

From Ecosystem Functions to Investment-Ready Systems

The AIRE Framework

Agroecology-to-Investment Readiness for Ecosystem Services

A flow-based framework linking natural capital, nature-positive management, ecosystem services, assessment and prioritization, and climate-resilient agrifood investment

CRAFS Conceptual Working Paper

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Public Sharing and Positioning Note

This paper presents the **first working draft (Version 1.0) of the AIRE Framework (Agroecology-to-Investment Readiness for Ecosystem Services)**, an author-led conceptual and screening-level diagnostic framework for connecting natural-capital assets and condition, nature-positive and agroecological management, ecosystem-service benefits, evidence and prioritization, incentives, and investment pathways.

AIRE is an **independent analytical contribution by Dr. Bui Le Vinh / CRAFS**. It builds on the author's earlier FlowScape Framework and Circular VAC-R systems-design work and draws on applied experience in climate-smart agriculture, agroecology, nature-based solutions, natural-capital assessment, spatial analysis, MRV, farmer incentives, public-private finance and regional agrifood-systems programming. Its development has also benefited from reflection on regional policy and practitioner dialogue concerning natural capital, ecosystem services, payment mechanisms, agroecological transition and investment readiness in the Greater Mekong Subregion. **AIRE is not an official framework of ADB, SAFSP, the GMS Working Group on Agriculture, or any other external organization.**

At its current stage, AIRE is intended to support **conceptual development, screening-level diagnosis, project design, readiness assessment, investment prioritization, R&D concept development and investment-preparation dialogue**. It does not replace specialized methodologies for natural-capital accounting, ecosystem-service valuation, biodiversity assessment, MRV, certification, financial appraisal, carbon accounting or safeguards.

As a first working draft, **AIRE is expected to evolve through further application, practitioner and peer feedback, empirical testing, and engagement with emerging natural-capital and nature-finance approaches**. Future versions may refine the framework's analytical structure, diagnostic tools, application guidance and evidence base.

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Abstract

Agroecological, circular, climate-smart and nature-based practices are increasingly available across agrifood systems, yet technically sound practices do not automatically become scalable or investment-ready systems. A persistent gap lies between the ecological performance of farms and landscapes and the evidentiary, institutional, market and financial conditions needed to recognize, prioritize, reward and finance that performance. The Agroecology-to-Investment Readiness for Ecosystem Services (AIRE) Framework addresses this gap through a flow-based systems architecture that connects natural capital, nature-positive and agroecological management, ecosystem services, assessment and prioritization, investment readiness and resilient productive systems.

AIRE organizes the framework around six linked stages and seven system flows, while placing five cross-cutting readiness conditions—data, GIS and digital tools; knowledge and capacity; policy and governance; institutional coordination; and market and finance—across the full pathway. It also distinguishes three investment-readiness pathways: (i) evidence, spatial data and MRV; (ii) incentive, market and finance mechanisms; and (iii) investment prioritization, packaging and scaling.

AIRE proposes that investment readiness emerges when four functions are connected: ecological performance is generated through practice; benefits are made credible through evidence and assurance; locations, services and interventions are prioritized spatially and institutionally; and value is translated into incentives, finance and investable packages. This logic allows the framework to accommodate payment for ecosystem services, carbon and nature finance, public investment, blended finance and conventional agrifood investment without assuming that every ecosystem service must be monetized. The framework can therefore support screening-level natural-capital assessment, project preparation, landscape prioritization, investment pipeline development and regional learning while retaining the ecological and livelihood logic of agroecological transition. AIRE differs from approaches that focus primarily on ecological assessment, ecosystem-service valuation, agroecological practice or financial appraisal by explicitly structuring the intermediate translation from ecological performance to decision and investment readiness. Its distinctive contribution is therefore not a new valuation, accounting or financing methodology, but an integrative architecture connecting practice, evidence, spatial prioritization, incentives and investment pathways.

Keywords: agroecology; natural capital; ecosystem services; nature-positive management; investment readiness; natural-capital assessment; MRV; GIS; PES; nature finance; circular bioeconomy; systems thinking; resilient agrifood systems

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List of Abbreviations

Abbreviation	Meaning	Abbreviation	Meaning
ADB	Asian Development Bank	MRV	Monitoring, Reporting and Verification
AIRE	Agroecology-to-Investment Readiness for Ecosystem Services	NCA	Natural Capital Assessment
CSA	Climate-Smart Agriculture	NbS	Nature-based Solutions
FSF	FlowScape Framework	PES	Payment for Ecosystem Services
GIS	Geographic Information System	RPG	Regional Public Good
GMS	Greater Mekong Subregion	SME	Small and Medium-sized Enterprise

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1. Introduction: the missing middle between good practices and investment-ready systems

Agrifood transformation is often framed as a search for better technologies or practices. In many landscapes, however, the technical menu is already extensive: diversified agroecological production, conservation agriculture, integrated crop-livestock systems, agroforestry, circular nutrient management, residue recycling, water-saving irrigation, low-emission rice, biological inputs, digital advisory services and nature-based solutions. The more difficult question is why promising practices remain confined to pilots, demonstration sites or isolated value chains rather than becoming durable, financeable and scalable systems (Barrios et al., 2019; Barbon et al., 2021; IUCN, 2020).

