



## Center for Geospatial Solutions: Think Globally, Map Locally

IN THE 1980s, not long after China had opened up to global trade and commerce, the nation's farmland began succumbing to rapid urbanization. The explosive growth of cities consumed an estimated 7 million to 12 million acres of prime farmland from 1987 to 1995. This pattern led to dramatic changes in the landscape and grave concerns about food security. Aware that no farms meant no food for the country's growing population—and just a few decades removed from a devastating famine that had cost the lives of 20 million to 50 million people between 1958 and 1961—the central government enacted regulations requiring those who converted farmland for other uses to ensure the protection of the same amount of farmland elsewhere.

China's Ministry of Land and Resources tried heroically to meet these zero net loss mandates. But it was impossible to monitor land quality and local land exchange decisions, especially with last-generation management systems like limited data, paper records, and low-resolution maps. Urbanization continued apace, swallowing an estimated 82 million acres of farmland between 2001 and 2013. In most cases, the rich farmlands around growing cities were “replaced” with less productive woodlands and grasslands. To get higher yields from less fertile land, farmers had to adopt more intensive cultivation practices, relying on chemical fertilizers, pesticides, and irrigation. These technical solutions maintained food security, but at a high cost, including the depletion of aquifers and contamination of soil.

China is now a net importer of grains and future production hinges on finding new sources of water for irrigation. Concerns are growing about food security once more, but something else is changing in China: the land and resources agency—now called the Ministry of Natural Resources—is modernizing the system it uses to monitor and enforce the farmland preservation policy. This includes adopting geospatial data from satellite imagery and other remote sensing to map and evaluate the quality of reclaimed land. It also includes monitoring urban frontiers to better guide development decisions.

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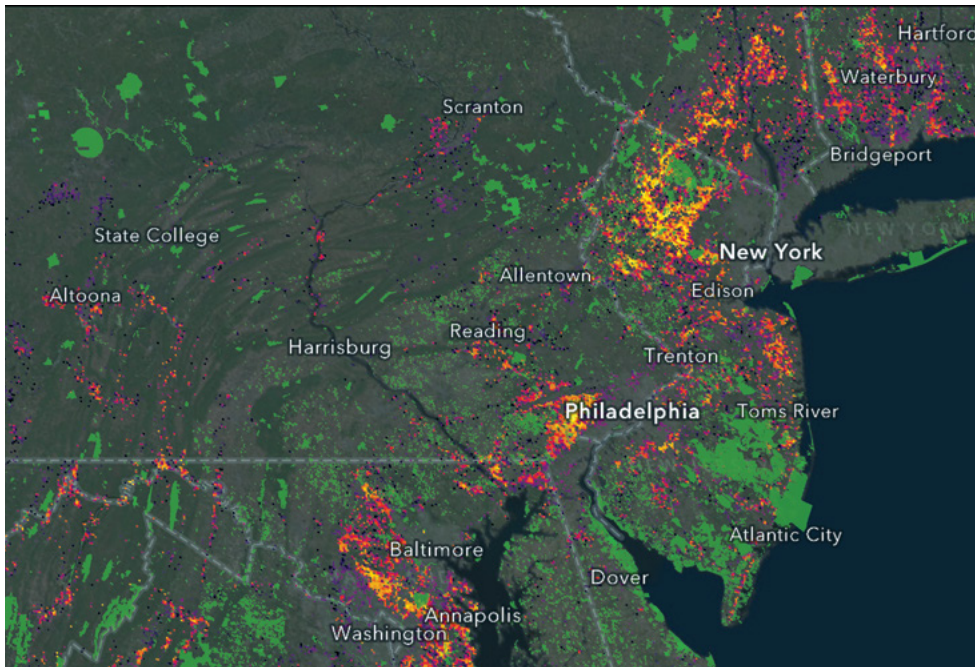
Recent improvements in the quality of satellite imagery and computer analysis methods are making it possible to monitor China's farmland preservation efforts with increasing precision. These improvements also hold great promise for land and water conservation around the globe. This fall, the Lincoln Institute is taking a major step to expand the accessibility and use of such cutting-edge technology by launching the Center for Geospatial Solutions (CGS).

CGS is a new hub of data, expertise, and services for people and organizations across the public, private, and nonprofit sectors working to conserve land and water resources. It will expand access to geographic information systems (GIS), remote sensing, and other tools that can inform decisions about land and water management. Although these tools have existed for decades, many organizations lack the data, equipment, staff, or expertise to implement them, limiting their ability to achieve their goals and to collaborate with others at large scales. The center will focus on opening access to cutting-edge technology for historically oppressed or marginalized people and communities; governments in low- to middle-income countries, regions, or states; nonprofit organizations with limited resources; and startup businesses, or businesses operating in developing or restricted economies.

