Evaluating regenerative foodscapes:

A learning-centered impact framework

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CONTENTS

Conversion of Brazil's Atlantic Forest to cattle ranching. © Adriano Gambarini

Background

WHAT IS REGENERATIVE AGRICULTURE?

The global agri-food system[1] accounts for at least 10% of the world economy, employs more than 1 billion people and has succeeded at feeding a growing population. But this success has come at a high price, paid in habitat and biodiversity loss, greenhouse gas emissions, depleted water resources, and soil erosion. **Regenerative agriculture** leverages food production to contribute to the solution of these global problems. While there are many ways to define regenerative agriculture, from outcomes to practices to process[2], a common thread is that regenerative agriculture contributes to rebuilding the natural resources of an area and the benefits people derive from these natural resources. The sum benefit of these natural resources to people is natural capital.

There will always be trade-offs between the need to produce food and the restoration of nature. For instance, cover crops that are used to reduce sediment and nutrient loss need to be terminated before main crop planting; this is often accomplished with tillage or herbicides. Reducing irrigation in rice to protect water resources can create a new challenge for how to manage weeds. Managing trade-offs in a farm or field is an inherent component of growing food. What is different about regenerative agriculture is that it moves beyond crop production as the main outcome of focus and incorporates multiples outcomes related to agri-food system productivity, resilience, profitability, and sustainability. Rebuilding natural capital from agriculture requires assessment beyond the individual plot of land, and a view towards the food producing landscape, or foodscape.

WHAT ARE REGENERATIVE FOODSCAPES?

Foodscapes, most simply, are agri-food producing landscapes. Just like a landscape, they can be defined based on natural features (e.g. watersheds), jurisdictional boundaries (e.g. administrative regions), or management zones. They could be relatively homogenous in their typologies of food production (e.g. extensive monocropping) or heterogeneous (e.g. mixed-use landscapes of many crops and incorporation of natural elements)[3]. Foodscapes could be entirely terrestrial or incorporate freshwater fisheries or coastal foods. While there is no formulaic way to describe a foodscape, the critical element is that of scale: foodscapes are local enough where interventions must be accountable to concrete change, broad enough where intervening on systems change is necessary to achieve objectives. This is the vision of **regenerative foodscapes**—place-based transformations of systemic barriers to scale practices that restore and increase the resilience of natural capital at the landscape scale.

To achieve this vision, The Nature Conservancy (TNC) is applying a foodscapes model to show how agri-food systems can drive change in a portfolio of critical landscapes. Each foodscape represents a


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Wheat threshing in Karnal district, Haryana, India.

[1] We use the term agri-food system throughout this document to capture the importance of sustainably producing food, fiber, and energy.

[2] Tittonell et al. 2022. Front. Sust. Food Syst. doi: 10.3389/fsufs.2022.844261

[3] Bossio et al. 2021. Foodscapes: Toward Food System Transition. ISBN: 978-0-578-31122-7

[4] Jenkins, RE. 1975. The Preservation of Natural Diversity: A Survey and Recommendations. Prepared for U.S. Department of Interior. **https://lastgreatplaces.us/wp-content/uploads/2023/11/Preservation_of_Natural_Diversity-Extract.pdf**

unique laboratory that catalyzes change locally and generates evidence and insights that can accelerate change globally. TNC has been a proponent of and leader in landscape-level conservation since at least the 1970s[4].

Our regenerative foodscapes are centered around four principles:

1. **Foodscapes contribute to rebuilding or improving natural capital at the landscape scale.**
2. **Foodscapes are co-created with Interested Parties[5] of the foodscape.**
3. **Foodscapes emphasize interventions that are rooted in the unique challenges and opportunities of the landscape, while focusing on systems change.**
4. **Foodscapes interventions are built on theories of change and evaluated based on the implementation of monitoring, evaluation and learning plans.**

Our initial portfolio of foodscapes includes the Gran Chaco, Kenya's Central Highlands Ecoregion, Northwest India, the U.S. Upper Mississippi River Basin and Orinoquia, Colombia. These landscapes represent long-term commitments from TNC. We aim to grow this portfolio while also supporting others in implementing and scaling the foodscapes model.

[5] Interested Parties are individuals or groups that relate to, potentially affect, or are affected by the conservation work in a socio-ecological system. Interested Parties is a preferred term to "stakeholders," which may be disenfranchising to some parties, such as groups that are legal Rights Holders in many situations. **https://www.conservationbydesign.org/modules/interested-parties/**

Farmer explains irrigation and forest management on his farm in Montrose, Colorado.

Aerial image of an irrigation canal and dried riverbed amidst agriculture crops in the Central Valley, California.

These foodscapes are focused on implementing a place-based strategies, and associated interventions, that can drive fundamental change in the agri-food system. These place-based strategies emerge out of a systems analysis of the threats and barriers to change in these landscapes.

PLACE-BASED STRATEGIES

Example interventions from place-based strategies include:

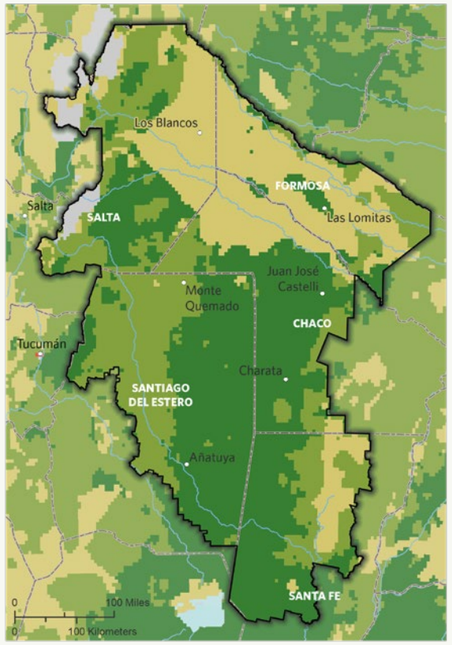
- Work with power utilities to purchase electricity credits from solar panels on irrigation pumps to incentivize groundwater use reductions.
- Develop farming innovation hubs that combine technical assistance and inputs with off-takers so that markets can better incentivize sustainable farming practices.
- Support environmental authorities to improve water management for agricultural uses.
- Support peer-to-peer farmer learning networks.
- Support farmer co-ops to create business models for scaling access to machinery needed for no till agriculture and dry seeding of rice.
- Influence public policy to strengthen land use planning to avoid conversion of natural ecosystems while improving food production and preserving culture.

Example. Policy levers to influence food systems change

The Argentinian Gran Chaco covers 130 million hectares of threatened tropical dry savanna habitat. The term chaco means "hunting territory", illustrating the important biodiversity of the region, such as the jaguar, giant armadillo, tapir, and giant anteater. More than one third of the natural habitat has been converted to agricultural production, largely to support beef supply chains. Continued cultivation has led to loss of biodiversity as well as degradation of existing agricultural land.

The Gran Chaco foodscape is working to create policies and incentives to protect these forests and savannas. TNC is collaborating with regional government to create local regulations that implement Federal Forest Law 26.331. This law delineates categories for the conservation of forests possessing high ecological value, and provides incentives designed to assist landowners in managing these areas through the provision of resources from the National Fund for Forest Conservation. Through collaboration with regional governments in Salta and Formosa, TNC is working to ensure the application of the law is contextualized to local conditions. These incentives can become critical for ensuring forest protection, especially when combined with technical assistance that enables farmers to intensify and produce more crop per acre on cultivated areas.