The constraint is frequently architectural rather than purely technical. A practice can improve soil structure, reduce erosion, regulate water, retain biomass, support biodiversity, reduce emissions or strengthen livelihood resilience, yet these benefits may remain invisible to decision makers. Data may be fragmented, baselines incomplete, ecosystem services poorly defined, beneficiaries unclear, monitoring expensive, institutional mandates dispersed and incentives weak. Investors may therefore see technical promise but insufficient evidence, aggregation, risk allocation or cash-flow logic. Public agencies may see environmental value but lack a transparent basis for spatial prioritization and investment sequencing.

This creates a missing middle between ecological performance and investment readiness. Natural capital must first be understood as a productive asset base. Management practices must then influence the condition and functions of that asset base. Those functions generate ecosystem services and livelihood benefits. Evidence must make those benefits visible and credible. Prioritization must identify where intervention matters most, for whom and under what conditions. Finally, incentive and financing mechanisms must connect the resulting value to farmers, communities, enterprises and public institutions.

Central proposition of AIRE

Good practices become investment-ready systems when natural-capital condition, ecosystem-service value, credible evidence, spatial and institutional prioritization, incentives and finance are sufficiently connected to support a defensible decision and implementation pathway.

Several established approaches address important parts of this problem. Ecosystem-service frameworks characterize the benefits people obtain from ecosystems; natural-capital accounting organizes information on ecosystem assets, condition and services; agroecological and nature-based approaches focus on management transitions and ecological performance; while PES, carbon and nature-finance mechanisms address selected pathways for translating environmental outcomes into incentives or financial flows. These approaches are complementary, but they do not necessarily provide a common project-preparation architecture linking management change, ecosystem-service generation, evidence and assurance, spatial prioritization, institutional readiness and investment packaging. AIRE is positioned in this intermediate space (Millennium Ecosystem Assessment, 2005; TEEB, 2010; Natural Capital Coalition, 2016; United Nations et al., 2021; IUCN, 2020; World Bank, 2021).

AIRE was developed to make this translation process explicit. It is neither a natural-capital accounting standard nor a financing product. It is a systems framework for diagnosing how far an agrifood landscape, value chain or project concept has progressed from ecological potential toward an investment-ready configuration. The framework is deliberately broad enough to accommodate public investment, payment for ecosystem services (PES), carbon or nature finance, blended finance, agribusiness investment and non-monetary incentive mechanisms. It also recognizes that some ecosystem services are public goods whose value should guide planning even where direct payment is inappropriate or infeasible.

The framework is particularly relevant to settings in which production systems, ecosystem condition, local livelihoods and downstream beneficiaries are tightly connected. In this paper, “productive systems” refers not only to agrifood systems in the narrow sense, but also to resource-dependent livelihood systems, coastal and deltaic production zones, restoration landscapes, managed watersheds and other landscape or seascape settings where natural-capital condition shapes economic, livelihood and investment outcomes. This includes upland watersheds, irrigated rice landscapes, agroforestry systems, circular crop–livestock systems, coastal and blue-economy systems,

restoration landscapes and value chains in which environmental performance increasingly affects market access, public investment or project preparation.

The concept is organized around three questions: (1) how do nature-positive and agroecological management systems generate ecosystem-service value; (2) what makes that value visible, credible and useful for prioritization; and (3) what conditions allow promising local systems to become fundable, bankable or scalable through public, blended or private investment?

2. From connected agrifood landscapes to an investment-readiness framework

AIRE starts from the premise that investment readiness cannot be assessed independently from the ecological, productive and livelihood systems from which value is generated. Natural capital, production practices, ecosystem functions, value chains, institutions and markets interact across landscapes, while the benefits and costs of environmental change are distributed among different actors. AIRE therefore begins with the connected system before considering specific investment or financing mechanisms.

