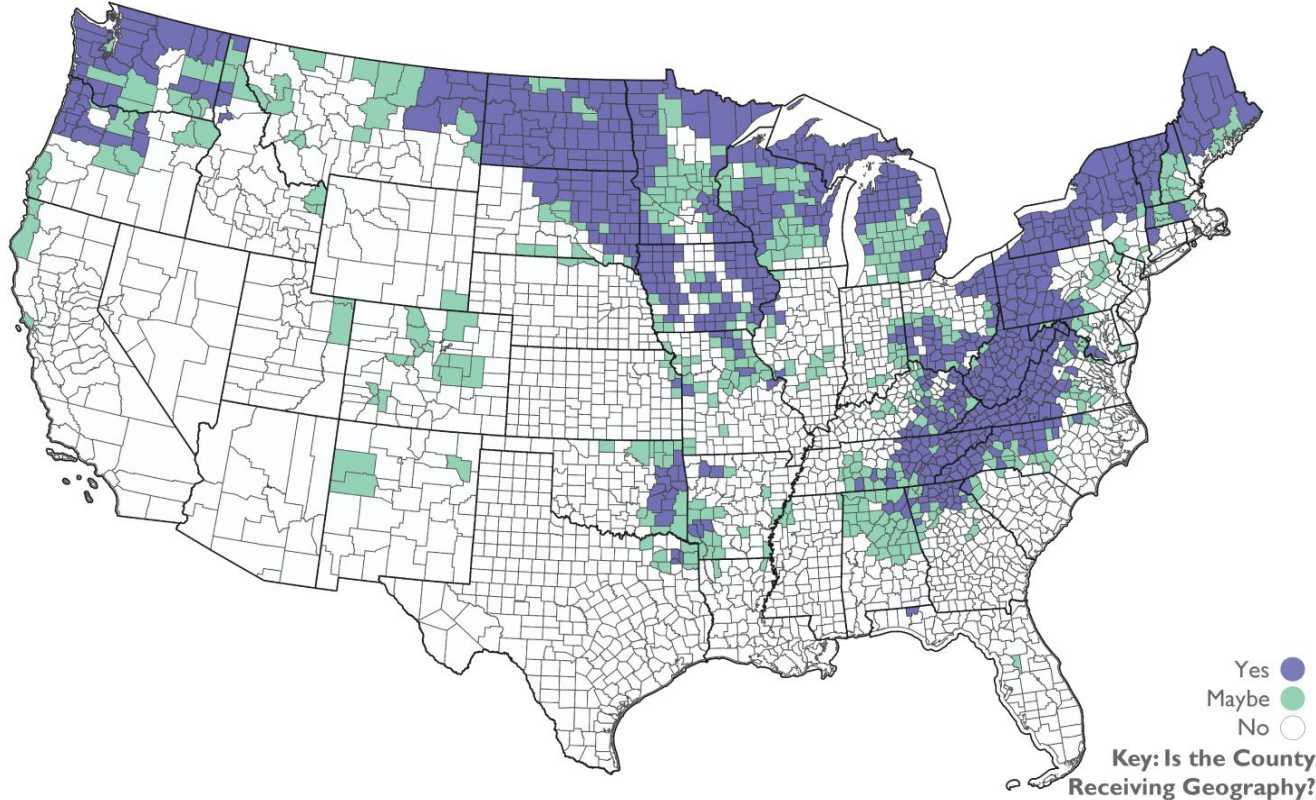
Central Appalachia is poised to play an outsized role in the United States' national climate adaptation

- Physical properties including distance from rising seas and Atlantic cyclones, mild summers, and plentiful rainfall
- Proximity to high risk coastal and southern regions
- Climate in-migration already happening
- Risk of exacerbating existing inequalities
- Social, political, and economic factors critical to climate resilience



Climate Receiver Counties

Climate Receiver Places Project at PLACE Initiative



Map Version 2.0. Meta-analysis based on data from Four Twenty Seven and ProPublica, March 2022. This map displays receiver places selected by PLACE Initiative. Places are color coded based on county-level climate risk score on a scale of 0-14 (14 being the highest risk), and sized based on municipal population. Greyed out counties follow the receiving geographies outlined in the County Map of Receiving Geography. Risk score does not include local flood risk.