GRAN CHACO



Map: Chris Bruce/TNC

- Scattered cropland and grazing
- Mixed and diverse food cultivation
- Irrigated and/or intensive food production
- Areas with little or only subsistence food production
- State/Province/Department Boundary

SCALING CHANGE TO GLOBAL IMPACT

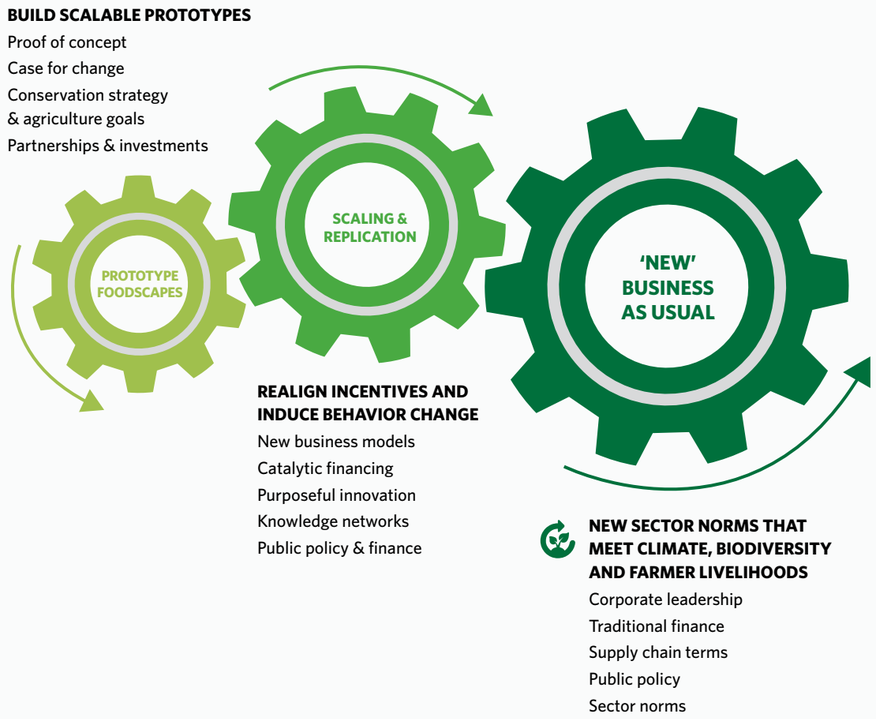
In addition to driving local change, foodscapes are part of a broader network that can enable change at a greater scale. By building scalable prototypes, foodscapes can unlock broader changes in policies and market structures that can create new sector norms at a broad scale (Figure 1). For example, foodscapes are linked through commodities that can enable action through the broader value chain. The Gran Chaco and the Upper Mississippi River foodscapes are both exporters of soybeans and soybean meal. Changes in the market in one foodscape can impact the other, such as the 2022/23 drought in Argentina that led to greater export of soy from the US. This global linkage enables value chain-wide efforts such that efforts to increase sustainability in one landscape do not create unintended consequences in other landscapes, such as increasing rates of conversion. These value chain linkages can create collaborative, pre-competitive spaces for value chain actors to collectively work towards science-based commitments to improving biodiversity and reducing emissions.

> **Many companies' agricultural value chains overlap within the same landscapes, which are also situated within ecological and jurisdictional boundaries where many others are working to promote regeneration. Rather than only working on sustainability goals at an individual company level, focusing on shared goals for a place can achieve greater impact by enabling collaboration and avoiding duplicative, competing efforts.**
>
> Steven Rosenzweig, Agriculture Science Lead, General Mills

Foodscapes can scale impact from local to global by building coalitions and replicating models that work in similar landscapes. In this way, we can inspire a new norm where food production is leading positive outcomes for habitats, biodiversity, climate and livelihoods, helping to create a world where people and nature thrive.

Gran Chaco in Argentina Agricultural expansion and intensification threaten South America's largest tropical dry forest.

FIGURE 1. SCALING MODEL FOR FOODSCAPES



NEED AND CONTEXT FOR THIS FRAMEWORK

The vision of regenerative foodscapes described above is ambitious. Achieving this vision requires demonstrating change. This is needed both to evaluate the effectiveness of strategies, and adapt where necessary, while providing the evidence base to market actors and policy makers. Demonstrating change requires specifying an audience: who needs to know what information by when. As co-created, landscape-level efforts, foodscapes monitoring, evaluation and learning (MEL) will inform multiple actors, which requires documenting the different information needs – and timelines – of these different actors.

In addition, demonstrating change is critical for foodscapes because of the inevitable trade-offs and unintended challenges that emerge when scaling new modes of production. Yet, at the same time, there are many dimensions of outcomes that are critical to regenerative agriculture[6] and quantifying the impact of landscape efforts on each of these dimensions would be

[6] For example, Mottet et al. 2020. Front. Sust. Food Syst. doi: **10.3389/fsufs.2020.579154**


© Cara Byington/TNC

TNC scientists Stephen Wood and Rodd Kelsey sampling soil in the Sacramento River Delta, California.

costly and time consuming for a large set of straightforward metrics, let alone complex ones such as soil health that is itself a complex metaphor with multiple metrics.

The need to monitor change and impact in landscape-scale agriculture efforts is not new to regenerative foodscapes. While an exhaustive review of landscape monitoring tools is outside of the scope of this document, other organizations and coalitions have developed approaches at the landscape scale[7]. In addition, The Nature Conservancy has a long history of implementing and monitoring conservation activities at a landscape scale, such as Resilient Watersheds[8], as well as general learnings and guidance on MEL[9] and guidance specific to inclusive and equitable MEL with Indigenous Peoples and Local Communities[10]. The aim of this foodscapes MEL document is to draw on these efforts, specifically the learnings within The Nature Conservancy, to develop an approach that meets the specific needs of implementing regenerative foodscapes, namely the need to balance demonstrating change with improving implementation, while not overburdening implementation teams with a large amount of data collection demands. This framework offers an approach for what steps to take to develop a MEL plan for foodscapes, what to measure, how to measure, and at what level to invest resources and time into MEL.

A LEARNING-CENTERED APPROACH

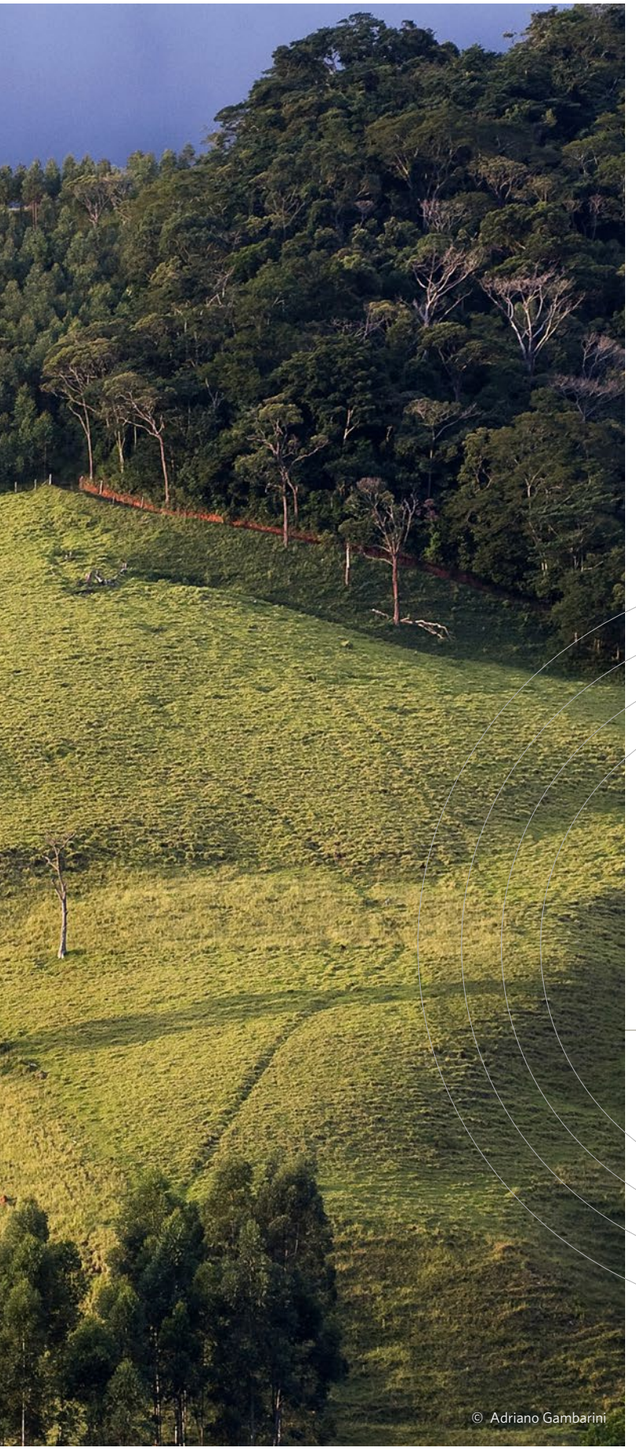
A learning-centered approach emphasizes the importance of understanding why people act, to refine the interventions of a foodscape. As such, the emphasis is more on continuous

[7] E.g. EcoAgriculture Partners, FAO TAPE, Regen10, etc.