2.1. Framework development approach

AIRE was developed through iterative conceptual synthesis rather than as an empirical impact-evaluation methodology. Its architecture draws on four main sources: (i) systems thinking embodied in the author's earlier FlowScope Framework (Bui, 2026c) and Circular VAC-R (Bui et al., 2026) work; (ii) applied experience in climate-smart agriculture, agroecology, soil and water management, nature-based solutions and agrifood value chains; (iii) work on spatial analysis, MRV, incentives, public-private finance and regional agrifood programming; and (iv) reflection on recurring implementation challenges raised through regional policy and practitioner dialogue.

The framework was progressively organized around a central analytical problem: **how can ecological performance move from management practice and ecosystem function through evidence, prioritization and institutional arrangements toward credible investment decisions?** Its architecture was iteratively checked across agrifood, watershed, restoration and coastal application contexts. At its present stage, AIRE should therefore be understood as an **author-led conceptual and screening-level diagnostic framework** intended to support analysis, prioritization and project preparation, rather than as a validated predictive model or a substitute for detailed ecological, accounting or financial methodologies.

2.2. The connected-system foundation of AIRE

AIRE starts from a connected agrifood landscape (Figure 1) rather than from a financing instrument. Farms, forests, soils, water bodies, livestock systems, processing facilities, logistics, markets and consumers are linked by flows of water, nutrients, biomass, energy, information, products, finance and value. Ecological processes do not stop at farm boundaries, and neither do the economic consequences of environmental degradation or restoration. The same landscape can simultaneously provide food, water regulation, erosion control, habitat, carbon storage, local employment and market products.

The FlowScope Framework provides the systems foundation for this perspective by emphasizing connections among natural systems, production systems, value chains, institutions and markets. AIRE adds an explicit readiness question: **when do these connected systems generate sufficient evidence, alignment and incentives for ecological and productive value to become decision-ready and investment-ready?** (Bui, 2026c)

This distinction is important. Natural-capital assessment can identify assets, condition, pressures and ecosystem services without itself producing an investable intervention. Conversely, a financially attractive intervention may fail to account for the ecological functions and resource dependencies on which its long-term performance depends. AIRE therefore treats natural-capital assessment and investment preparation as **linked but distinct functions**, connected through evidence, spatial prioritization, institutional arrangements and appropriate incentive or financing pathways.

This systems perspective also allows AIRE to extend beyond agriculture to watersheds, forests, restoration landscapes and coastal or blue-economy systems. The specific assets, pressures, services and beneficiaries may differ, but the underlying readiness question remains similar.

