Strategic Plan

Long-Term Agroecosystem Research Network

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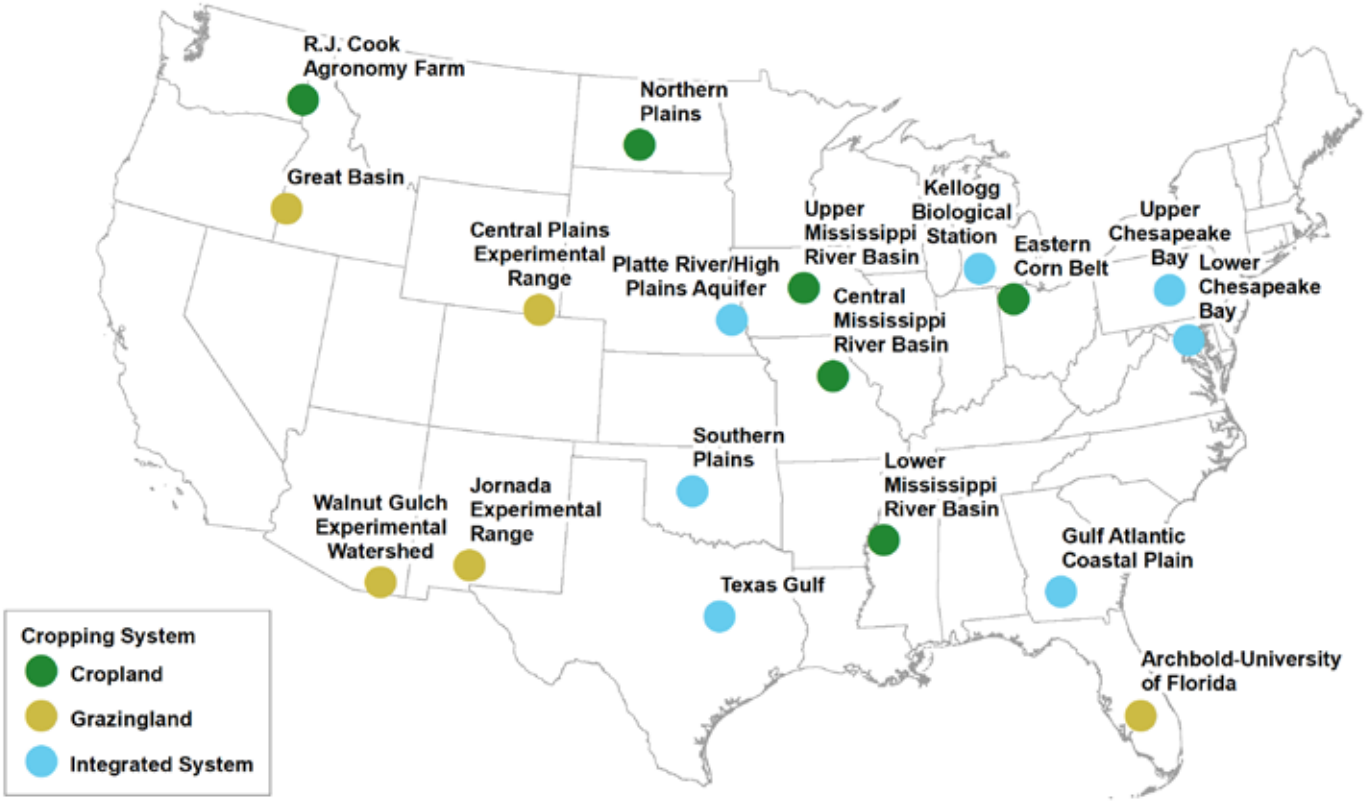
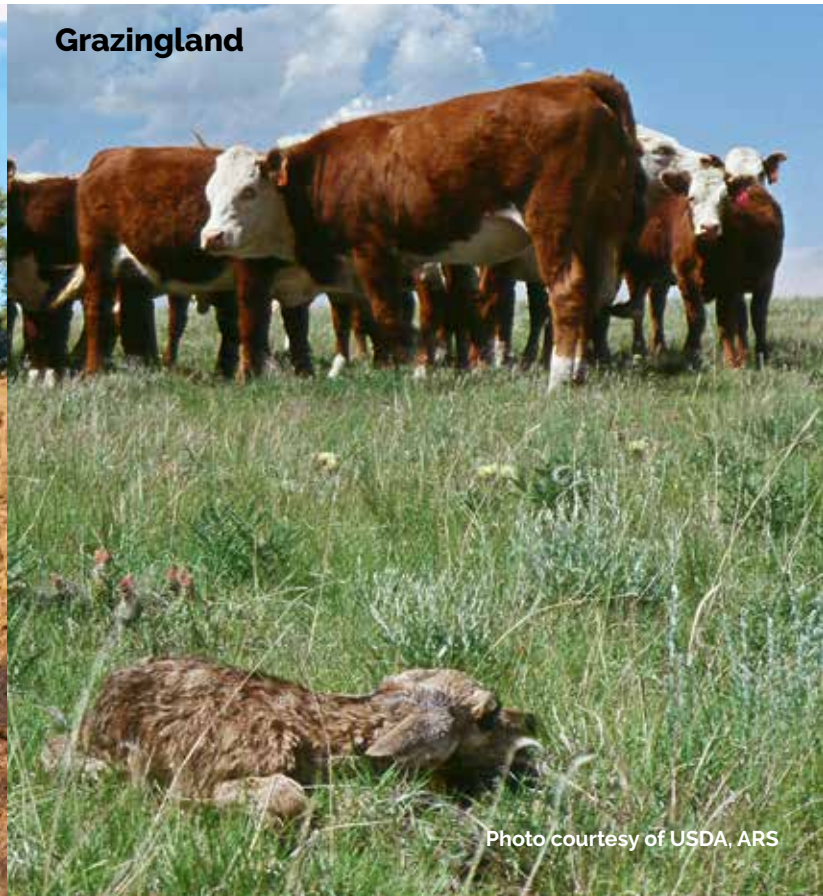