[8] Resilient Watersheds Monitoring and Evaluation Toolbox: **https://waterfundstoolbox.org/methods/monitoring-and-evaluation-programs**; Karres N, Kang S, Vigerstol K and Miralles-Wilhelm F. Water Funds Monitoring & Evaluation: Program Review. 2022. Internal Document.

[9] Conservation by Design. **https://www.conservationbydesign.org/modules/monitoring-evaluation-learning/**

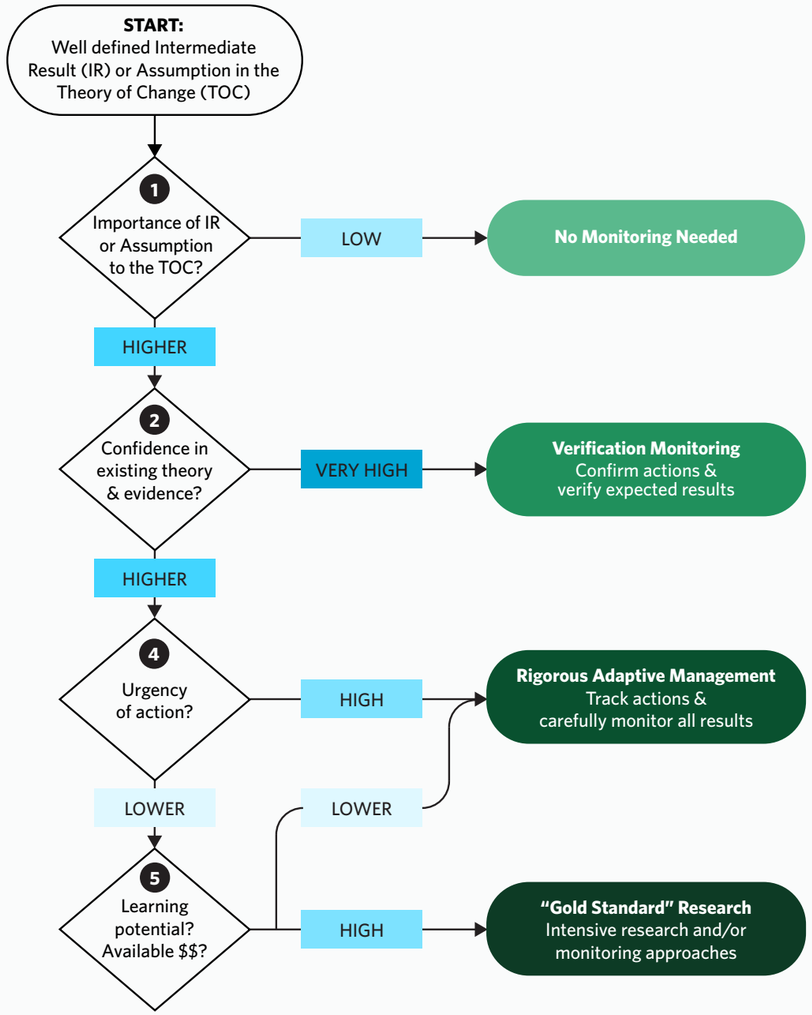
[10] Monitoring the Voice, Choice, and Action (VCA) Framework. 2021. **https://tnc.app.box.com/s/2r3oozu76hxfc1pqoct3i655ixtaolym/file/865322482743**


© Adriano Gambarini

Conversion of Brazil's Atlantic Forest to cattle ranching.

improvement and creating change and less on causal attribution. Causal attribution and allocation of claims can still play an important role, and are best suited to specific interventions and specific outcomes. At a food systems level, it is challenging to use impact evaluation methods, like randomized control trials, that can demonstrate causality. While impact evaluation and causal attribution usually focus exclusively on quantitative data, learning can be achieved through quantitative or qualitative data. The appropriate methods depend on what the information will be used for. Figure 2 shows a decision tree that can help guide when different methods are appropriate.

FIGURE 2. DECISION TREE FOR WHEN TO USE DIFFERENT METHODS FOR MONITORING, EVALUATION, AND LEARNING. ADAPTED FROM SALAFSKY AND MARGOLUIS PATHWAYS TO SUCCESS 2021




© Andrew Kornylak

What to measure

Our approach is a learning-centered impact framework. This means that it is built on two pillars: (1) learning about whether the strategy to create change is effective and (2) assessing changes in key outcomes in the landscape. These pillars are equally important yet require different approaches.

> **A learning approach will ensure we find a path to impact, even if today the path is full of obstacles and uncertainties.**
>
> Sheila Reddy, Global Director and Lead Scientist, Conservation Impact, The Nature Conservancy.

LEARNING INDICATORS

The aim of learning indicators is to evaluate whether the target interventions of foodscapes are effective at creating change. This is focused on the processes of change, rather than the change outcome, which is the focus of impact metrics. As such, learning indicators will be specific to each foodscape.

Learning indicators should be strongly rooted in a well-developed theory of how the foodscape will create change through its selected interventions. Broadly, a theory of change is a set of hypotheses about how interventions will lead to intended outcomes (and unintended consequences) through a series of intermediate results[11]. Because theories of change are hypotheses about how change will happen, they include critical assumptions (often called causal link assumptions) about how an intervention will lead to intermediate results that will eventually cascade to an intended final outcome or about enabling conditions for change.

For example, the Northwest India foodscape aims to improve air quality by reducing crop residue burning through providing technical support to farmers to adopt crop residue management technology such as the Happy Seeder, Super Seeder and Smart Seeder. This theory of change makes critical assumptions, e.g. that by providing technical support, farmers will adopt the technology.

[10] We use **Conservation by Design** as a process to develop theories of change.

Farmers managing rice residue in the fields of Punjab, India

Learning indicators could be answered in two ways: they could be assessed through a rigorous process that maximizes confidence, or they could be answered through a rapid assessment to quickly evaluate an assumption. An example of a more rigorous process would be to quantify the number of farmers that have adopted no-till agriculture for at least a few years, and understand what drove them to do this. While this is not an ultimate outcome, it is a quantifiable intermediate result that provides insight into the effectiveness of processes of change. Quantifying intermediate results and attributing them to intervention activities can itself be a large effort; for instance, there is a long history of research and causal impact evaluations on understanding the causal drivers of behavior change, such as farmer adoption. For food systems, the International Fund for Agricultural Development has a useful Evaluation Manual[12].

[11] IFAD. 2022. Evaluation Manual, Third Edition. **https://ioe.ifad.org/en/w/evaluation-manual-third-edition**

It is, however, not realistic that all intermediate results and assumptions in a theory of change will be evaluated with high rigor (see Figure 2 from page 13). In some cases, rapid assessments may be adequate to assess processes of change. A foodscape effort may establish questions like "are the technical services provided by our effort adequate to enable farmers to adopt new practices? What are other barriers that might exist?" If an impact evaluation, like a randomized trial, is not possible, the foodscape effort may emphasize using focus groups or key informant interview to understand why farmers act. Additionally, methods such as focus groups and interviews can provide more nuanced insight into why something is happening, even if these methods cannot definitively establish causality around a narrow set of interventions. Although these efforts may require less time and cost than a formal impact evaluation, rigorous methodology is still critical to ensure that insights are not biased by an unrepresentative group. Other methods like discrete choice models and choice experiments are also possible. Generally, learning indicators are meant to evaluate if the strategy's theory of change is working in the originally expected way and to adapt based on learnings about what has and has not worked. Multiple methods can be used to answer these questions.

