Planning for the future of food

A brief look at the upcoming report
Foodscapes: Planning the Food System Transformation

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A brief look at the upcoming report

“Foodscapes: Planning the Food System Transformation”

Scientific studies, economic reports and additional work by experts in public health, civil society, biodiversity, food production and climate change in recent years all point to food as the single strongest lever to optimize human health and environmental sustainability on Earth.

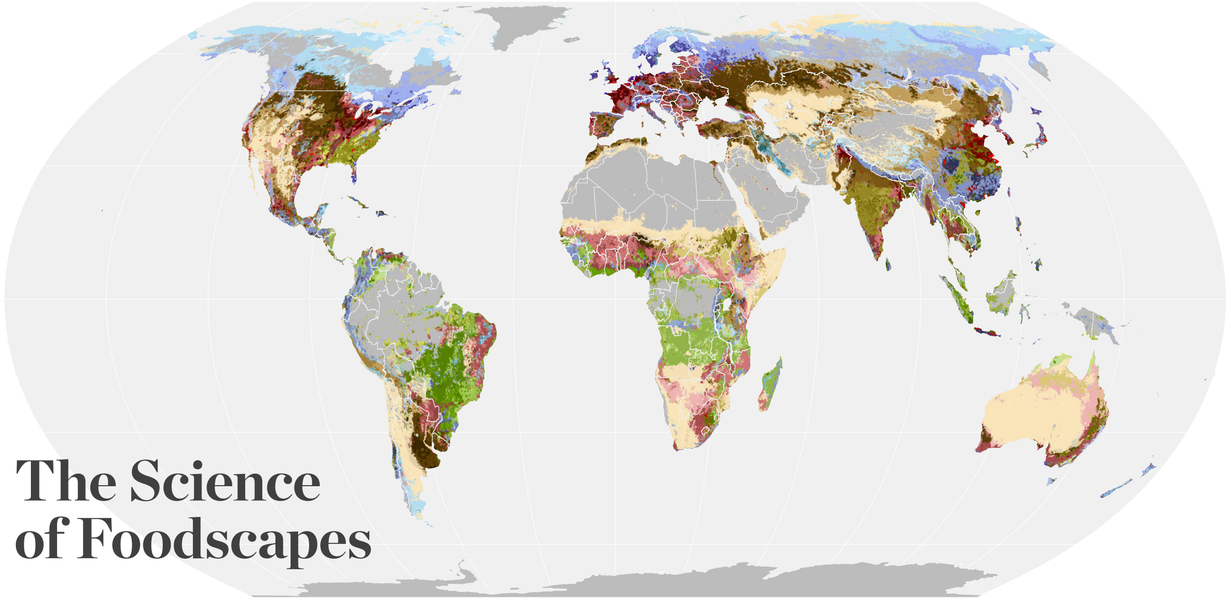
The challenge is clear: We must transform the global food system in ways that not only improve livelihoods and public health, but also regenerate rather than deplete resources, mitigate rather than exacerbate climate change, and restore and protect rather than accelerate the destruction of biodiversity and habitat.

But a global-level transformation is easy to call for and hard to manage because transformation is an outcome, not a process. Transformation of global food production is, then, essentially the sum of myriad smaller-scale transitions across the entire system.

To help people plan at that transitional level where change happens in real places for real people, the forthcoming report “Foodscapes: Planning the Food System Transformation” introduces the first analysis, classification and mapping of the world’s ‘foodscapes’. This spatially explicit approach enables new ways of envisioning, managing and implementing the transitions that are, and will continue to be, necessary for the full-scale transformation of our global food systems.

Foodscape

a distinct food production geography with specific combinations of biophysical characteristics and management attributes.



The Science of Foodscapes

Researchers identified terrestrial foodscapes (Figure 1) that are distinct based on their particular combination of biophysical and management-related variables by collating and harmonizing the best available global spatial datasets (at a five km by five km resolution) documenting biophysical and management properties of terrestrial food production systems.

Next, using a two-tier unsupervised classification approach researchers analyzed the datasets to identify distinct clusters of variables that define unique foodscape classes. This form of clustering is predominantly data-driven and highlights regions of highly similar distinctive characteristics, rather than areas described based on an a priori defined classification system.

