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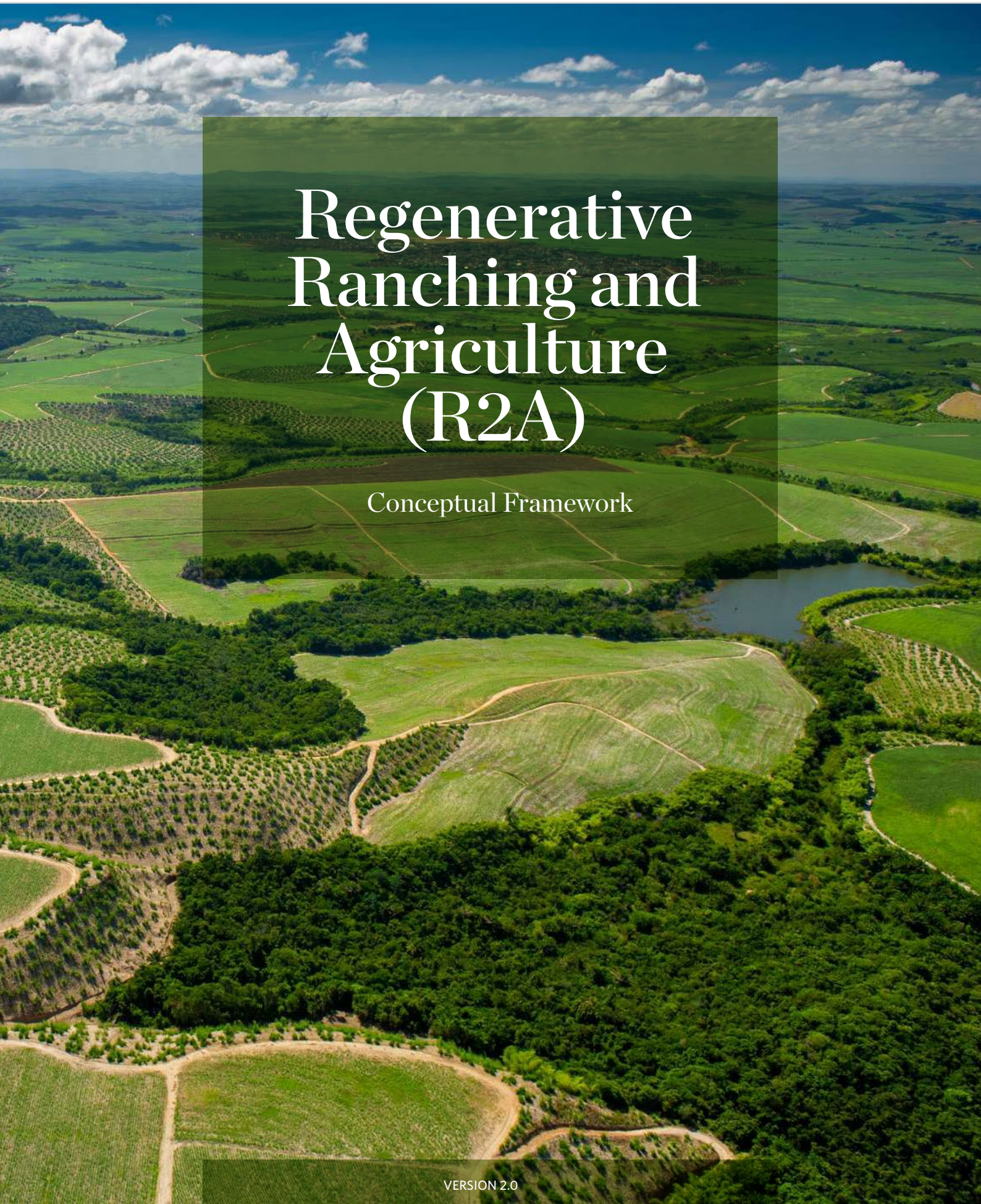

Regenerative Ranching and Agriculture (R2A)

Conceptual Framework

VERSION 2.0

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Introduction

The world's agri-food systems are grappling with the joint challenges of ensuring food and nutrition security for a growing population, restoring our planet's ecological and climate balance, and safeguarding the livelihoods of vulnerable communities. The expansion of large-scale industrial agriculture and other unsustainable production practices have set in motion a cycle of adverse environmental, economic, and social impacts across the globe. Significant transformations to the systems are needed, to both embed sustainable practices in food production and consumption and to enhance equity throughout the value chain.

