NATIONAL SECURITY PROGRAMS
Argonne National Laboratory

Argonne NATIONAL LABORATORY

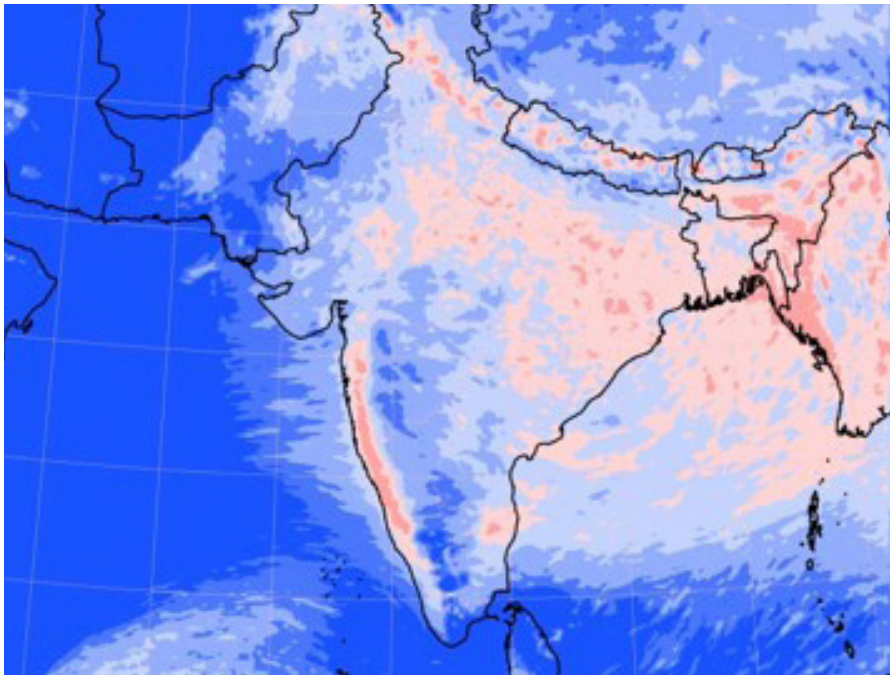
FORECASTING GLOBAL CHANGES: ENVIRONMENTAL SCARCITY, URBAN SYSTEMS, AND POPULATION DYNAMICS

Providing strategic foresight into global environmental, urban, and social challenges facing the security community.

- Environmental scarcity and climate extremes
- Critical infrastructure and changing urban systems
- Population dynamics, conflict, and disease

To provide essential insights for decision makers in global security, Argonne brings together climate modeling, environmental analyses, infrastructure science, and agent-based social modeling. This combined expertise can enhance global security by predicting risks to critical systems, guiding intervention options, and reducing uncertainty to achieve better decisions.

ENVIRONMENTAL SCARCITY



Climate and Environmental Extremes

- Projected shifts in rainfall and runoff
- Extreme heat and drought
- Environmental and health impacts
- Predicting risk and characterizing uncertainty

Water, Food, and Energy Scarcity

- Surface and groundwater modeling
- Land and crop modeling
- Effects on energy production

Environmental Sensors and Forecasting

- Radar climatology
- Climate modeling and weather forecasting
- Remote sensing and data analytics

U.S. DEPARTMENT OF ENERGY
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IMPACTS TO URBAN SYSTEMS

SHIFTING POPULATION DYNAMICS

Critical infrastructure

- Understanding how rapidly growing populations stress urban infrastructures
- Interdependencies of water, energy, transportation, and communications systems
- Power grid modeling and resilience

Urban science

- Impacts of rapid urbanization and planning for megacities
- Harnessing real-time sensor networks and machine learning

Climate, migration and conflict

- Effect of climate and scarce resources on mass migration and conflict
- Agent-based modeling to predict social dynamics, from regional migration to the “next Syria”

Infectious disease outbreaks

- Impact of climate, population densification and mobility on pathogens and disease vectors, increasing threats of food-, water- and vector-borne diseases
- Agent-based modeling to characterize exposure vulnerabilities and disease risks
- Analysis and modeling to guide preventive interventions for destabilizing disease outbreaks and pandemics

CONTACT

Tom Wall
Infrastructure and Preparedness Analyst
Global Security Sciences
Phone: 630-252-8832
Email: twall@anl.gov

Rao Kotamarthi
Chief Scientist/Department Head
Atmospheric Science and Climate Research
Phone: 630-252-7164
Email: vrkotamarthi@anl.gov

Keith Bradley
Director
National Security Programs
Phone: 630-252-4685
Email: ksbradley@anl.gov