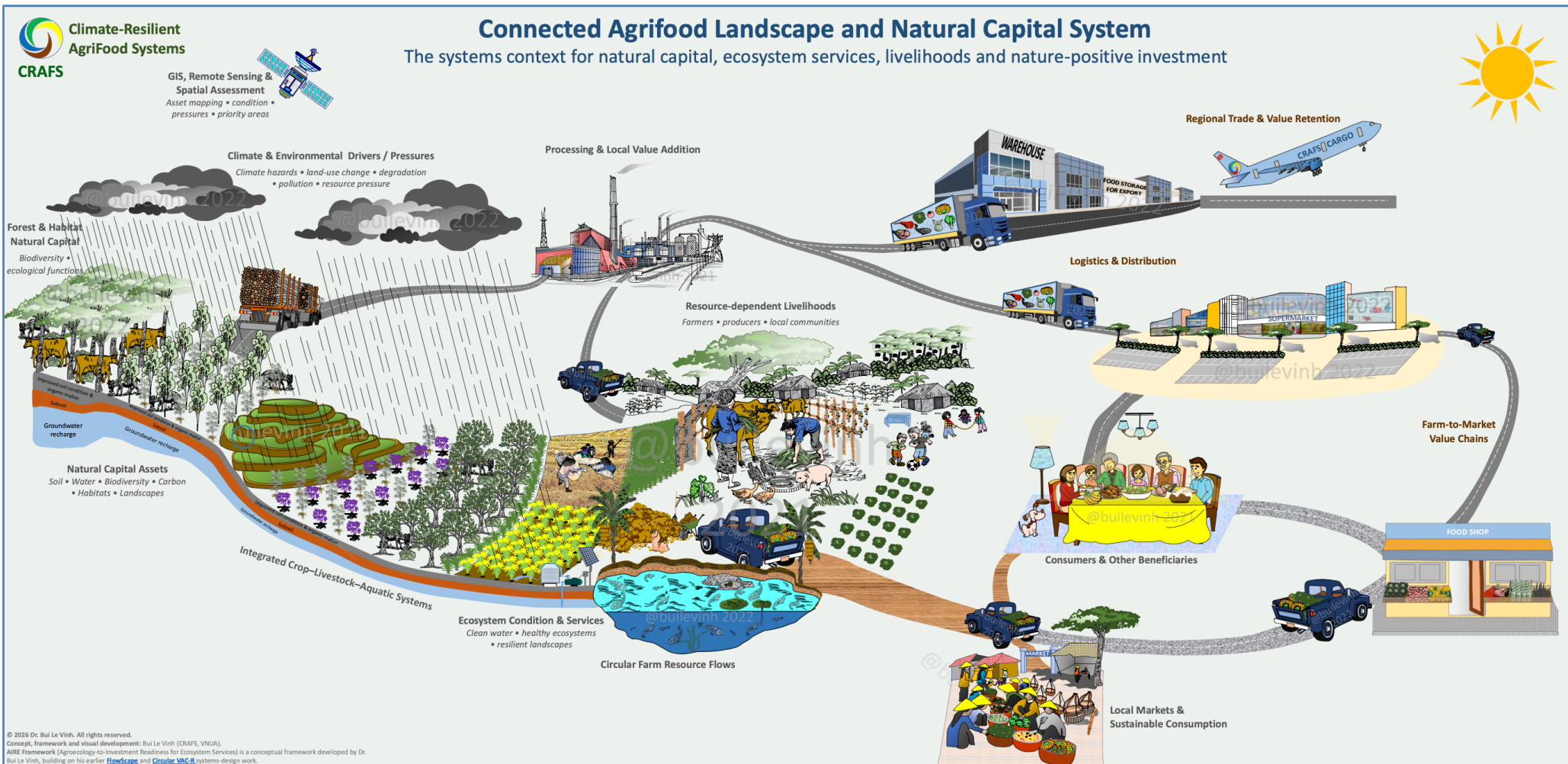


Figure 1. Connected agrifood landscape and natural-capital system as the systems context for linking ecosystem functions, livelihoods, value chains and nature-positive investment

Figure 1 represents the **system context within which AIRE operates**; it is not itself the AIRE Framework. AIRE builds on this context by introducing an analytical architecture for examining how natural-capital condition and management change move through ecosystem services, evidence and prioritization toward investment readiness. **Figure 1 therefore describes the connected system**; **Figure 2, introduced in Section 3, describes the AIRE architecture applied to that system.**

3. The AIRE Framework architecture

3.1 Six backbone stages

The AIRE architecture is organized as a left-to-right transition from ecological assets to resilient productive systems. The arrows do not imply a one-way causal chain. Feedback loops are expected: investment changes management; management changes ecosystem condition; new evidence changes prioritization; and market signals can alter land-use decisions. The sequence is therefore best understood as a readiness pathway rather than a linear project cycle.

Table 1. Six backbone stages of the AIRE Framework

Stage	Core question	Primary analytical focus
1. Natural Capital	What ecological assets and functions matter?	Soil, water, biodiversity, carbon, habitats, landscapes and their condition, trends and pressures.
2. Nature-positive Management	What management changes can maintain or improve those assets?	Agroecology, circularity, restoration, resource efficiency, resilience and productivity.
3. Ecosystem Services	What benefits are generated, for whom and at what scale?	Soil fertility, water regulation, biodiversity, carbon, resilience, livelihood and productive benefits.
4. Assessment & Prioritization	What evidence is credible and where should action come first?	Indicators, baselines, spatial analysis, beneficiaries, additionality, risk, feasibility and priority areas.
5. Investment Readiness	What mechanism can translate value into implementation?	Incentives, PES, public finance, carbon/nature finance, blended finance, business models and investment packaging.
6. Resilient Productive Systems	What durable outcome should investment support?	Productive, adaptive, lower-risk agrifood systems that retain ecological functions and local value.

3.2 Seven system flows: how ecological and livelihood value is generated

The seven flows make the framework operational at farm and landscape level. They are not separate sectors; each can interact with several ecosystem services and investment mechanisms. Their purpose is to prevent assessment from becoming a list of disconnected indicators and to keep attention on how resources and value move through the system.

Table 2. Seven system flows and their ecosystem-service relevance

System flow	Illustrative functions and services	Readiness relevance
1. Biodiversity, Habitats & Ecological Functions	Habitat quality, pollination, biological control, landscape connectivity and ecological resilience.	Supports biodiversity and restoration priorities; may underpin PES, nature finance or public-good investment.
2. Biomass Resources & Bioeconomy	Crop residues, by-products, biomass recovery, local processing and circular bio-based products.	Connects waste reduction, local value addition, circular economy and enterprise models.
3. Soil & Nutrient Cycling	Soil organic matter, fertility, nutrient retention, manure/compost use and reduced nutrient loss.	Links soil-health evidence to productivity, resilience, input savings and environmental outcomes.
4. Water Regulation & Circular Water	Storage, infiltration, recharge, runoff control, reuse, water quality and drought buffering.	Central to watershed services, irrigation resilience, downstream beneficiaries and water-related PES.
5. Feed-Livestock Integration	Feed production, manure return, mixed farming, nutrient loops and diversified production.	Supports circular farm design, reduced input dependence and integrated livelihood value.
6. Carbon & Energy	Carbon storage, avoided emissions, residue management, biogas, biochar and renewable energy.	Connects mitigation evidence with energy savings, carbon finance and low-emission investment.