The LTAR Network

What is the LTAR Network?

The Long-Term Agroecosystem Research Network (LTAR) was formed in 2012 to create a platform for research, education, and outreach to improve the current and future capacity of farmers and ranchers to provide agricultural commodities and other agroecosystem goods and services.

Most sites are managed by USDA, Agricultural Research Service (ARS), while others are managed exclusively by or in combination with university partners and nonprofit organizations.

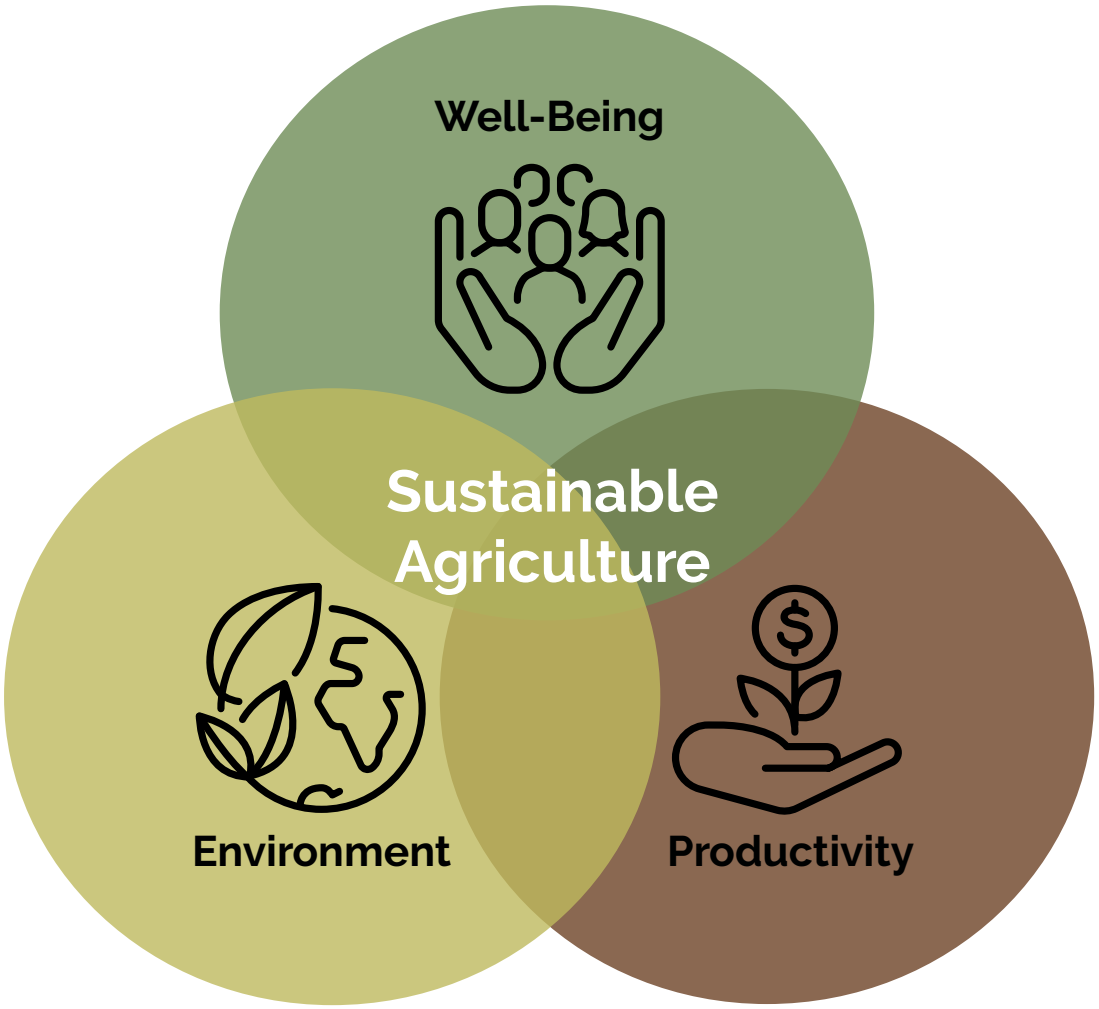
While several organizations conduct long-term agricultural research, the LTAR Network conducts research that is coordinated among sites and partnering institutions, providing a broad array of scientific information with national-level impacts. Coordinated, long-term experiments are employed to develop and test agricultural innovations applicable to broad regions.

Multiple indicators appropriate to regional production systems are measured so that LTAR can report on agricultural production, environmental impacts, and societal outcomes to support decision making. Multisite working groups standardize, integrate, and publish data across sites and produce new technologies and information products addressing specific problems.

The LTAR Network is organized and led by ARS using appropriated funding from Congress. The goals of the network are to support producers, processors, and rural communities across the United States as well as the goals and priorities of USDA and two of its component mission areas, Research, Education and Economics (REE), and Farm Production and Conservation (FPAC).

Integrated System

Photo courtesy of Ruben Ulbrich, Kellogg Biological Station



Rationale for the Network

Long-term research is critical for understanding how agroecosystems adapt and respond to management practices under a variety of stressors and a changing climate.

But systems-level agricultural challenges are too complex to be solved by a particular discipline in a particular geography over short time periods. Thus, long-term transdisciplinary networked science is essential to advance goals for U.S. agriculture.

A transdisciplinary, networked science approach accelerates scientific progress and discovery and enables shared ideas, resources, data, expertise, and perspectives.

In addition, working across a network of sites and institutions enables researchers to develop agroecosystem management approaches and innovations that are matched to different enterprise types and social and environmental conditions.

The LTAR Network is uniquely positioned to address key challenges facing agriculture. Its diverse research sites have decades of prior research and data across the United States. Working as a network instead of as individual sites creates synergies and promotes insights that advance agricultural sustainability.

Strategic Plan for a Growing Network

The LTAR Network was initially guided by a shared research strategy that described network goals and approaches to achieve them. However, over the past decade, new concepts, capabilities, and priorities have emerged that demand a fresh look at the network's strategic directions. This strategic plan will guide the network for the next decade and will be updated periodically.