Creating Opportunities out of Challenges: Invest Appalachia's Sectoral Priorities

- Invest Appalachia's priority sectors were determined using a social determinants of health analysis: *Community Health, Clean Energy, Food & Agriculture, and Creative Placemaking*.
- The development of each contributes to increased investment readiness and entrepreneurial opportunities for the region's economic markets now, with an eye towards multi-generational sustainability.
- Longitudinal resilience planning, investment strategy, and capital deployment across these and other emerging markets must position the region to adapt and thrive in a climate-impacted future.



Sector-Based Analysis:



Sector Based Analysis



Clean Energy

- EE and green buildings
- Electrical grid durability
- Solar (community, residential, commercial, & utility) & storage
- Hydro, wind, & other renewable generation
- Energy democracy & local self-sufficiency



Placemaking

- Downtown revitalization, adaptive reuse, EE buildings
- Climate smart design
- Place-based tourism and outdoor recreation
- Arts & culture, preserving & integrating cultural identity



Community Health

- Expanding flood plains & limited housing stock/sites
- Extreme heat, air quality
- Mental health services
- Climate/rural gentrification compounding housing crisis, overextending social services



Food & Agriculture

- Resilient regional food systems/short supply chains
- Regenerative agricultural, agroforestry, restorative land management practices
- Carbon sequestration & carbon markets
- Green PAD infrastructure

Cross-Sector Projects and Additional Industries that Advance Climate Resilience

Food & Agriculture

- Greater demand for strong regional food systems/circular markets
- Warming trends are leading to new opportunities, challenges in agricultural production and agroforestry practices
- Regional/Sub-Regional supply chains essential to sustained food security and economic growth
- Soil carbon sequestration and carbon market opportunities
- Restorative land management practices at sites damaged by mining



Community Health

- Expanding flood plains/areas of high risk for displacement
- Climate/rural gentrification - compounding housing crisis, overextending social services
- Increase risk of forest fires → Air quality and extreme heat as a chronic risk to public health
- Mental health services
- Community cooling centers and heat island reduction methods



Clean Energy

Narrative shifts: Creating an energy hub for the 21st century

- Central Appalachia leads the nation in projected economic benefit of solar and wind buildout from 2021-2030
- Former mining workforce transition to renewables
- Focus on energy democracy: community solar, co-ops, etc.
- Increased AC use, demand on energy supply/grid
- Evolving and increasing hydro assets



Placemaking

- Downtown revitalization
- Leveraging the creative economy
- Place-based tourism and outdoor recreation
- Preserving and shaping cultural identity
- Integrating new and multigenerational, multicultural stakeholders



Recommendations:



Capital Investment

- Federally funded, regionally managed resource pool for funding climate adaptation
- Philanthropic pool to incentivize & de-risk climate investment
- Allocation of resources from Inflation Reduction Act (IRA) Greenhouse Gas Reduction Fund
- Locally/regionally-led strategies to bolster sustainable, inclusive, and equitable economic development



Research

- Climate impacts research specific to Appalachia region
- Detailed analysis and forecasting of voluntary internal US migration in response to climate crisis in the short to medium term
- Regional asset and resource mapping
- Climate informed guidance on the deployment of IRA, ARPA, and other large scale federal funding for infrastructure
- Coordinated regional agroforestry and conservation strategy.

Community Engagement

- Empower and equip rural communities to be their best agents of preparedness and recovery
- Climate informed revitalization and protection of community hubs, specifically historic downtowns which are predominantly located along waterways.
- Creation of a Rural Resilience Corps
 - Prepare for and respond to climate shocks at the local level
 - Share strategies for adapting their built and natural environment through sustainable design practices.
 - Train and employ Appalachian residents in the resilience workforce



Public Policy

- Revised, granular floodplain and flash flood risk mapping that includes climate change model projections → Flood Insurance
- Support equitable clean energy transition through tax credits and other incentives
- Expanded affordable housing access and protections
- Funding of the RECOMPETE Act
- Funding regional climate pool

Recommendations & Partners:

Community Engagement:

- Central Appalachian Network
- Appalachian Funders Network
- Others

Research:

- NCICS
- NOAA
- Academic Institutions
- High Tech Foundation



(Appalachian
Climate
Knowledge &
Resilience
Nexus)

Capital Investment/Pipeline Development:

- Invest Appalachia
- Regional CDFIs
- Appalachia Funders Network

Public Policy:

- Appalachia Funders Network
- Just Transition Fund
- Think tanks & advocacy partners

North Carolina Institute for Climate Studies (NCICS)

- **National Presence, Regional Heart:** A top-tier climate research institution with roots proudly planted in Appalachia.
- **Vital Analysis:** Produces State Climate Summaries, NC Climate Science Report, key contributor to the National Climate Assessment.
- **Bridging Gaps:** Connects academic research and federal government science with industry and community partners
- **Capacity Catalyst:** Empowers communities and stakeholders with resources and knowledge, driving robust initiatives for resilience.
- **Data-Driven Decisions:** Bridging the gap between community needs and science to expedite the data-to-decision process.