Overall, the foodscape classification showcases the diversity of production landscapes across the globe. Despite the relatively coarse resolution, which necessarily simplified the tremendous diversity found in the world’s food production areas,

> **More than 80 distinct foodscape classes emerged from the analysis.**

Some of these classes occur in quite narrow geographic locations, whereas others are widespread over large tracts of multiple continents, highlighting the need for diverse approaches to scaling interventions, including nature-based solutions.

FIGURE 1 Combined terrestrial map showing foodscape classes around the world. Owing to the large number of classes, a legend is not shown. An online interactive will be available following report publication.

High potential soils, such as Mollisols found primarily in the plains throughout the world are the basis for the majority of our 'breadbasket' foodscape classes characterized by comprehensive use of the land area for croplands and intensive farm management including large scale irrigation. These foodscapes cover only 12% of the world's land area and produce two-thirds of the world's crop output, including much of the cereals and oil crops, half of which are used for animal feed, industrial and energy uses such as biofuels.

Mixed mosaics of food production are found over a wide mix of soil and biophysical conditions, often in hilly and mountainous areas ranging from arid to humid. In these foodscapes classes, croplands can be closely associated with natural ecosystems. Covering 22% of the world's terrestrial area, half of the crop outputs in mixed foodscape groups are in perennial crops, such as coconut, oil palm, coffee, tea, cocoa, tropical and temperate fruits, nuts, sugarcane, and bananas.

Scattered cropland and grazing foodscape classes comprise another third of our terrestrial area. Large tracts of land that are primarily grazed characterize these areas which cover large areas of North America, South America, Asia, Africa and Australia.

The final third of the terrestrial area is classified on the global map as having little or no food production. These non-food producing areas range from forested landscapes to deserts and arctic tundra, and while they are classified as non-food producing in this global analysis, they can be very important for food security and diet diversity for local communities, along with fisheries and aquaculture (as described in 'other foodscape classes' in the full report).

Because food production is clearly dependent on a healthy environment and simultaneously a driver of environmental degradation, the forthcoming report also examines ways the world's foodscapes are both subject to, and responsible for, environmental degradation.

By overlaying the terrestrial foodscape map with a series of independent spatial datasets, the report highlights foodscape classes that contribute the most, and are affected by, pressures on ecosystem health. The work also incorporates several pre-existing analyses of threats to and from aquatic foodscapes.

The report shows the intensity of these pressures as experienced in foodscape classes and demonstrates that many foodscapes are at risk from multiple pressures, calling for an integrated set of interventions to regenerate ecosystems, sustain food production, and protect biodiversity. And in recognition of the challenges, researchers also examined the existing potential of nature-based interventions to offer solutions best suited for key foodscape classifications.

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A Kenyan woman picking tea on a tea plantation in the Upper Tana watershed, Kenya. ©Nick Hall

Foodscapes + Nature-Based Solutions

Addressing these challenges with nature-positive solutions can support large scale restoration, resilience and natural capital accumulation.

In the context of the Foodscapes report, nature-based solutions include ecological, regenerative and restorative methods of food production in agriculture, aquaculture, mariculture and fisheries—along with land management, including protection and restoration of habitat—all of which support climate stabilization, resilience, biodiversity, food production, and livelihoods. For example, agroecology and regenerative agricultural practices are ecologically sound, nature-based solutions that build or restore natural capital while providing healthy food, secure livelihoods, and adherence to principles of fairness, equity, and participation.

The report considers both restoration of natural ecosystems in areas where agriculture is currently practiced, and nature-based solutions implemented in agricultural and aquacultural foodscapes that are in harmony with food production.

The analysis focuses on quantifying the impact of these nature-based solutions in today's foodscapes, without considering fundamental restructuring of food systems,

A young boy on horseback minding his family's herd of goats in the grassland steppe of eastern Mongolia's Tosonhulstai Nature Reserve. © Nick Hall

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such as major shifts in crop distribution or global trade.