Using a systems thinking approach[1] and grounded in science and collaboration, TNC embarked on a three-year process that included participatory workshops, meetings, research, and input-gathering to develop its Regenerative Ranching and Agriculture (R2A) Strategy for Latin America. This process aimed to: (1) understand the systemic drivers of unsustainable agri-food systems in the region; (2) identify the key opportunities and landcapes to transform agri-food systems in the region; (3) map the barriers to scaling R2A; and (4) prioritize key entry points to mainstream R2A.

The resulting R2A Strategy lays out an ambitious vision and a set of key synergistic interventions aimed at achieving systemic transformations in Latin America's agriculture. However, advancing this strategy first requires a clear understanding of what is meant by *regenerative agriculture*. Whereas this term is increasingly showing up in public and private agendas, a lack of clarity on the preferred practices, intended outcomes, or even role in transforming the region's agri-food systems still prevails. This document aims to propose a definition of the term Regenerative Ranching and Agriculture (R2A), outline its key principles and expected outcomes, and identify the systemic entry points to achieve change at a relevant scale.

1. Systems thinking is an approach that seeks to understand the interconnections between the parts of a system and the behaviors that emerge from them (Sterman, 2000). In the context of agriculture, it means considering the production system within its broader context, and explicitly seeking environmental, social and economic benefits in the short and long term.

Cover: Sugarcane cultivation and Atlantic Forest remnants in the city of Goiana, near Recife, Pernambuco, Brazil. © Cacio Murilo De Vasconcelos

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Defining Regenerative Ranching and Agriculture (R2A)

As a concept, regenerative agriculture is becoming more popular among scientists, policymakers, practitioners, private companies, and in national and international agendas. But interpretations of the term are as diverse as the interests promoting it, which increases the potential for greenwashing. The scientific literature largely associates regenerative agriculture with restoring soils, sequestering carbon, increasing biodiversity, and improving water use efficiency. Meanwhile, practitioners tend to emphasize the use of certain practices as the pathway to deliver specific outcomes. What is often lacking is a recognition that the socioeconomic and political elements of the system are as important as the agronomic practices, if the goal is to achieve lasting impacts at scale (Barrios et al., 2020; Tittonell et al., 2022).

After a collective reflection process, TNC and the Department of Environmental Politics of the Helmholtz Centre for Environmental Research (UFZ) propose the following definition for the Latin American context:

R2A

An approach to managing agri-food systems that integrates scientific and local knowledge to actively conserve and restore ecosystems and biodiversity in and around production areas, to reduce the footprints, build resilience, and improve productivity, while enhancing social inclusion, human health, and livelihoods.

R2A therefore implies a shift to a systemic perspective that considers the long-term health of the environment and the well-being of communities. Under the basic principle of equity, R2A can be adapted to diverse scales of production, from smallholders and large-scale producers.

Our definition of R2A explicitly recognizes three basic tenets. First, rather than promoting a universal set of practices, the focus should be on promoting the basic principles that must be applied to design effective context-specific practices (Gliessman & Tittonell, 2015). Second, the performance of R2A should be assessed through outcome-based rather than practice-based targets (Jones & DeClerck, 2023). Third, if the goal is to transform agri-food systems, changes must happen in multiple dimensions and at multiple scales (Wezel et al., 2018).

Focus on principles rather than practices

Drawing from multiple sources (FAO, 2018; Barrios et al., 2020; Newton et al., 2020; Tittonell et al., 2022), we propose six basic agroecological principles to guide the development and implementation of interventions that transform agriculture at multiple scales (Table 1). Whereas the application of all principles is the goal, we see R2A uptake as a gradual transition process in which the simpler principles are applied first, laying the foundation for the incremental adoption of others that reinforce previous outcomes and deliver on new ones.