ACKRN

Appalachian Climate Knowledge and Resilience Nexus

- **Starting Point:** For climate resilience and capacity building in Appalachia, ACKRN is the place to turn to first.
- **Integrated Engagement:** Matching needs to solutions through deep partnerships across communities, organizations, and scientific entities
- **Catalyzing Innovation:** Stimulating climate tech, research, and entrepreneurship for economic growth and job creation.
- **Collaborative Vision:** Harnessing collective strength by bringing together diverse sectors, from tech to philanthropy, under a unified vision.
- **Appalachia's Advocate:** Champions the unique climate challenges and opportunities specific to the Appalachian region, ensuring our voice is heard on the national stage.





North Carolina Institute for Climate Studies

Inspire. Advance. Engage.

Appalachian Climate Knowledge and Resilience Nexus (ACKRN)

September 7, 2023

Jenny Dissen and Nicholas Shanahan

NCICS Engagement

NC STATE UNIVERSITY



Cooperative Institute for Satellite Earth System Studies (CISESS)

ncics.org/cisess

NCICS' primary activity is operating the Asheville location of CISESS — a NOAA Cooperative Institute formed as a partnership between NC State and the University of Maryland.

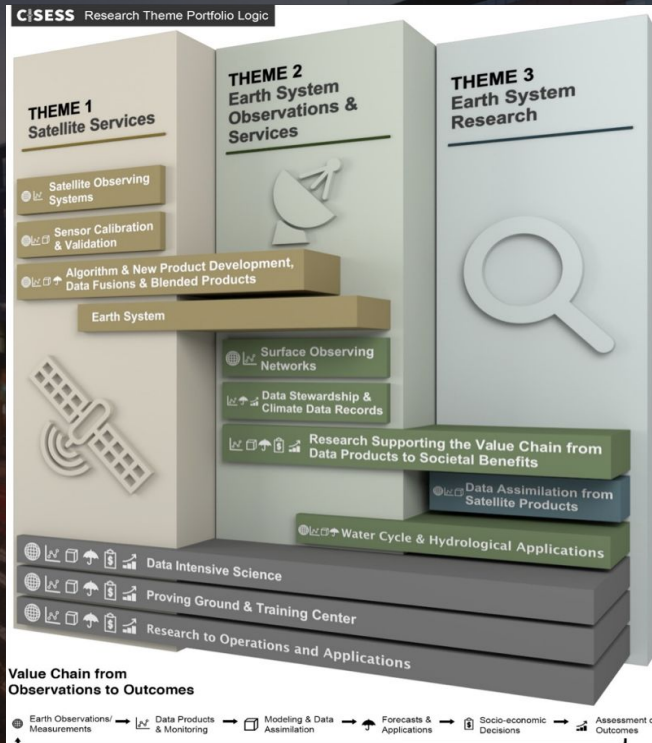
The grand scientific challenge of CISESS is to enhance our understanding of how the natural components of the Earth system — atmosphere, ocean, land, and biosphere — interact with human activities as a coupled system.



NC STATE UNIVERSITY



NCICS Research and Innovation



- Climate Assessments
- Research to Operations
- Cloud Transition
- AI/ML Research
- Climate Literacy, Outreach, Engagement, and Communications
- Innovative, High Risk Research
- Workforce Development

Fifth National Climate Assessment

The Fifth National Climate Assessment is now underway, with an expected delivery in late 2023.

NCICS scientists and technical experts are supporting every aspect of the report development process, including climate research, enhancing collaboration tools, and providing science communication expertise.



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GlobalChange.gov
U.S. Global Change Research Program

North Carolina Climate Science Report

ncics.org/nccsr

NCICS led the development of the North Carolina Climate Science Report, which was released in March 2020. The Report assesses observed and projected climate changes and associated impacts and was a key component of the state's 2020 North Carolina Climate Risk Assessment and Resilience Plan.