System flow	Illustrative functions and services	Readiness relevance
7. On-farm & Local Value	Food, income, savings, livelihood diversification, local employment and value retention.	Ensures ecological performance is linked to farmer incentives, distributional outcomes and economic feasibility.

3.3 Five cross-cutting readiness conditions

The backbone and system flows describe what is being transformed. Readiness conditions describe whether the enabling environment is capable of supporting that transformation. These conditions cut across all stages and are intentionally framed as capabilities rather than as sectors.

Table 3. Five cross-cutting readiness conditions

Readiness condition	Key questions	Typical gaps
Data, GIS & digital tools	Are assets, pressures, beneficiaries and interventions spatially visible? Are baselines and monitoring systems proportionate to the decision?	Fragmented datasets; weak baselines; high verification cost; poor interoperability; limited geospatial capacity.
Knowledge & capacity	Can farmers, agencies, service providers and enterprises interpret evidence and act on it?	Technology transfer without systems diagnosis; limited advisory capacity; weak local ownership.
Policy & governance	Are rights, mandates, standards, safeguards and policy incentives sufficiently clear?	Overlapping mandates; uncertain tenure or benefit rights; weak enforcement; policy-finance disconnect.
Institutional coordination	Can ecological, agricultural, spatial, social and financial workstreams be integrated?	Siloed agencies and projects; weak data sharing; unclear lead institution; transaction costs.
Market & finance	Is there a credible demand, payer, budget line, revenue stream or public-value case?	No buyer or payer; small project size; weak aggregation; unsuitable finance; transition risk placed on farmers.

3.4 Three investment-readiness pathways

AIRE does not assume that all projects move toward the same financial instrument. Instead, it distinguishes three pathways that can operate separately or in combination. This is important because a public watershed investment, a PES scheme and a commercially oriented circular-bioeconomy enterprise may share ecological evidence but require different transaction structures.

Table 4. Three investment-readiness pathways

Pathway	Purpose	Typical outputs
Evidence, Spatial Data & MRV	Make ecosystem condition, services, pressures and change visible and credible.	Asset maps; baselines; indicators; monitoring protocols; GIS layers; verification arrangements; learning system.
Incentive, Market & Finance Mechanisms	Translate ecosystem-service or resource-efficiency value into rewards and implementation incentives.	PES design; benefit-sharing; market premiums; carbon/nature finance; public incentives; contracts; green value chains.
Investment Prioritization, Packaging & Scaling	Convert evidence and incentives into decision-ready portfolios and investable packages.	Spatial priorities; intervention packages; costs and benefits; implementation roles; risk allocation; public-private financing plan; scaling pathway.

Figure 2 integrates these four analytical layers and should be read from both left to right—as a readiness transition—and recursively, because investment, evidence and market signals feed back into management decisions and natural-capital condition.