IMPACT METRICS

The aim of impact metrics is to assess change in critical outcomes, rather than processes of change. While learning indicators are specific to each foodscape, impact metrics are meant to apply to all foodscapes. We break metrics down into nature-based metrics and agri-food systems metrics. Nature-based metrics describe ecosystem impacts and benefits of nature to people. These metrics are borrowed from The Nature Conservancy's metrics to track its 2030 goals. Agri-food system metrics are specific to food and agricultural outcomes.

Like with learning indicators, impact metrics can be evaluated through multiple methods, ranging from impact evaluation and causal attribution of change to methods that focus on estimating change outcomes without formal attribution. Impact evaluations are rigorous, but may not be well suited to all circumstances, such as if there are multiple causal drivers, and are likely to be too costly to implement for all outcomes. When possible, an impact evaluation should be pursued. This framework focuses on establishing a minimal approach that should be followed and does not detail methods for impact evaluation.

NATURE-BASED METRICS

Our nature-based metrics include 17 metrics related to climate, oceans, freshwater, lands, and people. The specific metrics are listed in Table 1. Some foodscapes may not quantify certain metrics depending on the nature of their work. For instance, a foodscape with no connection to oceans will not quantify the oceans metrics. There may be some intermediate indicators that are important for some systems that are not reflected in this list. For instance, soil health can be an intermediate indicator for climate, water quality, or some people goals. These intermediate indicators could be included in the Learning Indicators.

Farm labourers sort tomatoes after harvesting, Karnal district, Haryana, India

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3. ESSENTIAL METRICS FOR FOODSCAPES
THESE ARE DIVIDED INTO GENERAL METRICS AND AGRI-FOOD SYSTEMS SPECIFIC METRICS

METRIC		UNITS
Nature-Based Metrics		
Climate	Greenhouse gas emissions reduction	CO_2e
	People adapting to climate change	# people
Oceans	Ocean area with improved management	ha
	At-risk ocean area with avoided impact	ha
	Oceans area protected	ha
Freshwater	River systems with improved management	km
	At-risk river systems with avoided impact	km
	River systems protected	km
	Lakes and wetlands with improved management	ha
	At-risk lakes and wetlands with avoided impact	ha
	Lakes and wetlands protected	ha
Land	Land area with improved management	ha
	At-risk natural lands with avoided impact	ha
	Land area protected	ha
People	People with increased sustainable, placed-based economic opportunity	# people
	People with increased security of rights to territory or resouces	# people
	People with increased ability to meaningfully participate in decision-making about territory or resources	# people
Agri-food Systems Metrics		
Profitability	Change in revenue for different social groups and resilience to change	$
Productivity	Total productivity of agri-food commodities	Tons/ha
	Contribution to nutritional production, or nutritional availability in food supply	People potentially nourished per ha
Scaling	Number of policies adopted that align with sustainable agriculture	#
	Amount of investment in sustainable agriculture	$

Cattle in São Félix do Xingu, Brazilian Amazon.

In this section we provide some higher-level insight into nuances about the metrics as they relate to agriculture.

Improved management vs. avoided impact

The oceans, freshwater and lands metric categories all differentiate between improved management and avoided impact. Improved management refers to land or water management that improves the ecological condition of that system. Examples would be riparian buffer restoration around streams adjacent to agricultural lands or aquaculture practices that create habitat for wildlife. Avoided impact refers to avoidance of degradation of ecosystems that would have otherwise occurred. An example would be avoiding deforestation of the Amazon by working with the beef industry to ensure livestock are sourced from areas without forest conversion. Briefly, improved management can be thought of through the lens of natural capital: land management that significantly improves natural capital, and ecosystem services, would be an improved management action.

Improved agricultural lands

Agricultural management practices, such as cover crops, no till, or agroforestry, should be counted for the metric or metrics where they have ecological impact. For instance, if cover crops sequester carbon, then the quantity of removals should be counted under climate change mitigation. If those cover crops also reduce nutrient losses to freshwater systems, then those practices should be counted towards freshwater targets. If agricultural practices, such as edge-of-field restoration, conserve or restore ecosystems and at-risk biodiversity, the area of those practices should be counted towards land area with improved management.

[13] This tool is one example of how to translate area of activity to freshwater ecosystem: **https://stephenawood.users.earthengine.app/view/foodscapes-water**


© Jason Houston

Units of measurement for water and where groundwater fits

Water outcomes are quantified in units of the ecosystems that benefit from the interventions – either area of lake or wetland or length of river. This approach requires translating water use, such as changes in amount of water, into the scale of the ecosystem impacted.

The freshwater metrics are meant to capture benefits to freshwater ecosystems. Reducing groundwater use from agriculture would be counted towards that if those reductions benefit groundwater dependent ecosystems, like wetlands that depended on high water tables. Groundwater use reductions that mainly benefit people – either by improving drinking water quantity and quality or enabling a more sustainable water supply for future irrigation – could be counted under people (drinking water) or climate adaptation (sustainable future irrigation) metrics.

People benefits

Agriculture impacts people in ways beyond economic opportunity, security of rights, and participation in decision making. Other human outcomes like health benefits from reduced crop residue burning or improved nutrition would be captured under additional agri-food systems metrics (see next section).

AGRI-FOOD SYSTEMS METRICS

Because the above general metrics do not include metrics related specifically to food-related outcomes, the following three metrics are a minimum set essential to demonstrate that an agri-food system is on the path to sustainable, systems-level change: food producer profitability, food system productivity, and systems change. While there are many metrics that may be important for individual foodscapes, the core metrics are meant to be the ones that will be universally relevant to all foodscapes. For each of these indicators, it is also critical to assess them in the context of climate change. For instance, increasing producer profitability is important as well as increasing the resilience of profitability to climate change.


© Harley Soltes

Stream depth measurements are made with a homemade depth gauge, Ellsworth Creek, Willipa Bay, Washington.

Food producer profitability

Understanding the costs and benefits of a farming system transition is critical. Foodscapes should quantify impact of profit (i.e. gross revenue minus costs) across the landscapes. We emphasize profit (rather than costs alone) because costs depend on the type of practices that are changing – planting trees might cost more than cover crops. As part of assessing profit, it may be critical to also assess actions farmers took that are indicative of their profitability or the resilience of their profitability, such as if farmers required accessing support programs like crop insurance.

Assessing changes in profitability at the foodscape scale will require data collection at the farm or household level. This is because other changes occurring in the background economy, like remittances from urban wage laborers, are critical to quantify. These exogenous factors can enhance, or detract, from a food producer's capacity to undergo a transition.

When assessing changes at the system level it is also critical to break down the assessment by social groups to see if there are any groups that are not benefitting and to ensure no unintentional harm is being done. Some foodscapes may choose to focus their interventions on reducing inequities in profitability.

It is also critical to quantify how profit changes over time to identify how to bridge potential profit gaps with novel finance. For

instance, early on farm profit may decrease with new practices, which will need to be financed, but may increase to positive after a certain amount of time. Understanding both the dynamics of that transition and the magnitude of financing needed can be critical for engaging global partners to support regenerative transitions elsewhere.

Agri-food system productivity

The recommended focus on agri-food system productivity is to go beyond productivity of individual crops. This could go as far as to assess a holistic indicator such as total factor productivity[13], which quantifies the efficiency of food production, considering human, financial and natural capital. This approach could also take a more modest approach and look at other indicators beyond yield such as the combined production of multiple commodities over the foodscape area or the production of key nutrients within the foodscape, and the contribution of the foodscape to nutritional production for local, regional, or international populations[14].