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Photo by Mike Burke on Unsplash

NOAA Open Data Dissemination

www.noaa.gov/nodd

- NCICS is the Technical Data Broker and Engagement Lead that supports the NOAA Open Data Dissemination activities
- Supported data access and use of over 35+ petabytes of NOAA data via Google, Amazon and Microsoft
- Works across a ecosystem of partners to accelerate use and application inspiring innovation across all sectors



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AWS Open Data + NOAA Open Data Dissemination (NODD) Pilot
Environmental Data Office Hours

MARCH 15th, 2023 | 12-1PM EDT | [REGISTER HERE](#)

Share your experience, case studies and lessons learned

- Chris Stoner, AWS Open Environmental Data Lead
- Adrienne Simonson, Patrick Keown, Jenny Dissen (NODD)
- Cindy Eisenheimer, Partnership Engagement Lead, NOAA NWS Office of Organizational Excellence
- Geoff Manikin, Environmental Modeling Center NWS

We invite your input or questions about environmental data via the cloud - in advance when you register and during the discussion!

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NODD | NOAA Open Data Dissemination

Accelerating Access to Earth, Ocean, and Atmospheric Data

NOOD Metrics | Real Time Monitoring | Reports | Logout

NOAA Open Data Dissemination
Cloud Data Analytics Summary
Analytics Team: CISSS-NC
Version 1.0.0 | Generated: July 7, 2023

34.7 PB Total Storage

NODD-Wide Weekly Metrics

Combined metrics from Amazon Web Services (AWS), Microsoft Azure (Azure), and Google Cloud Platform (GCP).

Accessions	Interactions	Uploads
3.17 PB	1.26 B	364.42 TB

NODD Metrics Portal

Image: flickr.com/Markus Spiske

International Climate Discussions with U.S. Department of State

U.S.–India Partnership for Climate Resilience

The second phase of the Partnership is underway, with a focus on sustainable landscapes, natural resource management, and forestry.

CISESS is collaborating with NCEI and The Energy and Resources Institute (TERI) in India to provide training on modern climate model downscaling methods and to help India-based forestry managers use climate projections in state climate action plans.

Developing the Next Generation of Female Environmentalists

Collaboration with NCSU focused on enabling gender parity for female environmentalists in climate change and environmental sciences via partnerships with Pakistan based universities and NCSU.

Activities include Monthly Climate and Environmental Change Women Speaker Webinar series, in person visits to give seminars, field courses, training workshops, and climate and associate environmental change forums, host at least 10 Pakistani women faculty, students, and policymakers for 30 days to have a field course, on-campus workshop, and interaction with colleagues at NCICS.



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Climate and Health Research

ncics.org/portfolio/climate-and-human-health/

NCICS scientists are working to understand and respond to the human health impacts of climate change and weather events.

- Collaboration with the Centers for Disease Control and Protection
- Developed website with climate/weather datasets for COVID research
- Using Crisis Text Line data for near-real-time assessment of mental health impacts of extreme weather and COVID-19
- Evaluating heat health exposure metrics using USCRN data



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Artificial Intelligence and Machine Learning

ncics.org/portfolio/machinelearning

NCICS is supporting the development of artificial intelligence and machine learning capabilities at NOAA. Recent accomplishments include:

- Developing and leading a series of virtual AI/ML training seminars for NCEI
- Supporting the creation of the NOAA Center for Artificial Intelligence
- Planning for 11th International Conference of Climate Informatics



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Image: flickr.com/mikemacmarketing

Engagement and Outreach



Workforce Development



- Future scientific and technical workforce for NOAA and its users
- Develop diversity through training



Education and Outreach



- Develop next generation skilled scientists, extending reach to underserved communities
- Outreach to students and general public



User / Sector Engagement



- Reach industry sectors, associations and build partnerships to support decision makers and policy makers
- Advance & improve use, access & value of environmental information



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Examining the Role of Philanthropy:

- Cultivating collaborative learning & action with place-based funders
- Increasing partnership & investment with national funders
- Establishing best practices for rural investment, sustainable & participatory design, holistic community & economic development



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FOUNDATION GIVING TO CLIMATE CHANGE MITIGATION, 2015–2021, USD BILLIONS



<https://climateworks.org/report/funding-trends-2022/>



Examining the Role of Philanthropy:

- What are the elements of impactful climate focused grantmaking (not just for climate and environmental justice funders, but for all philanthropy)?
- Are there best practices that are different in our region?
- Can we equip our communities with the ability to adequately plan and imagine a thriving life amidst the flooding we'll continue to experience in Appalachia?
- Can we equip people with the ability to re-imagine their communities as places that can retain cultural folkways and still welcome millions of climate refugees?



Questions?

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