Within the framework of today's foodscapes, the suitable area for interventions that maintain food production levels including soil health, nutrient balancing, water efficiency, silvopasture, agroforestry, and restorative aquaculture is very large, and to achieve the potential would be transformative. Silvopasture and agroforestry systems in particular offer the opportunity to maintain or even enhance food production while providing increased biodiversity, habitat quality, and carbon benefits. Further, these nature-based solutions, if designed to do so, can also support a shift to healthier diets.

Numerous assessments and studies demonstrate the potential of nature-based solutions at the global system level. What remains less clear are the specifics: what to do, where and when, and how to drive durable transformations on the ground, which is where foodscapes show their true worth as vehicles for creating positive change for people and nature.

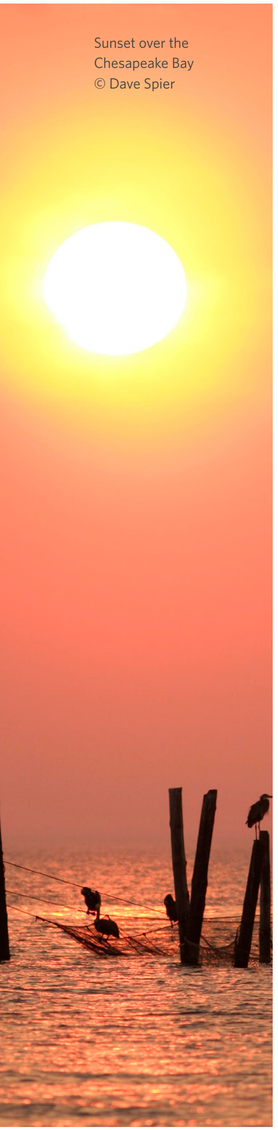
The Foodscapes report–examining the world's current distribution of food production systems, the risks to the systems and the opportunities of nature-based solutions –supports planning for food production transitions that bridge the space between global scenarios and locally led approaches and helps address the needs of those most vulnerable to climate change and nutrition insecurity.

By design, the distinct foodscape unit of analysis may be overlaid with distinct supply chains or form a mosaic within a political unit of analysis, geography, or agroecological zone. In doing so any policy maker, economist, analyst, or community leader can use foodscapes as a tool to help map a relevant path towards food system transformation.

The foodscape classification described in the report explicitly incorporates several of the biophysical and management factors that influence suitability for nature-based solutions. Yet this only tells part of the story because the specific pathways to adoption of nature-based solutions will depend on the economics of transition in each place as well as the political, cultural, and historical backdrop against which change would take place,and for which there are no global data to enable mapping.

To shed light on the role of nature-based solutions in different contexts, and the private and public benefit they can provide in foodscapes, the forthcoming Foodscapes report includes a series of case studies from all continents (except Antarctica).

While by no means exhaustive of all global food production systems, these case studies illustrate the diversity of relevant nature-based solutions that might apply in similar foodscapes, the multiple means by which to scale adoption, and the different sources of value the nature-based systems can unlock for producers and the public.



Sunset over the Chesapeake Bay
© Dave Spier

For example, though specific foodscapes are unique, many are connected through global supply chains. The implication of this connection is that the potential for nature-based solutions in one landscape is partially determined by actions in other geographies.

Take almonds. One of the biggest factors pushing almond producers in the Granada (Spain) foodscape to produce organic almonds is that they are not able to compete with the relatively cheap, irrigated almonds from the San Joaquin Valley (USA) foodscape.

Foodscapes also highlight that land, water and marine systems strongly impact each other calling for approaches that combine their management. In the Chesapeake Bay foodscape (USA), for instance, oyster bed restoration is effective at remediating excess nitrogen in the Bay. Regulatory frameworks will soon allow for oyster bed restoration to be included as an allowed activity towards meeting nutrient reduction targets.

Around the world, aligning public policy around multiple outcomes is key to achieving results.

In the Punjab-Haryana foodscape (India), government provision of free electricity to rural areas drove high rates of groundwater pumping and overdraft. Policies then enacted to limit dry season irrigation led to a narrower window between rice harvest and wheat planting, which inadvertently contributed to large-scale crop residue burning to quickly prepare fields for wheat. At peak burning periods, agriculture burning contributes around 30% of fine particulate matter in the air in Delhi, causing respiratory harm, contributing to climate change, and disproportionately affecting the poor who are less able to take adaptive measures.