Today, agroecosystem science is being asked to chart a path for U.S. agriculture that is:

1. **sustainable and balances production, environmental quality, and human well-being for current and future generations;**
2. **resilient to forces that can disrupt agricultural production and supply chains;**
3. **climate-smart to both mitigate greenhouse gas emissions and cope with climate change;**
4. **equitable to all people with respect to the benefits and costs of agriculture; and**
5. **transformational when commonly used practices cannot be adapted to achieve desired outcomes.**

The LTAR Network strategic planning process engaged researchers and stakeholders to

1. **define a network-wide vision,**
2. **prioritize resource allocation,**
3. **develop evaluation metrics, and**
4. **differentiate the network from its peers.**

Data Management

Agroecosystem research covers a wide range of interconnected scientific disciplines. New strategies for agricultural data management and accessibility are essential for scientific discovery and innovation. The LTAR Data Management Working Group is developing new ways to catalog, integrate, and use the vast long-term datasets produced by the network and other agricultural research efforts.

Water Resources

LTAR scientists are using their sites' historic precipitation datasets to calculate water budgets for a variety of agroecosystems. These water budgets provide a baseline for developing strategies to adapt agriculture to changing water availability. In addition, these measurements are being used to monitor regional changes in climate and hydrology alongside agriculture.

Strategic Framework

Vision

A vibrant, inclusive, adaptable, and resilient agricultural community achieving production, environmental, and societal goals sustainably.

Mission

To conduct long-term, transdisciplinary, networked research to create innovative tools and practices and regionally-tailored, evidence-based knowledge supporting adaptable, resilient, sustainable agriculture.

Strategic Goals

1. Improve scientific understanding of agroecosystem function and responses to management and external drivers.
2. Develop and test new tools, technologies, and management practices that promote the agricultural goals of sustainability, resilience, and climate adaptation and mitigation.
3. Enhance equitable access to science information leading to the adoption of locally tailored tools and practices.

Network Approach to Science and Stakeholder Engagement

Science that directly involves stakeholders is more likely to benefit decision making at all levels.

The LTAR Network will achieve its strategic goals by linking societally relevant questions with long-term networked research that is coproduced with stakeholders. Research findings, innovations, tools, and solutions will then be delivered and communicated to stakeholders. This approach to research with stakeholders and partners is known as coproduction and is the core of the LTAR Network approach to science.

Early and ongoing engagement with producer communities and other stakeholders and partners will be required. Time and resources will be allocated to both framing and designing research that is relevant to users as well as packaging and disseminating science in formats that are accessible, useful, adoptable, and ultimately influential.

The LTAR Network Approach: LTAR scientists use stakeholder input at all steps to ensure that the science and outcomes are relevant to users.

1 Engage Partners and Build Relationships

Engage producers, stakeholders, nongovernmental organizations, and government agencies in defining research priorities and strategies.

Strengthen and foster existing and new relationships with early career, underrepresented, and smallholder farmers/ranchers.

2 Conduct Relevant Network Research

Carry out interdisciplinary research via network-wide working groups.

Partner with research organizations and sites from outside the LTAR Network.

Conduct coordinated research comparing alternative management strategies.

3 Share and Publish Data and Research Findings

Manage, standardize, and integrate data across sites.

Make high-quality data and derived information and tools freely accessible to stakeholders.

Publish data and synthesized findings in peer-reviewed publications.

4 Produce Tools that are Useful, Usable, and Used

Consider how tools and methods will be used and by whom.