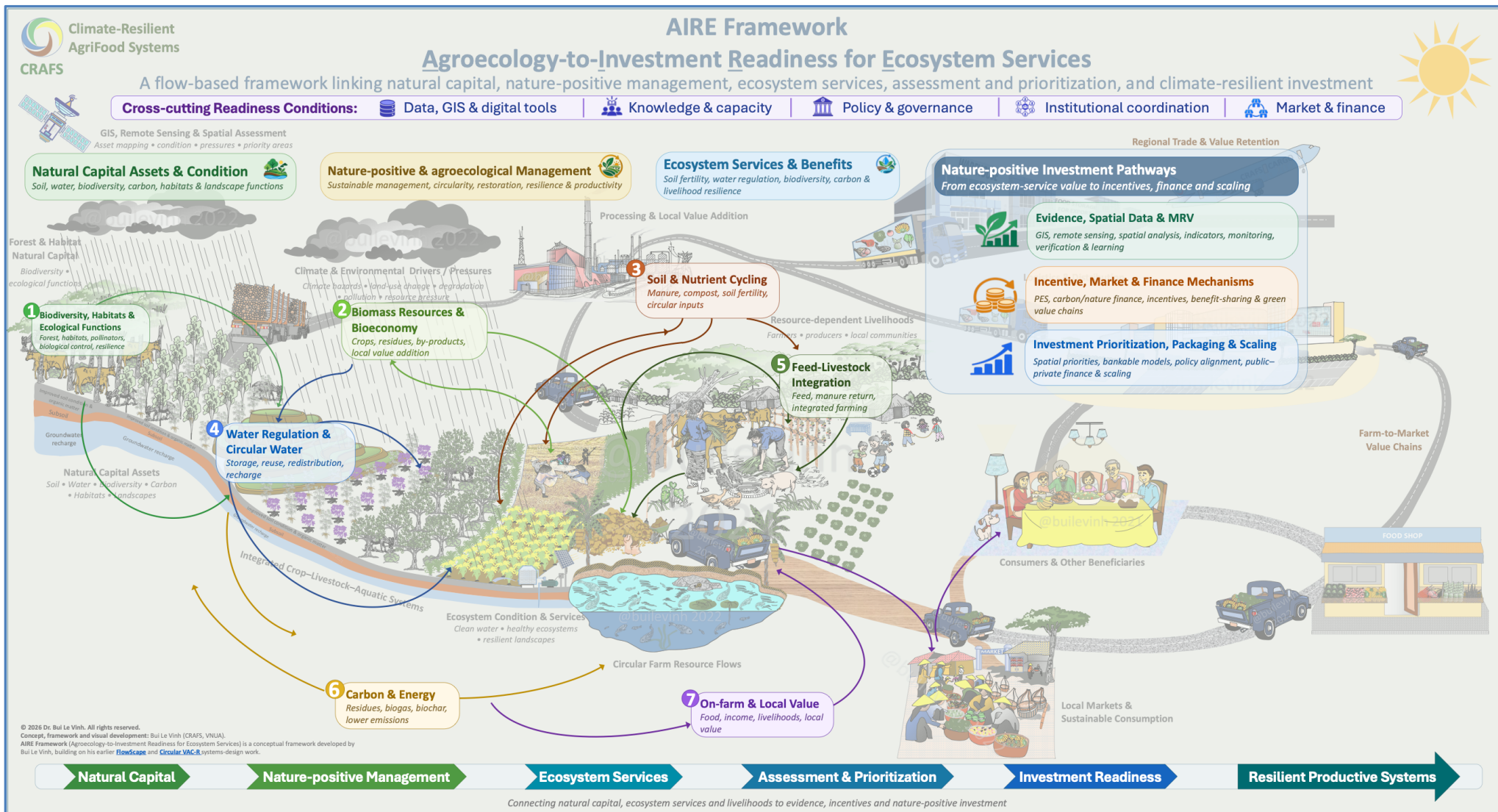


Figure 2. AIRE Framework: flow from natural capital through nature-positive management and ecosystem services to assessment, investment readiness and resilient productive systems

These components operate at different analytical levels. The six backbone stages describe the overall readiness transition; the seven system flows describe how ecological, productive and livelihood value is generated within the landscape; the five cross-cutting conditions describe enabling capabilities; and the three investment-readiness pathways describe how evidence and value are translated toward implementation. They should therefore not be interpreted as four competing classifications, but as nested components of a single analytical architecture.

4. From ecosystem-service generation to evidence, prioritization and incentives

The transition embedded in AIRE can be interpreted through a simple 4P heuristic: Practice, Proof, Prioritization and Payment/Investment. The 4P heuristic is not an additional layer of the AIRE architecture; rather, it provides a practical way to explain how ecological performance moves through the framework toward a credible decision and implementation pathway. Practice generates ecological and productive change; Proof establishes whether that change is sufficiently credible; Prioritization determines where and for whom intervention matters most; and Payment/Investment identifies an appropriate incentive or implementation mechanism. These functions are related but not necessarily sequential: strong practice may lack adequate evidence, credible evidence may not yet identify priority locations, and a financing mechanism may exist without sufficient ecological additionality or implementation readiness.

Table 5. The 4P heuristic for interpreting the AIRE readiness transition

Function	Question	What must be established
Practice	What management change improves natural-capital condition or reduces pressure?	Technical feasibility, local fit, adoption conditions and expected ecological/productive response.
Proof	How do we know that the expected service or benefit exists and changes?	Baselines, indicators, causal logic, spatial evidence, monitoring and proportionate verification.
Prioritization	Where and for whom does intervention create the greatest value?	Priority assets, locations, beneficiaries, pressures, feasibility and implementation relevance.
Payment / Investment	What incentive, mandate or financing mechanism can support implementation?	Payer or public-budget logic, benefit-sharing, financing structure, risk allocation and implementation arrangements.