We're launching this effort because we know that sweeping reforms like those China implemented to preserve farmland are just the first step toward an intended outcome. To succeed, such policies must be followed by the less

glamorous work of persistent enforcement and monitoring, with adjustments to the rules in response to lessons learned. In addition, if policy makers hope to manage land policy at the national or international level, they need access to the best possible data and precision tools to track and respond to what is happening locally. CGS, led by staff members with deep expertise in mapping technologies, organizational development, public health, and conservation, will provide data, conduct analysis, and build customized tools to respond to increasing demand from organizations of all sizes, with all levels of technical capacity.

CGS builds on the Lincoln Institute's long track record of pioneering ideas that have transformed land policy at national and global levels. Beginning in the 1970s, the Lincoln Institute played a leading role in developing computerized property assessment. This revolutionized how local governments around the world administered the property tax—the most important component of local public revenues in most places. In the early 1980s, the Lincoln



The Center for Geospatial Solutions (CGS) will expand access to geographic information systems (GIS), remote sensing, and other tools that can inform decisions about land and water management. This CGS map combines social and environmental data to highlight landscapes that are relied on by at-risk species, facing development pressures, and adjacent to existing protected areas (shown in green). Credit: CGS.

Institute convened some 40 land trusts to mobilize efforts to conserve private land in the United States to complement public land conservation. By expanding the scope and use of conservation easements and advocating successfully for state and federal tax breaks for private land conservation, the coalition, which became the Land Trust Alliance, has since helped to protect more than 56 million acres of private land—equal to the land area of Minnesota. And in 2014, we launched the International Land Conservation Network, which connects civic and private land conservation organizations and people around the globe, and has spawned major conservation initiatives on several continents.

With the launch of CGS, we are prepared to apply our expertise to the work of supporting and amplifying today's bold land-based initiatives. Earlier this year, for example, the Campaign for Nature launched an effort to protect 30 percent of the planet's land and oceans by 2030. The "30 by 30 Campaign" seeks to address climate change, support a growing global population, and prevent mass extinctions by protecting critical natural resources and ecosystems, and monitoring and managing their protection in perpetuity. This colossal effort can learn from farmland protection efforts in China and other bold efforts to manage land and resources at national or global levels, and it will benefit from the kind of tools and analysis CGS brings to the table.

An important first question is whether we can leverage the traumas of 2020—a pandemic, devastating wildfires in Australia and the United States, the increasing frequency and severity of weather-related calamities—to forge the political will to take meaningful global action. Can we convince global politicians and voters that the climate crisis or mass extinctions threaten human survival and require the type of coordinated global action sparked by the pandemic? Second, can we sharpen the global goal of 30 by 30 to motivate more specific (and practical) actions at lower levels of geography to avoid unintended consequences? While 30 by 30 is a handy slogan, the 30 percent of lands and

oceans the campaign chooses to protect will have direct bearing on whether we can reverse the climate crisis or avert mass extinctions. We will need to determine which land and other resources to protect, which to protect first, and how to do it. We will need to monitor local actors to make sure their actions are consistent with global goals and strategies. And we'll need to find ways to hold key actors accountable for meeting critical benchmarks. Finally, once we've identified the specific ecosystems we want to protect, we will need legal mechanisms to protect them and means to monitor protection and stewardship in perpetuity. It will require thousands of people equipped with the tools and training to monitor and enforce legal agreements and the authority to do so.

The Lincoln Institute can contribute to this bold global effort by helping the Campaign determine which land and other resources to protect first, how to monitor and manage that protection, and, with the help of ILCN, how to navigate the relevant legal mechanisms across different countries with different legal systems. In parallel efforts, the Lincoln Institute is building distance learning curricula to train local government officials and practitioners to use new land and water management tools and approaches more effectively. CGS can decentralize decision making by providing tools and training that can be deployed locally to support global goals. By making mapping technology universally available, we can enable people and organizations to collaborate and achieve impact in land and water conservation that is orders of magnitude greater than what they can accomplish alone.

The Center for Geospatial Solutions exists to bring new clarity and insight to the business of global land conservation, increasing access to data in the name of building a more sustainable future. Like lifting a fog, applying geospatial technology will enable anyone to see what is happening anywhere on the Earth. It will make the planet feel that much smaller, and the solutions to humanity's toughest problems that much easier to grasp. □