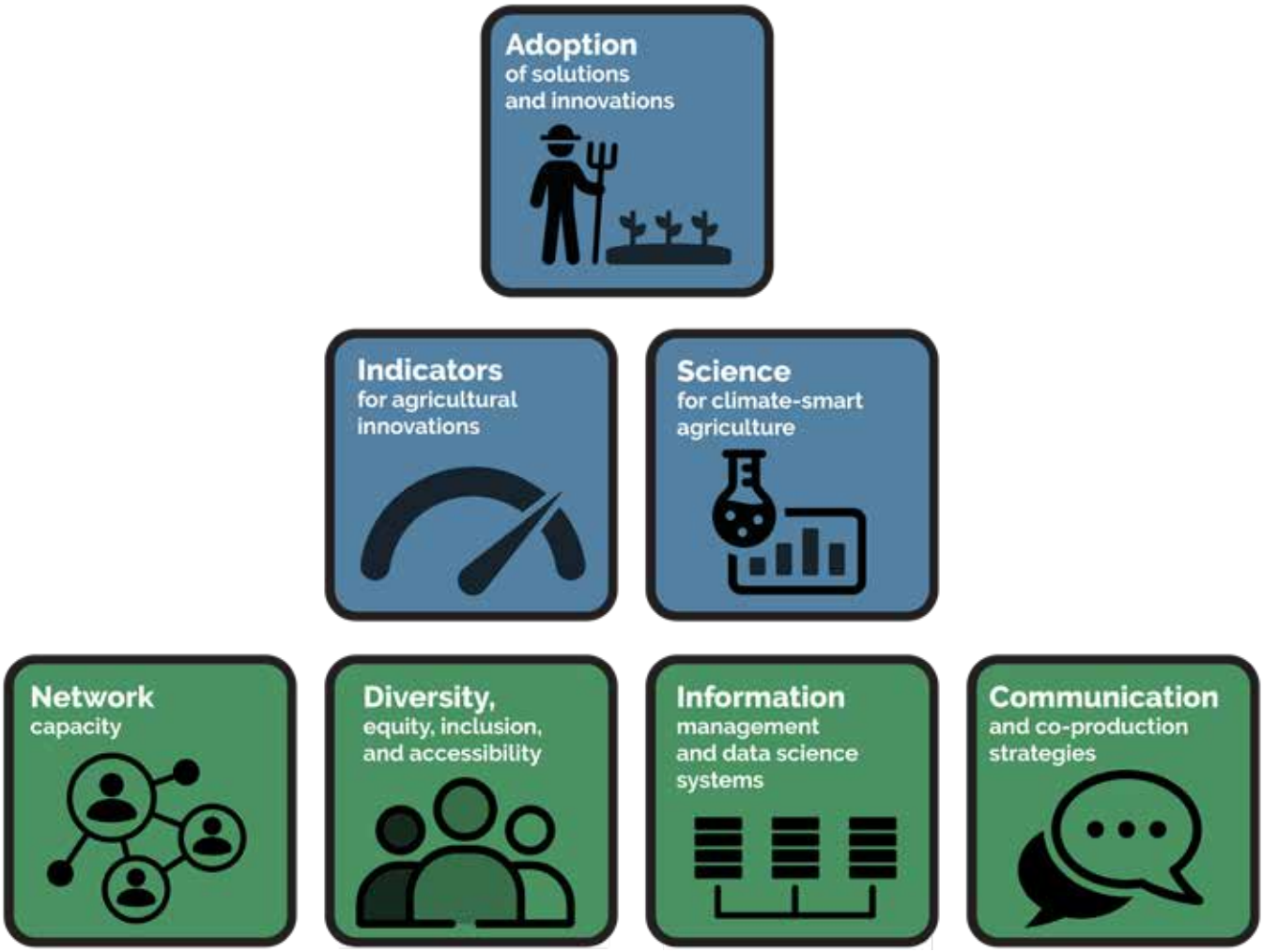
Develop solutions applicable to stakeholders at different points along agricultural value chains.

5 Translate and Communicate Findings

Collaborate with experts in science communication and human dimensions research to identify barriers and incentives for adoption.

Design effective, tailored communication to reach diverse stakeholders and elevate awareness of LTAR Network products.

Strategic Initiatives



The LTAR Network Strategic Plan contains seven strategic initiatives that build on the network's strengths and address core challenges and opportunities.

Research initiatives 1—3 identify and link primary network-level research activities to deliver information, solutions, and innovations to stakeholders using the network approach.

To improve network function and the robustness of the research initiatives, four organizational (4—7) initiatives will be implemented. Organizational initiatives will improve network capabilities to deliver positive societal outcomes from LTAR research.

Research Initiatives: Creating a Shared Science Focus

Initiative: 1 Core Performance Indicators for Agricultural Innovations

Develop indicators of agroecosystem function to quantify the performance of agricultural innovations relating to production, environmental, economic, and societal concerns.

Initiative 2: Science for Climate-Smart Agriculture

Conduct research on new and existing agricultural practices, and synthesize results to quantify the effectiveness of practices for climate change mitigation and adaptation, including adaptation to extreme weather events.