PRINCIPLES OF R2A

Principle	Key elements
Diversity and synergistic integration	Encourages the diversification of plant and animal species, genetic varieties, and ecological functions, as well as people and livelihood options in accordance with the local socio-ecological conditions. Promotes the synergistic integration between these diverse elements at both the farm and landscape level, and the cooperation between local actors and stakeholders.
Resource efficiency and recycling	Promotes the optimized and rational use of local renewable resources (e.g., soil, water, forest) and the closing of energy, nutrient, and water cycles, thus reducing reliance on external inputs and negative environmental impacts.
Resilience	Improves the capacity of the agri-food system to withstand ecological and socio-economic shocks, and its capacity to recover and learn from them.
Agrobiodiversity and food culture	Safeguards and increases agrobiodiversity as a basis for nutritious, diversified and culturally appropriate diets for both farmers and consumers.
Knowledge co-production and inclusive governance	Enables tailored R2A dissemination through fair and inclusive decision making, capacity building, and transdisciplinary engagement. Promotes the effective participation of rural communities to develop innovative policies, institutions and/or markets that disincentivize unsustainable agricultural practices and encourage regenerative practices.
Circular and regenerative economy	Reduces social and environmental externalities (e.g., food waste) along the value chains, reconnects producers with consumers, promotes fair incomes for food producers, and encourages R2A local/regional businesses and markets that generate dignified job opportunities and fair prices for consumers.

Adapted from FAO, 2018.

Evaluate outcomes over practices

Because the same regenerative practice may lead to different outcomes when applied in different contexts, and the same outcome can be reached through different practices, R2A should be evaluated on the basis of the outcomes achieved rather than the practices used. Ultimately, this provides a certain flexibility in the how, while ensuring progress towards the what. We propose six main desired outcomes and provide examples of how context-specific practices contribute to achieve them.

EXPECTED OUTCOMES

Outcome	What changes with respect to baseline?	Examples of practices leading to outcomes
Biodiversity enhancement	All levels of diversity (genetic, crop, species) are critical for providing the ecosystem services that sustain human life, from water purification to nutrient recycling. But while agriculture is highly reliant on these services, it is often responsible for the oversimplification of ecosystems which in turn drives biodiversity loss of all levels. Regenerative practices based on principles such diversity and synergistic integration or resource efficiency and recycling, reduce the impacts on biodiversity and may help reverse the damage.	Agroforestry systems that combine cacao trees with other permanent or temporary crops and with woody species, increase biodiversity in the cultivation system while also diversifying livelihood options. They can also contribute to increase connectivity and maintain biodiversity across the landscape (Cerda et al., 2014; Jagoret et al., 2014).
Water resource improvement	Availability of clean water is essential for agricultural production, but conventional cultivation practices are often wasteful, and climate change is further exacerbating water scarcity. Water misuse and contamination is partly the result of viewing water as an external resource to be disposed of, rather than an internal resource that, when properly managed, can be indefinitely recirculated within the agricultural system. Regenerative practices that harness synergistic integration and closed cycles can help optimize water use within the agricultural system and protect its quality and availability in the broader landscape.	In sugarcane plantations, maintaining crop residues as mulch to cover the soils supports water use efficiency by: reducing losses to evapotranspiration, and increasing the SOM content which enhances water holding capacity, making water more available for plant uptake and reducing the need for irrigation. It also returns nutrients into the soil reducing the need for fertilization and the risk of runoff pollution (Calle et al., 2022).
Soil health	Conventional agricultural practices such as excessive tillage, overuse of synthetic inputs, and monoculture, contribute to the physical, chemical, and biological degradation of the soil, which is still proceeding at an alarming rate worldwide. And yet soil health is critical for maintaining agricultural productivity. Regenerative practices, especially those that protect the soil structure and support soil biota, facilitate the recovery of overall soil health, and thus contribute to maintain and increase crop productivity over time.	In mixed vegetable systems, synthetic inputs can be replaced with organic alternatives such as composts, green manure, or mulches, or by intercropping with species that fix nitrogen or mobilize phosphorus. These practices contribute to improve soil structure and support the assemblage of soil micro/ macro fauna, both critical for soil fertility and crop health.
Climate mitigation and adaptation	The agriculture sector contributes significantly to global GHG emissions and is also highly vulnerable to the impacts of climate change. Tree-based practices such as agroforestry, soil-conservation practices such as cover cropping, and other R2A practices, support climate mitigation by increasing the permanent storage of CO2 in both plant biomass and soils. These same practices also often support climate adaptation by buffering cropping systems against climate extremes and by helping farmers reduce losses and maintain stable production.	In previously forested lands, transforming extensive grazing areas into intensive silvopastoral systems contributes to both climate mitigation and adaptation. Adding living fences, scattered trees, and other permanent woody vegetation in and around pastures increases permanent carbon storage; rotational grazing and forage-based diets reduce GHG emissions and increase soil carbon. Silvopasture also buffers cattle against climate extremes improving farmers' adaptive capacity (Chará et al., 2019).