Structural change

Given the landscape-scale focus of a foodscape, it is also critical to document impact on structural enablers of food systems change at the landscape scale. Sustainable change for people and nature often requires some level of systemic change, i.e. change in views, actions, structures. This depends on shifts in the dominant paradigm of how people feel and act, as well as incentives for adopting new methods of production. The nature of structural change will differ among foodscapes and there will not be a single metric to measure. We recommend at least tracking towards the number of effective policy actions taken that align with sustainable agri-food systems and the amount of public and private investment into scaling more sustainable food production models. Other metrics to consider are alignment of social networks around systemic food system change, knowledge and focus of agricultural advisors, number of companies aligning sourcing decisions with new production models, etc. In the context of the foodscape theory of change, these would be considered key intermediate results for how the interventions lead to ultimate outcomes related to agri-food system and ecological conditions.

[13] DeFries et al. 2015. Metrics for Land-Scarce Agriculture. Science. **doi: 10.1126/science.aaa57**

[14] Coomes et al. 2021. Leveraging total factor productivity growth for sustainable and resilient farming. Nature Sustainability. doi: 10.1038/s41893-018-0200-3

Newly harvested carrots being washed and packaged for the following day's farmers market at the Blaney family farm in Albany, Ohio.

© Alex Snyder/TNC

MEL Steps


© Ciril Jazbec

Small alluvial plains support sheep grazing along the Krupa River, Croatia.

- » **Begin with a theory of change**
- » **Establishing learning questions**
- » **Monitor where interventions occur**
- » **Use data on intervention to estimate impact**

BEGIN WITH A THEORY OF CHANGE

A theory of change is a set of hypotheses about how interventions will lead ultimately to desired outcomes. Because we can never have full certainty that the interventions will lead to the outcomes, one of the critical roles of MEL is to evaluate the assumptions of the theory of change and to adapt the interventions. Developing a theory of change is a critical step in a strategy planning process, and there are earlier steps in the planning process to prepare for the theory of change, which include identifying interested parties, defining objectives, and conducting a situation analysis. The theory of change leads to a set of hypotheses about how a set of interventions can create change. These hypotheses are represented as a series of intermediate results and assumptions; these intermediate results and assumptions need to be evaluated to determine if the foodscape is being effective at creating change. Completing all of these planning steps is important to developing an effective MEL plan. For instance, effectively using the information collected during MEL requires understanding the information needs of different interested parties. At The Nature Conservancy, the **Conservation by Design** process is used to develop theories of change.

THE CONSERVATION BY DESIGN PROCESS

PLANNING READINESS

Integrating Equity
Build capacity to develop and improve equitable strategies

Integrating Equity
Reflect on past work to harness learnings for future work

TYPICAL ORDER OF PLANNING STEPS

Planning Scope
Define and align on the scope of the strategy development process

Interested Parties
Identify and prepare to engage interested parties to support an inclusive process

Defining Objectives
Identify what the team aims to maintain or improve for nature and people

Situation Analysis
Understand the system and identify leverage points for action

Strategy Selection
Identify, evaluate, and select strategies to pursue

Theory of Change
Articulate how planned actions will lead to desired outcomes

Monitoring, Evaluation, and Learning
Develop a MEL plan to focus learning on key assumptions in the theory of change

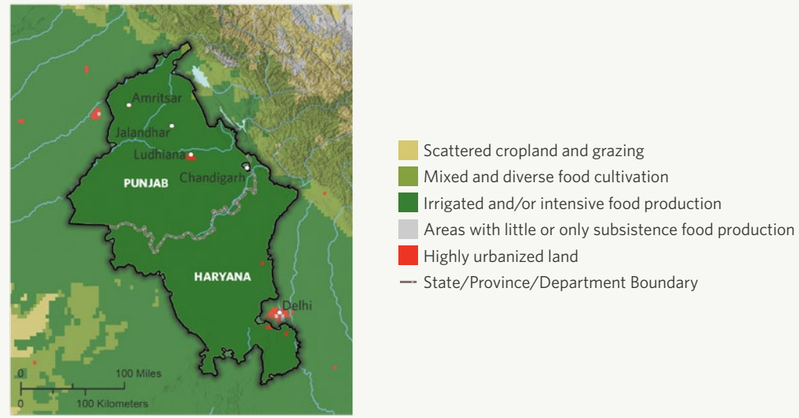
Learn more at
www.conservationbydesign.org

Example. Northwest India theory of change

Northwest India is the most productive rice and wheat growing area in South Asia. The success of this system has depended on technologies and policies that enable farmers to grow high-yield rice and wheat crops at a large scale. These policies and technologies have also created environmental and human health challenges: irrigation from groundwater has depleted aquifers and the short window between rice and wheat crops has incentivized farmers to burn crop residue, leading to respiratory disease from particulate matter throughout northwest India and greenhouse gas emissions. The goal of the Northwest India foodscape is to support and scale innovative strategies to reduce residue burning, reduce overextraction of groundwater, and increase resilience to climate change.

The foodscape is focused on three strategic interventions: promote crop diversification, increase adoption of water-saving rice practice, and leverage opportunities in the energy sector to reduce groundwater use. These strategic approaches lead to six intermediate results: new income-generating opportunities are in place, an agronomic support system is in place to help farmers with new practices, farmers continue to use practices without incentives, canal infrastructure is improved to provide additional irrigation water, emissions decrease per hectare, and a risk mitigation mechanism is in place.

