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AI-driven predictive analytics and innovations to combat climate vulnerability

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AI-driven predictive analytics and innovative solutions are taking center stage in the fight against climate vulnerability. In a significant development, Pegasus Capital Advisors has partnered with the SDG Digital Transformation Lab to release the Digital Social Vulnerability Index, a tool designed to address critical challenges posed by climate change. Meanwhile, new collaborations with the Center for Effective Global Action (CEGA) at UC Berkeley are driving advancements in AI-based predictive analytics to foster innovations in agriculture, food systems, climate resilience, and inclusive economic opportunities in some of the worldâ??s most climate-vulnerable regions.

The index will initially focus on **extreme heat and drought** in **India, Indonesia, Kenya, and Ethiopia**, regions facing rising risks to health, food systems, and infrastructure due to extreme heat.

Pegasus Capital Advisors, a leading private equity firm specializing in blended sustainable investments across climate, food, water, and ocean ecosystems, and the **SDG Digital Transformation and Sustainability Solutions Lab** â?? which brings together academics and other experts to unlock innovative AI and data science approaches and insights aimed at accelerating the SDGs â?? announced the launch of a new machine learningâ??powered **social vulnerability index.** The initiative is designed to help policymakers anticipate and reduce the impacts of extreme climate events in some of the world's most at-risk regions.

The Data-Driven Social Vulnerability Index (DDSVI) is being developed in collaboration with Stanford Professor Vasilis Syrgkanis, who leads the Stanford Causal AI Lab. DDSVI builds on existing UNDP SDG AI Lab Digital Social Vulnerability Index (DSVI), an innovative tool that helps UN organizations, governments and non-profit organizations (NGOs) better understand the spatial patterns of social vulnerability (SV). DSVI uses machine-learning (ML) techniques, which automate the

whole process. Moreover, DSVI uses geographic information systems (GIS) technologies to develop high-resolution maps for improved representation of a country's SV beyond administrative boundaries.

The DDSVI application of causal inference can potentially identify why certain communities face higher losses from climate-induced shocksâ??and which interventions most effectively reduce those risks. This causal inference-based model, which leverages machine learning, connects social vulnerability factors to measurable outcomes such as mortality, recovery time, and economic disruptionâ??enabling more precise and equitable resilience planning. By integrating public datasets, satellite imagery, and local data, the model identifies which factors most strongly drive climate vulnerabilityâ??such as lack of green spaces or reliance on monoculture farmingâ??and prioritizes the interventions that most effectively reduce risk.

"This next phase of the Lab's work demonstrates how advanced data analytics can help governments and communities move from awareness to action," said Craig Cogut, Founder, Chairman, and CEO of Pegasus Capital Advisors and Co-Founder of the SDG Digital Transformation Lab. "By combining Pegasus's investment experience in climate resilience with the Stanford and U.C. Berkeley communities' technical expertise and UNDP's global reach, we can accelerate data-driven solutions that protect people and livelihoods on the front lines of climate change."

The project is part of the Lab's broader mission to advance sustainable sovereign AI collaborations, applying cutting-edge digital innovation and modeling to anticipate cascading risks in food systems, infrastructure, livelihoods, oceans, clean energy, and ecosystems across several countries in Asia and Africa. The initiative exemplifies how the SDG Digital Transformation Lab is uniting academic innovation, investment expertise, and development partnerships to tackle the world's most urgent climate challenges. The Lab will continue expanding its modeling applications across regions and sectorsâ??building a global network of data-driven resilience tools to support the communities most affected by climate change.