Outcome	What changes with respect to baseline?	Examples of practices leading to outcomes
Economic well-being	Declining productivity, increasing input costs, and climate variability have transformed agriculture into a high risk, low-margin activity. Regenerative agriculture can help farmers improve their income and return on investment by soil fertility, reducing reliance on external inputs, and increasing resilience to external shocks, but also by diversifying production and opening new market opportunities. Farmers' economic well-being is crucial to ensure both global and local food supplies.	Crop-livestock integration can improve soil fertility, reduce input costs, diversify on-farm production and enrich local diets. For example, the use of sheep to control weeds in a nut tree orchard facilitates the transition to organic management and reduces costs by eliminating herbicide use and replacing fertilizers with manure; it also creates additional revenue from meat and milk production on the same plot.
Thriving communities	Once regarded as the backbone of proud rural communities, agriculture has gradually become a marginal activity. The rural social fabric has debilitated as farmers' sense of pride and identity fades, and rural youth, women and minorities cease to envision a future in farming. Regenerative systems based on knowledge co-creation, safeguarding agrobiodiversity, circular economies, and inclusive governance can help re-empower rural communities by providing opportunities for dignified work with fair compensation, for decision-making and capacity development, and for social inclusion and generational integration.	Structured transdisciplinary engagement processes in which, for example, agroforestry systems design integrates local and scientific knowledge, allow for the incorporation of a variety of species that cater to diverse interests, including those of women and marginalized groups (Dumont et al., 2021). Likewise, guarantee systems designed through participatory processes enable access to better prices for smallholder farmers and foster participation in decision-making (Nelson et al., 2016).
Food security, health, and nutrition	Agricultural globalization often leads to the transformation of diversified foodscapes into specialized monoculture landscapes. For local producers, this often entails giving up their autonomy over what they grow and how, including local seed varieties; for local communities, it frequently means a significant loss of food diversity that impacts local culture. Monocultural production practices can also impact the health of farmer families, food consumers, and the environment, and even favor the abuse of workers and farm animals. The adoption of R2A principles embodied in practices such as crop-livestock integration, intercropping, or agroforestry, can enhance food security and nutrition, and reduce many of the health risks associated with monocultural practices.	Agroforestry systems can be designed with specific R2A principles in mind (e.g., agrobiodiversity, resilience, inclusive governance) to improve food availability and ensure local year-round access to a diversified, nutritious, and healthy diet (Gotor et. al, 2017). The benefits of such agroforestry systems can be amplified where they are promoted by solidarity-based organizations, and supported by local markets that facilitate product trade or by state procurement programs to supply school meals (Deaconu et al., 2019; Muñoz et al., 2021; Singh & Fernandes, 2018).

Aim for systemic transformation

Latin American is the world's largest provider of ecosystem services, a region critical for both biodiversity conservation and global water and climate regulation. Despite covering only 15% of the Earth's land, the region retains almost half of its original forest cover and stores large amounts of carbon; it receives 30% of global precipitation and generates a third of the world's fresh water; and it maintains 40-50% of the global biodiversity and significant agrobiodiversity (Morris et al., 2020). As the world's largest food exporter, Latin America is also essential for the stability of the global food supply and its prices. Agriculture is central to the region's local economies, using 38% of the total land area, employing 14.1% of the labor force, and accounting for 4.7% of the Gross Domestic Product (GDP) (Morris et al., 2020). However, the agricultural sector is also responsible for some of Latin America's pressing problems: it consumes two thirds of the region's freshwater resources exacerbating groundwater and aquifer depletion; it accelerates soil degradation affecting almost half of the total land area; it drives deforestation at three times the global rate, causing habitat and biodiversity loss; and it contributes almost half of the region's GHG emissions. Finally, agri-food systems also contribute to the alarming recent trends in human health and nutrition, specifically the rising rates of malnutrition (e.g., 6% undernourishment, 37% food insecurity) and overweight (e.g., 57% overweight, 19% obesity) among Latin America's population (FAO et al., 2023; WHO, 2021).