NORTHWEST INDIA



Map: Chris Bruce/TNC

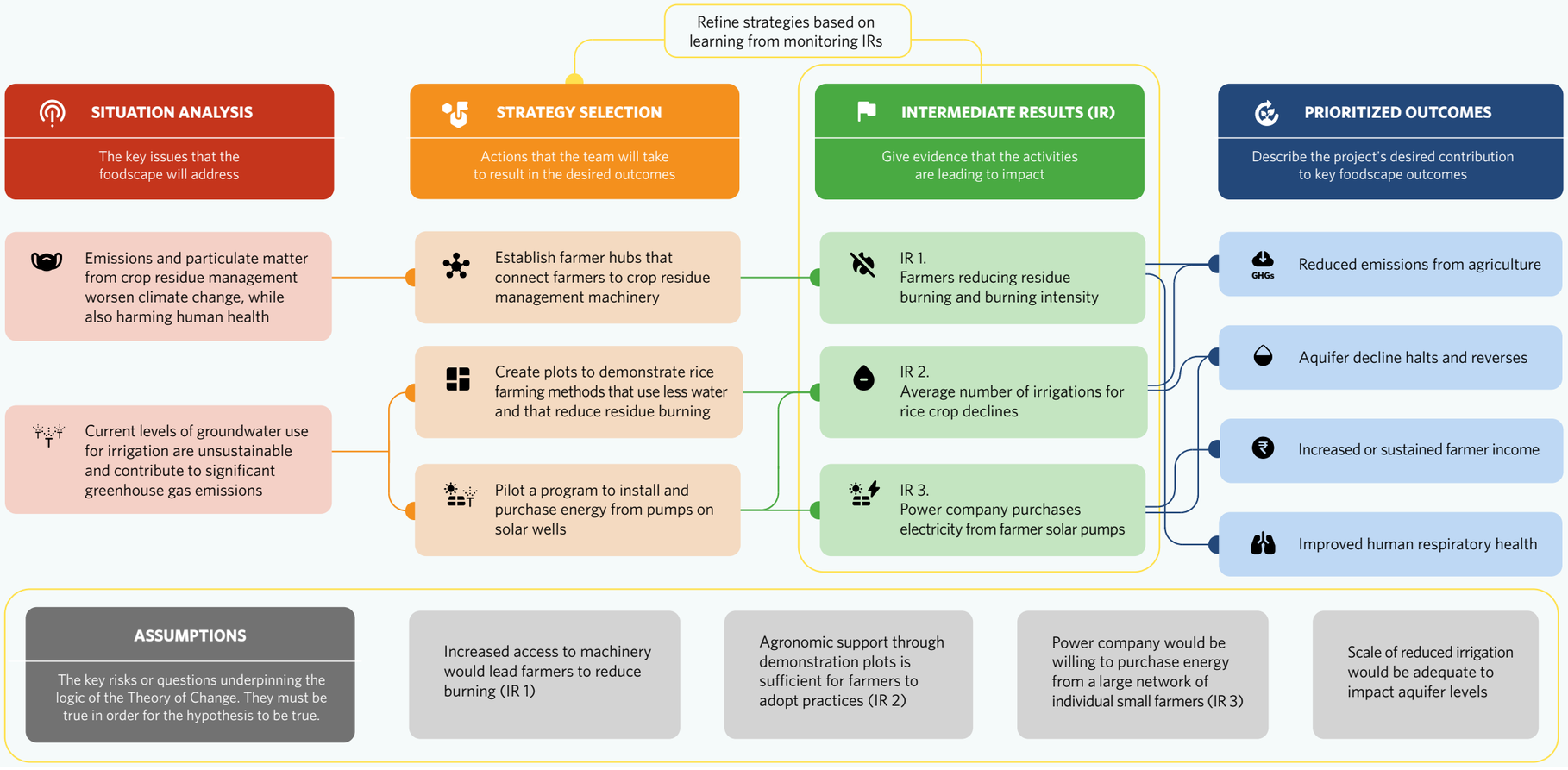


FIGURE 4: EXAMPLE THEORY OF CHANGE ADAPTED FROM NORTHWEST INDIA FOODSCAPE. INTERMEDIATE RESULTS AND ASSUMPTIONS ARE INPUTS TO THE MEL PLAN

ESTABLISH LEARNING QUESTIONS

Learning questions are used to evaluate the assumptions embedded in a theory of change. When answered, these questions should indicate whether the theory of change and associated implementation activities are adequate or need revision. Learning questions should be based on an understanding of audiences (e.g. those identified in Interested Party mapping and included in the foodscape co-creation) and their information needs. Different audience groups may have different learning questions. Develop your questions based on a review of existing knowledge to determine which learning questions, and associated theory of change pathways, have weak or inconsistent supporting evidence. Focus on these weakly supported pathways because they will be where knowledge is most critical.

EXAMPLE LEARNING QUESTIONS

1. Which practices lead to long-term benefits (economic, environmental, social) for producers?
2. How many farmers would need to change practices to realize the social and environmental goals of the foodscape?
3. Who is benefitting from, and who is negatively impacted by, an intervention to increase adoption of new agricultural practices?
4. What governance systems are needed to improve landscape-level agricultural planning?
5. What percentage of farmers can be influenced through incentives, and under what conditions are incentives ineffective?

ASSESS THE EXISTING EVIDENCE FOR EACH LEARNING QUESTION

Assess which learning questions and associated theory of change pathways have weak or inconsistent supporting evidence. To do this, use grey literature, formally published literature, and expert insights, such as key experts in the foodscape. For example, a learning question might be "how effective are extension services in enabling farmers to adapt practices?". This may be associated with an assumption in a theory of change where we assume that providing extension services that farmers will adopt practices and demonstrate their benefits. There may be existing published studies, either from the focal system or other areas, that look at the impact of extension programs. Or one could discuss with extension agents, farmer advisors, and producers about what are the successes and challenges of extension services in supporting practice transitions.

ANSWER LEARNING QUESTIONS WITH APPROPRIATE DATA

Based on the findings of the evidence assessment, determine if new data are needed from your project to address the learning questions and what kind of data are needed. In some cases, a project may choose to collect quantitative data. An example could be to do a randomized trial that studies whether farmers adopt a practice based on if they receive extension services or not. In other cases, a formal impact assessment may not be practical or desirable. Other methods, like focus groups or key informant interviews, could be used to answer the learning questions about how effective the effort is at contributing to change.

CREATE A BASELINE

Once Intermediate Results and learning questions have been established from the theory of change, the next step would be to establish a baseline for the learning indicators and impact metrics. Establishing a baseline involves evaluating the state of the indicators and metrics at the beginning of foodscape implementation. This could be done using existing data on the state of the indicators. An example might be public data on soil carbon stocks at a baseline year, if, for example, increasing soil carbon stocks is part of the climate mitigation impact metric. Alternatively, one might use activity data on the baseline use of practices and use the activity data to estimate outcomes from models or emissions factor. An example of this approach would be to use remote sensing to quantify the area of a practice, such as cover crops, in a baseline year and to use that activity data as an input to a biogeochemical model such as DNDC to quantify baseline emissions. Regardless of method, the baseline should serve as a reference for future change to demonstrate the impact of the foodscape activities.

MONITOR WHERE INTERVENTIONS OCCUR

Foremost, teams should focus effort on collecting data on interventions, area of intervention, and adoption. These data are of primary importance because they can then be used to estimate quantitative outcomes through tools like emissions factors, hydrologic models, or other scientific products. Given limited capacity for data collection, it is preferrable to collect complete and rigorous information on what activities are occurring and where, more than it is to collect detailed data on empirical outcomes in a subset of the foodscape.

When mapping the foodscape, it is important to consider multiple scales. This includes (1) the target boundary, or the project ambition area (e.g., Gran Chaco, Upper Mississippi), (2) and progress boundary, or focal or priority sub-areas within the foodscape (e.g. counties or watersheds), and (3) actual areas of implementation (e.g. farm boundaries). Quantifying area of implementation will likely require multiple approaches. For demonstration plots and direct implementation, it is possible to measure individual field boundaries to quantify precise areas of implementation. For broader influence work, it would not be possible to measure individual field boundaries; teams should invest in efforts such as remote sensing to estimate changes in the adoption of critical interventions at a broader scale. There are existing examples of estimating impact at landscape scales using remote sensing[15].

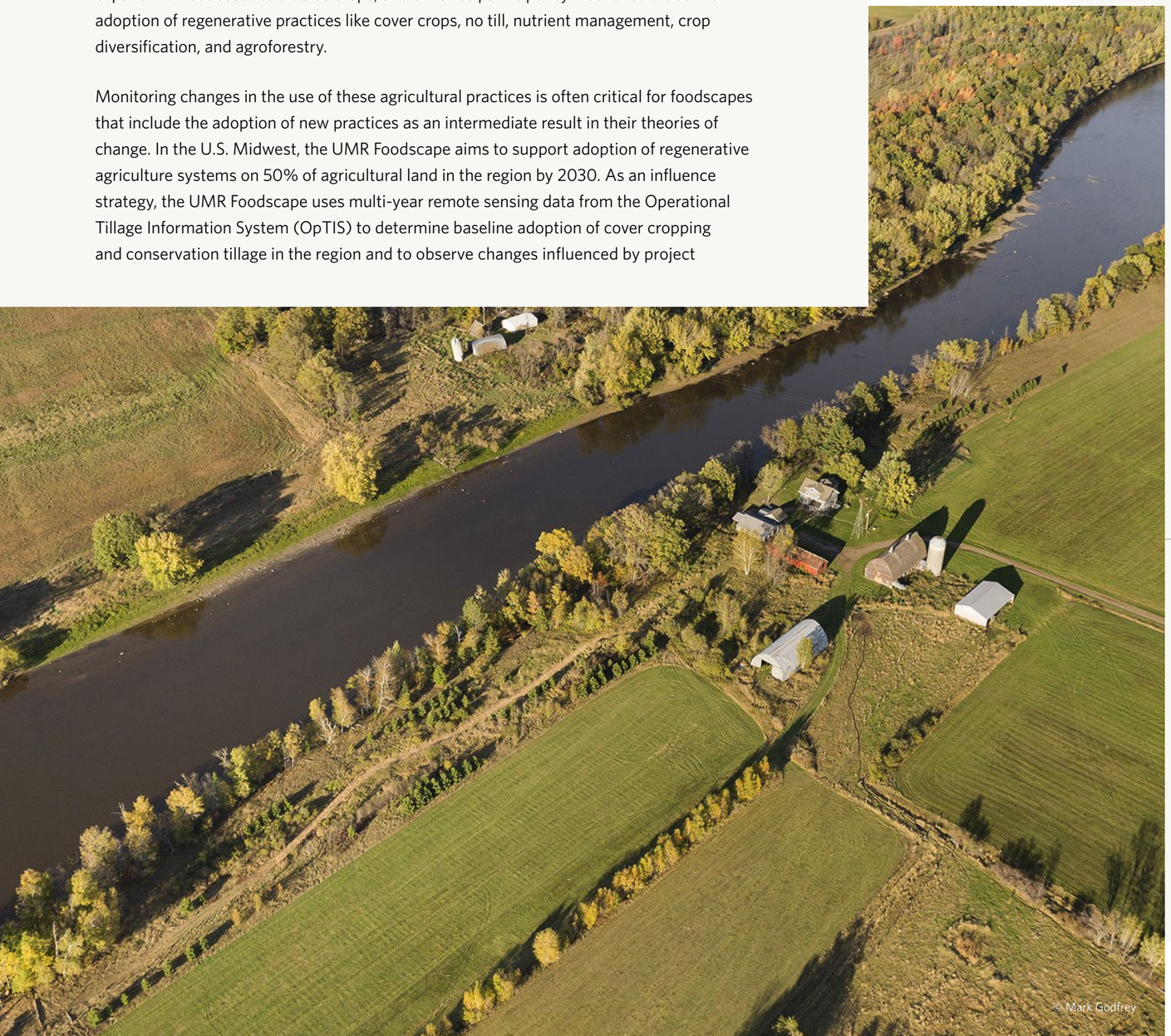
[15] e.g. Constenla-Villoslada *et al* 2022 Nature Sustainability.