Initiative 3: Science to Action - Understanding Adoption of Climate-Smart Solutions and Agricultural Innovations

Investigate incentives and barriers to stakeholder adoption of research innovations including site-specific environmental conditions and traditions, agroecosystem capacity, and economic realities in various U.S. regions.

Organizational Initiatives: Building a Path to Impact

Initiative 4: Building LTAR Network Capacity

Improve network function through centralized support, growing stakeholder engagement capacity, and expanding collaboration with diverse agricultural researchers, sites, and networks.

Initiative 5: Developing Network Information Management and Data Science Solutions

Organize information and data to facilitate scientific innovation and new initiatives. Develop comprehensive data management and sharing guidelines and protocols for publishing LTAR data in national repositories.

Initiative 6: Advancing Diversity, Equity, Inclusion, and Accessibility (DEIA)

Expand DEIA opportunities within the LTAR Network and with network stakeholders by creating awareness, developing formal protocols and training sessions, and conducting surveys to document progress.

Initiative 7: Designing Strategies for Communication and Coproduction

Develop protocols and procedures, in collaboration with communication specialists and human dimensions experts, to disseminate research results effectively and to engage stakeholders in research coproduction.

Network Research Themes

The LTAR Network uses 20 coordinated site experiments and over 60 network projects to develop and test strategies that increase agricultural productivity and profitability, reduce negative environmental impacts, and promote human well-being. In these studies, we evaluate six attributes that together reflect agricultural sustainability (inner circles) using a variety of indicator measurements (outer circle). The indicators allow stakeholders to evaluate tradeoffs among strategies based on local contexts and differing values.

Photo by Nicole Kaplan, USDA, Agricultural Research Service

Diversity, Equity, Inclusion, and Accessibility

Involvement in LTAR science should be widely available to diverse audiences, but such involvement has historically been limited in many communities. LTAR scientists are partnering with K—12 science educators to develop hands-on education programs based on LTAR science.

As a result of these efforts, thousands of K—12 students in communities underrepresented in science, technology, engineering, and mathematics (STEM) have experienced LTAR science in ways that may shape their career paths and knowledge of agriculture.

Photo courtesy of USDA, ARS

Precision Agriculture

High spatial and temporal variability is a long-standing challenge to agricultural efficiency and sustainability. LTAR scientists are developing precision technologies in croplands, pasturelands, and rangelands. Precision technologies on farm equipment in croplands can optimize fertilizer application rates for crops and soils that minimize nutrient runoff affecting water quality. In rangelands, precision grazing using collars outfitted with Global Positioning Systems (GPS) and virtual fencing technology allows for targeted use of forage to maximize cattle productivity, avoid overgrazing, and even to create fire breaks.

Photo courtesy of USDA, ARS

Nutrient Management

"Manureshed" research is finding ways to use animal manure in place of commercial fertilizer, turning agricultural waste byproducts from a liability for animal producers into a beneficial resource for crop producers. This comprehensive program takes advantage of extensive data systems, stakeholder networks, and innovative technologies to develop opportunities for manure nutrient recycling across agricultural supply chains.

Photo by Julie Kray, USDA, Agricultural Research Service

Coproduction

The Collaborative Adaptive Rangeland Management (CARM) project uses a management-science partnership framework linking stakeholders and scientists in a shared process of learning by doing. This effort incorporates experimental design of grazing management treatments and collaborative decision-making processes. Connecting researchers and managers throughout the research process empowers stakeholders to take ownership of and directly use research results.

Expected Outcomes of the Strategic Initiatives

1. Agricultural stakeholders are well informed about the costs and benefits of agricultural practices and use scientific knowledge in decisions.
2. Scientific knowledge and direct involvement is accessible to increasingly diverse stakeholders and communities.
3. LTAR Network science is produced by an increasingly diverse workforce.
4. Open data produced by the LTAR Network are findable, accessible, interoperable, and reusable.
5. LTAR Network science supports climate change mitigation and adaptation strategies at local-to-national levels.
6. Agricultural practices adopted based on LTAR Network science have demonstrable positive effects on production, environmental outcomes, rural communities, and climate mitigation and adaptation.

More Information

Teferi Tsegaye, LTAR Network Chair: teferi.tsegaye@usda.gov

ltarnetwork.org

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