In most of the case studies for which researchers did economic analysis, the costs of transition to nature-based solutions could be as high as, or higher than, current farm revenue. This level of transition cost will require public investment. However, it's important to note, that even though costs of transition are high,

> **In all cases researchers explored, the public and private benefits provided by the transition are greater than the total investment costs, resulting in a net social benefit.**

Developing new business models within the food economy which incorporate the hidden costs of food systems is an important step toward transition in foodscapes the world over.

Planning for the future of food

Science and economics are clear on the urgency of the environmental challenges and the limited time we have to address them. Around the middle of this century global population is expected to stabilize and the explosive phase of demand growth for certain commodities will shift and evolve roughly a generation from now.

But place-based analysis suggests many critical food production systems around the world do not have the time to spare. Productivity will collapse through over-exploitation of ecosystem services like water, soil organic matter and agro-biodiversity that food producers—farmers, fishers, grazers, and all of us—depend upon.

The food system transformation is among the most urgent needs the world faces for climate action and ecosystem health. Our analysis suggests the importance of planning and implementing transition pathways at the foodscape level, and the enormous potential for our collective food systems to be a leading source of nature-based solutions and ecosystem restoration. With further interventions in policy levers, economic opportunity, catalytic financing and supply chains, we can achieve the future food system the world requires and deliver significant social, environmental and economic benefits.

The Foodscapes Report

To receive the full Foodscapes report when it is released, **sign up** for The Nature Conservancy's Global Insights newsletter.

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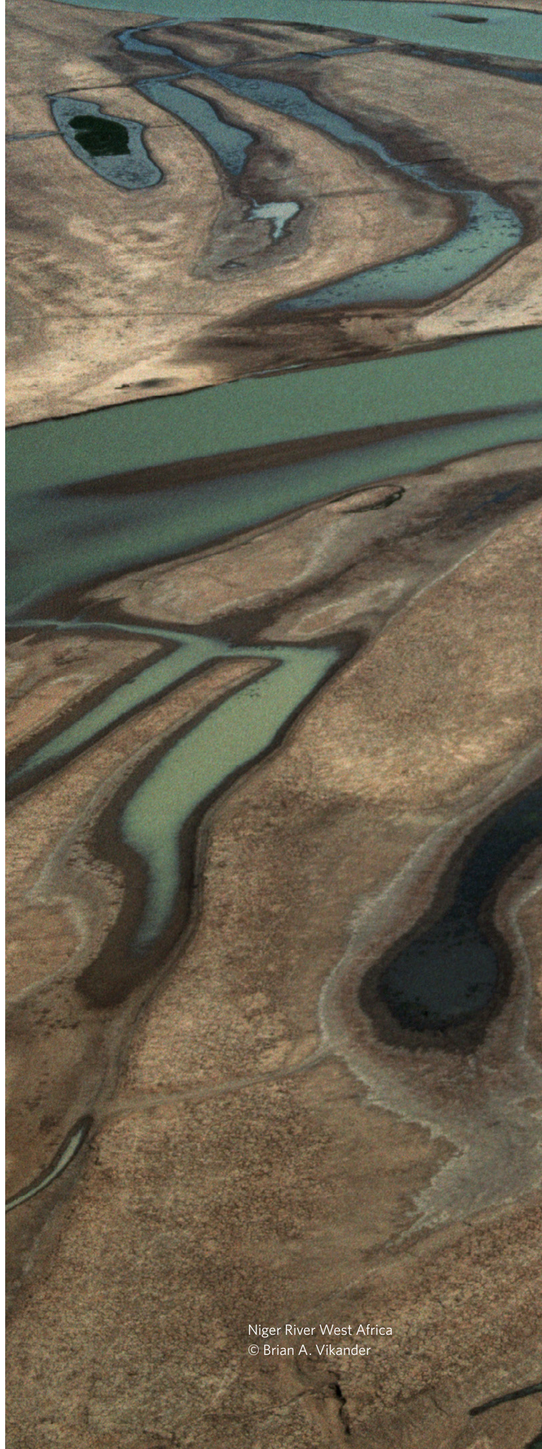

Niger River West Africa
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