Soil sampling in a barley field at Shield Ranch in Camp Verde, Arizona.

Example. Using remote sensing to monitor changes in agricultural practices.

The Upper Mississippi River (UMR) foodscape is a biodiversity hot spot that spans four states in the larger Mississippi River system. Lands of the UMR basin were historically converted from natural habitat to row crop and livestock agriculture. Once intact lands are now fragmented and existing habitats have been degraded; aquatic life in lakes, rivers, streams and the Gulf of Mexico suffer the impacts of excessive nutrient runoff from intensive agriculture. The UMR foodscape is working to shift supply chain incentives, expand market access to diverse crops, and enhance public policy incentives that drive adoption of regenerative practices like cover crops, no till, nutrient management, crop diversification, and agroforestry.

Monitoring changes in the use of these agricultural practices is often critical for foodscapes that include the adoption of new practices as an intermediate result in their theories of change. In the U.S. Midwest, the UMR Foodscape aims to support adoption of regenerative agriculture systems on 50% of agricultural land in the region by 2030. As an influence strategy, the UMR Foodscape uses multi-year remote sensing data from the Operational Tillage Information System (OpTIS) to determine baseline adoption of cover cropping and conservation tillage in the region and to observe changes influenced by project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UPPER MISSISSIPPI RIVER

Map: Chris Bruce/TNC

- Scattered cropland and grazing
- Mixed and diverse food cultivation
- Irrigated and/or intensive food production
- Areas with little or only subsistence food production
- Highly urbanized land
- State/Province/Department Boundary

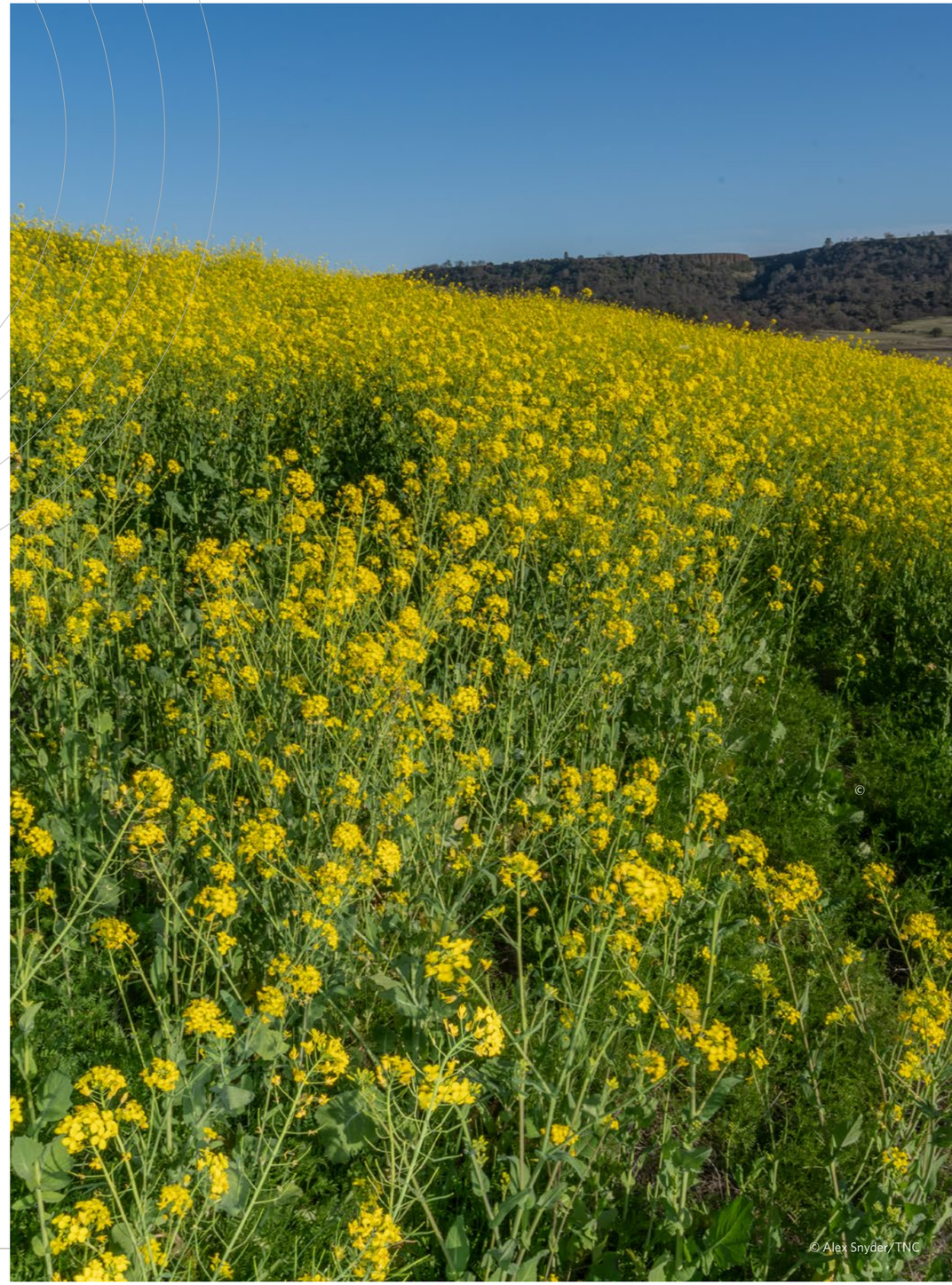
The Mississippi River TNC is working with partners to invest in restoring floodplains along the Mississippi River.

interventions. OpTIS – a collaboration between the Conservation Technology Information Center, Regrow Ag, and TNC – is a remote sensing product that uses satellite data to map conservation agriculture practices at the field scale in the continental U.S. With cover crops for example, OpTIS uses cloud-masked satellite imagery and 30-meter national cropland data to calculate a time series of Normalized Difference Vegetation Index (NDVI), a measure of vegetation greenness, between harvest and next season's planting dates. Estimates of cover cropping are based on an extensive field data set of where cover cropping is used. UMR used a three-year running average from 2017-2019 cover crop data from OpTIS to estimate baseline cover crop adoption of 7%, or 210,340 acres, on row crops (corn and soybean) in the UMR. As the UMR works toward influencing more cover crop adoption in the region, the team will continue to use updated OpTIS data to measure changes in adoption.

Kale and salad greens growing on the Blaney family farm in Albany, Ohio.