Using the 4P heuristic

Practice → Proof → Prioritization → Payment/Investment provides a simple interpretive shorthand for the transition from ecological performance to implementation. It does not replace AIRE's six backbone stages, seven system flows, five cross-cutting readiness conditions or three investment-readiness pathways.

4.1 Ecosystem services as the bridge—not the endpoint

Ecosystem services are the bridge between ecological functions and human decisions, but AIRE avoids treating them only as monetizable commodities. Some services can support direct payment or market transactions; others justify public expenditure, regulatory protection, risk reduction or collective action. Water regulation may benefit downstream irrigation, urban users or hydropower; soil health may primarily benefit farmers through productivity and resilience; habitat protection may generate diffuse public benefits; carbon can sometimes enter formal crediting systems. The appropriate mechanism depends on service characteristics, beneficiaries, rights, transaction costs and policy context ([Millennium Ecosystem Assessment, 2005](#); [TEEB, 2010](#); [Dasgupta, 2021](#)).

For this reason, valuation within AIRE is decision-oriented. Biophysical, spatial, qualitative and economic evidence can all be useful, provided the method is proportionate to the decision. Screening-level assessment should avoid false precision. Where evidence is limited, the framework should identify uncertainty explicitly and recommend targeted follow-up rather than implying that every service can be fully quantified at the outset ([TEEB, 2010](#); [Natural Capital Coalition, 2016](#); [United Nations et al., 2021](#)).

4.2 The assurance layer

Between ecosystem-service claims and investment decisions sits an assurance layer. This includes data provenance, baselines, indicators, GIS and remote sensing, monitoring protocols, sampling, quality assurance, verification, traceability and learning. The required assurance level should be matched to the decision. A public-sector prioritization exercise may need robust spatial screening and transparent assumptions; a results-based payment mechanism may require stronger attribution and verification; a carbon transaction may require compliance with a specific standard ([Natural Capital Coalition, 2016](#); [United Nations et al., 2021](#)).

Proportionality principle

Evidence should be credible enough for the decision being made, but not more complex or expensive than necessary. Readiness improves when assurance costs are proportionate to transaction size, risk and intended use.

4.3 Spatial prioritization as the missing bridge

Spatial prioritization is particularly important because natural capital, pressures, beneficiaries and investment feasibility are geographically uneven. AIRE therefore places GIS and spatial analysis at the center of assessment and prioritization rather than treating them as a downstream visualization step. Screening can combine ecosystem condition, service provision, climate exposure, production dependence, livelihood vulnerability, restoration opportunity, infrastructure access and implementation feasibility to identify priority areas for deeper analysis (United Nations et al., 2021; World Bank, 2021).

This makes AIRE compatible with screening-level natural-capital assessment. The objective is not necessarily to produce a complete natural-capital account, but to identify the assets and ecosystem services most relevant to a project decision, assess condition and pressures, understand livelihood and productive linkages, and use the resulting evidence to guide investment priorities. This is especially useful in project preparation where time and data are limited and where decision-oriented recommendations are more valuable than exhaustive valuation (Natural Capital Coalition, 2016; United Nations et al., 2021).

5. Operationalizing AIRE as a screening-level readiness diagnostic

AIRE can be operationalized as a diagnostic rather than as a single composite score. The diagnostic should reveal where a system is strong, where readiness breaks down and what additional work is required before investment. A project may have high ecological relevance but weak evidence; strong evidence but unclear institutions; or a viable enterprise model but limited safeguards and benefit-sharing. These profiles matter more than a single headline score.

Table 6. AIRE screening-level diagnostic areas, guiding questions and indicative evidence

Diagnostic area	Core screening questions	Indicative evidence
Natural-capital assets & condition	Which assets matter to the productive system? What is their condition, trend and spatial distribution?	Existing maps, land cover, soil/water data, habitat information, remote sensing, expert review, local knowledge.
Pressures & dependencies	What pressures are degrading assets? Which livelihoods and value chains depend on them?	Climate hazards, land-use change, pollution, extraction, production data, livelihood profiles, dependency mapping.
Management response	Which nature-positive or agroecological practices address priority pressures?	Practice inventories, feasibility evidence, adoption history, technical guidelines, local experience.
Ecosystem services & beneficiaries	What services change, who benefits and at what scale?	Service pathway diagrams, beneficiary mapping, biophysical proxies, qualitative evidence, valuation where justified.
Evidence & MRV readiness	Can changes be measured credibly and affordably?	Baseline availability, indicators, GIS, monitoring systems, data governance, verification options.
Institutional & policy readiness	Who has authority, rights and implementation responsibility?	Mandates, policies, tenure/use rights, safeguards, coordination mechanisms, benefit-sharing rules.
Market & finance readiness	What creates willingness or mandate to pay/invest?	Public budget case, avoided costs, buyer demand, market premium, PES/carbon/nature-finance opportunity, enterprise cash flow.
Investment packaging	Can priority interventions be aggregated into implementable packages?	Spatial priorities, intervention bundles, cost estimates, implementation partners, risks, financing mix, monitoring plan.