Transforming Latin America's agri-food systems is therefore critical to protect the natural capital that sustains production, ensure the continued provision of key services, and strengthen climate resilience. But not all agricultural systems across the region are the same, and the degree to which different systems contribute to or are affected by the impacts described above, varies. On one hand, large-scale industrial agriculture, often export-oriented and driven by yield maximization, has severely damaged the natural capital and compromised the region's long-term productive potential. On the other hand, smallholder agriculture, practiced by two thirds of the rural population on one third of the total cultivated area, still relies mostly on low-input agricultural practices (Altieri & Nicholls, 2008). This type of farming is crucial to local food security as it supplies approximately 41% of the domestic consumption, and yet smallholders are among the poorest people in Latin America, and increasingly vulnerable to climate, health, and financial shocks (Fan & Rue, 2020). This triggers the use of unsustainable agricultural practices that prioritize short-term productivity but over time, degrade the land and the water, reduce resiliency, and exacerbate problems related to health, out-migration and lack of opportunity in rural areas.

In the current scenario, several intertwined barriers are hindering efforts to scale R2A in Latin America (Figure 1):

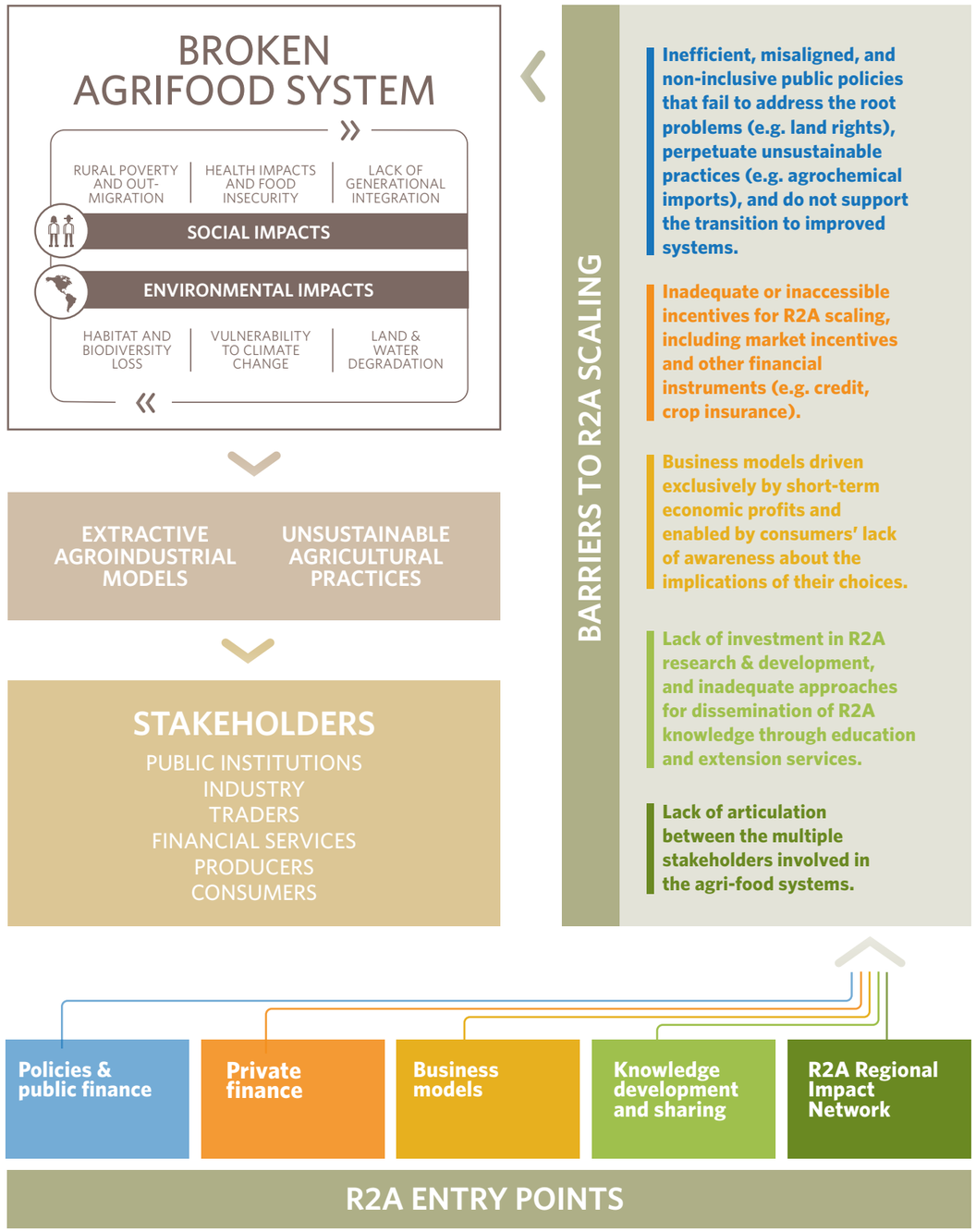
a. Inefficient, misaligned, and non-inclusive public policies that fail to address root issues (e.g., land tenure/land rights), perpetuate unsustainable practices (e.g., subsidies for chemical inputs), and do not support the transition to improved production systems (e.g., externalization of environmental and social costs).