USE DATA ON INTERVENTION TO ESTIMATE IMPACT

Our starting premise is that it is impractical to collect high-quality, empirical data on all of the important metrics of food systems transformation. Our emphasis is to use high quality data on implementation as an input into scientific tools that can provide transparent and consistent estimates of impact across a range of categories. Impact on climate, water, income, productivity, etc. can all be estimated with scientific models and tools. For instance, with data on where activities are occurring (see previous section), one can use Intergovernmental Panel on Climate Change Tier 2 or Tier 3 emissions factors to estimate changes in net greenhouse gas emissions, or one could use watershed hydrological models, like the **Soil & Water Assessment Tool**, to estimate impacts on freshwater outcomes. These estimates might not be accurate for any given unit of land but are more reliable at the scale of food systems.



A field of rapeseed in bloom on Table Mountain Ranch in Oroville, California.

How to invest and engage

- » Ensure adequate resources
- » Co-creation
- » Define how MEL information will be used
- » Focus on systems change
- » Attribute when possible, but recognize limitations

ENSURE ADEQUATE RESOURCES

For MEL to be effective it requires adequate infrastructural, technical and financial resources. Our recommendation is that at least 10% of total foodscape budget be allocated to MEL activities. This should include at least half time of an MEL specialist who is responsible for developing and executing the MEL plan in partnership with other staff and foodscape partners. This MEL staff member would ideally be integrated into the planning stages of the foodscape to ensure that the MEL plan is closely linked with the reasoning behind the Theory of Change. Adequate funding is a necessary, but not sufficient, enabler of effective monitoring and evaluation systems.

CO-CREATION

The MEL plan, learning questions, and data collection methods should be co-created with the foodscape partners who co-created the theory of change. By including diverse actors in the co-creation process there is likely to be different perspectives on what type of information is credible, salient, and legitimate. For example, Traditional Ecological Knowledge may be more important than Western scientific methods for some actors; data collection should reflect these different points of view so that data collected can most meaningfully catalyze action.

A farmer holds a handful of ripe coffee beans in La Igualdad, Guatemala.

© Melissa Ballarin & Daniel López Pérez

Mixed forest and pasture areas on Rosania Farm, which is promoting silvopasture in Cubarral, Meta, Colombia.

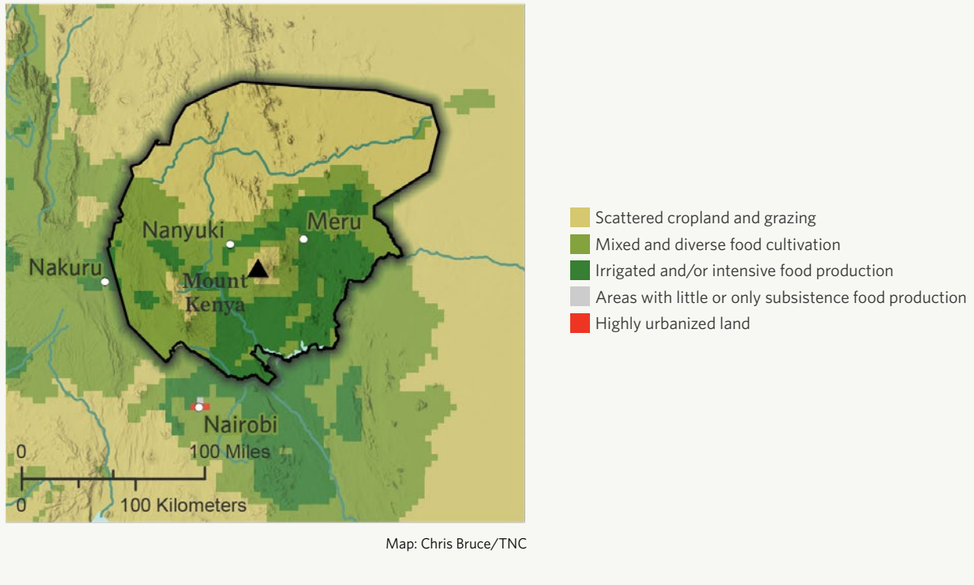
© Juan Arredondo

Example. Foodscapes co-creation in the Central Highlands Ecoregion.

The Central Highlands Ecoregion Foodscape (CHEF) in Kenya spans the water towers of Mt. Kenya and the Aberdares through high rainfall farmlands and semi-arid production lands to arid rangelands and wildlife conservancies. This area is one of the most important areas for biodiversity in East Africa and also a critical supplier of fruits, vegetables, grains, cut flowers, and livestock to markets in Kenya, Europe and the Middle East. Rapid expansion of agriculture—irrigated agriculture in particular—is both a boon to food supply and economic growth and a threat to wildlife and livestock who depend on increasingly scarce water resources.

CHEF is pioneering a long term, collaborative landscape-scale strategy to drive food systems transformation through addressing the agricultural, environmental, conservation and social challenges in the region. Building on interactions with partners, CHEF is taking an approach that connects multiple actors, challenges, activities, programs and goals in the foodscape, and that facilitates co-creation and co-learning among these actors, to catalyze positive change for people and nature. Co-creation and co-learning sit centrally in CHEF's approach to food system transformation. From the start, the CHEF team partnered with a co-creation & co-learning social enterprise to initiate workshops with a diversity of CHEF actors/stakeholders – including farmer organizations, nature conservancies, governments, businesses, NGOs, research organizations, and others – to jointly learn from the past, present and future through facilitated conversations to jointly create a timeline and spatially map a shared CHEF vision with key action pillars. Subsequently, these learnings were revisited in a second workshop where the CHEF theory of change was advanced to connect and bring the conveners' observations and interests together and identify key entry points for action. These workshops continue in CHEF around the development and support of monitoring, evaluation and learning and foodscape governance structures. It is through the building of strong partnerships, resilience capacities and pragmatic systems approaches that CHEF strives to transform the Central Highlands region to benefit people and nature.

CENTRAL HIGHLANDS ECOREGION



Map: Chris Bruce/TNC

An employee on Samson Kithinji's farm in Meru County, Kenya, carries snow peas to a waiting truck for export.

A farmer stands with avocado scions on his farm in Laikipia County, Kenya.

DEFINE HOW MEL INFORMATION WILL BE USED

There should be a plan for how information from monitoring will be used. The co-creation process should also include a clear plan for how to ensure partners are informed of the results, and that there is a process of collective learning and collective decision-making around adapting the foodscape theory of change and implementation plan. One way to do this could be to ensure that the team conducts a Pause, Reflect, Learn and Adapt[16] meeting at least once a year and strategy review once a year to discuss the learning questions and understand challenges with implementation.

FOCUS ON SYSTEMS CHANGE

MEL has been most rigorously developed to assess the impact of specific projects and specific interventions. Foodscapes are longer-term, strategic engagements that include different types of interventions at different scales. The MEL plan for the foodscape should be overarching to assess the progress of the foodscape overall, including the systems change elements that are often most critical for enabling regenerative systems. Foodscape MEL will likely also include pieces that focus on assessing the impact of specific interventions. Because causal attribution in systems change is challenging, different methods would be used to assess systems change than individual elements of foodscape activities.

ATTRIBUTE WHEN POSSIBLE, BUT RECOGNIZE LIMITATIONS

Investment in a foodscape is critical for driving change. Some actors who invest in the landscape want to make claims based on their investment, such as through Science-based Targets Initiative or Science-based Targets for Nature. These claims could be amount of biodiversity protected or amount of emissions reduced by the investment. Enabling investors to make claims about their work can help increase the visibility of action and motivate continued investment. At the same time, the impact of the outcomes – e.g. biodiversity or emissions – is the result of collective investment and action in the landscape. The aim of foodscapes MEL is to document the impact and effectiveness of the collective landscape effort. Additional steps and processes may be needed for individual actors in the landscape to meet their own needs.

[16] USAID. 2023. Good Practices Guide for Pause and Reflect in the Acitivity Cycle. **https://biodiversitylinks.org/library/resources/good-practices-guide-pause-and-reflect.pdf**

View of large scale agriculture fields bordering the Belize Maya Forest, Cayo District, Belize.