b. Inadequate or inaccessible monetary incentives for the adoption of sustainable practices, such as market incentives and other financial instruments (e.g., credit, crop insurance).

c. Business models driven exclusively by short-term economic profits and enabled by consumers' lack of awareness about the health and environmental implications of their choices on the prevailing production model.

d. Lack of investment in R2A research & development, and inadequate approaches for the dissemination of R2A knowledge through education, extension, and other services.

e. Lack of articulation between the multiple stakeholders involved in the agri-food systems.



Key entry points

After mapping Latin America's agri-food systems, TNC and partners identified the key drivers and institutional structures that must be addressed and the critical stakeholders that must be engaged to achieve a systemic transformation. Based on this analysis, we identified five entry points that should be tackled in tandem to enable R2A scaling in Latin America (Figure 1).

Policies and Public Finance

Co-design policies and finance options that create enabling conditions to reorient agricultural economies towards R2A. Includes transforming harmful subsidies, tapping into new and existing public financial flows, and leveraging markets for R2A's co-benefits (i.e., mitigation, biodiversity) to meet national commitments.

Private Finance

Boost availability of private finance by increasing R2A's visibility, de-risking it as an investment option, and enabling the design of tailored innovative financial instruments that support scaling.

Business Models

Identify and improve evidence based promising R2A business models, facilitate their dissemination among food producers, companies, and governments, and empower marginalized groups to claim their space through diversified livelihoods.

Knowledge Development and Sharing

Systematize R2A knowledge by rigorously documenting context-specific practices, monitoring and evaluating outcomes, and generating transdisciplinary analyses. Disseminate this knowledge to different stakeholders to create pathways for system transformation, strengthen

Left: Figure 1. Key entry points to achieve systemic transformation in Latin America's agri-food systems

their capacities, and raise awareness at multiple levels. Monitor impact to track progress and ensure that the sector contributes to NDCs, NBSAPs, NAPs & SDGs, and other commitments.

R2A Regional Impact Network

A diverse alliance of organizations and influential stakeholders (NGOs, government agencies, research institutions, and companies) pools core competencies and shares risks, responsibilities, resources, and benefits, working to achieve a common goal. The network coordinates activities and interacts with national hubs to promote partnerships and actions aimed at driving regional-level systemic change.

By operationalizing the R2A principles, tracking the outcomes, and addressing the key entry points, the R2A Strategy aims to disrupt the cycles of unsustainability in Latin America's agri-food systems and deliver a triple win for nature, agriculture, and communities. **Nature** benefits from reduced agricultural footprints, which in turn support the conservation and restoration of functioning and biodiverse ecosystems. **Agriculture** benefits from improved long-term productivity, reduced reliance on external inputs, and increased resilience to climate and market shocks. And **communities** benefit from healthier foods, steady incomes, dignified work conditions, and the reliable delivery of vital ecosystem services.

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