5.1 A practical five-step application sequence

AIRE can be applied as a rapid screening and project-preparation framework through five linked steps. The sequence is intended to structure analysis rather than prescribe a rigid methodology; the depth of assessment and evidence required should be proportional to the decision, risk and scale of the proposed intervention.

Step 1 – Define the decision and system boundary.

Clarify the decision to be supported, geographic scope, productive system, key actors and intended users of the assessment.

Step 2 – Screen natural capital and ecosystem services.

Identify material natural-capital assets, their condition and pressures, key dependencies, ecosystem services and the beneficiaries or productive activities that depend on them.

Step 3 – Diagnose readiness.

Assess whether priority relationships are supported by sufficient evidence, spatial information, institutional capacity, incentives, market conditions and financing arrangements.

Step 4 – Prioritize locations and interventions.

Use ecological importance, pressures, livelihood dependence, expected benefits, feasibility and evidence gaps to identify where action is most relevant and what should be addressed first.

Step 5 – Package the appropriate pathway.

Translate priorities into an implementation pathway by defining actors and responsibilities, evidence and monitoring requirements, incentive or financing options, and conditions for scaling.

The five steps are iterative rather than strictly sequential. New evidence may alter priorities; institutional or financial constraints may require intervention redesign; and monitoring results may feed back into natural-capital assessment and management decisions. The purpose is therefore not to move mechanically through five stages, but to identify the minimum set of ecological, evidentiary and enabling conditions required for a credible decision.

Box 1. Expected outputs from a rapid AIRE screening

Step 1 – Decision boundary → Defined decision, geography, system boundary and key actors

Step 2 – Natural-capital screening → Priority assets, condition, pressures, dependencies, ecosystem services and beneficiaries

Step 3 – Readiness diagnosis → Critical evidence, spatial, institutional, market and finance gaps

Step 4 – Prioritization → Priority locations, interventions and additional evidence needs

Step 5 – Pathway packaging → Implementation roles, incentive and financing options, monitoring requirements and conditions for scaling

A rapid AIRE screening is therefore expected to produce a **decision-oriented diagnostic**, rather than a comprehensive natural-capital account or a fully developed investment proposal. Its purpose is to identify what is sufficiently understood, what remains uncertain, where intervention has the greatest relevance, and what additional work is required to move toward implementation or investment preparation.

This application sequence is particularly useful for screening-level natural-capital assessment and nature-positive investment design, where available evidence must be translated quickly into spatial priorities, feasible intervention packages, financing pathways and implementation recommendations.

5.2 Screening-level natural-capital assessment within AIRE

For project preparation, AIRE can host a targeted natural-capital assessment without turning the framework into a full accounting methodology. The assessment should be selective: identify the natural-capital assets most material to project objectives; characterize condition and trends; identify key ecosystem services and dependencies; assess pressures; and link these findings to investment choices. Where marine, coastal, wetland or forest ecosystems are

central, the ecological modules should be adapted accordingly while retaining the same readiness logic ([Natural Capital Coalition, 2016](#); [United Nations et al., 2021](#)).

The value of this approach is integration. Ecological, economic, spatial and social workstreams can be organized around a shared set of decision questions rather than producing parallel studies that are difficult to synthesize. The framework therefore supports technical leadership and methodological consistency across disciplines, especially when the final output must be a prioritized set of project recommendations rather than a stand-alone environmental report.

6. Investment pathways and project preparation

6.1 Public and policy-led investment

Many ecosystem services are public or collective goods. In these cases, investment readiness may mean a sufficiently strong evidence base for public expenditure, policy reform, infrastructure design, extension services, restoration or risk-reduction measures. AIRE helps articulate the public-value case by linking natural-capital condition to productive dependence, avoided losses, resilience and livelihood outcomes. This pathway is particularly important where direct monetization would be artificial or transaction costs would exceed potential payments ([Millennium Ecosystem Assessment, 2005](#); [TEEB, 2010](#); [Dasgupta, 2021](#)).

6.2 PES and results-based incentives

PES is most credible when the service, provider, beneficiary or payer, conditionality, monitoring arrangement and benefit-sharing mechanism are clear. AIRE can be used to test whether these conditions exist before a scheme is designed in detail. This prevents premature movement from an appealing ecosystem-service narrative to a payment mechanism that lacks rights clarity, measurable outcomes or an economically plausible payer ([TEEB, 2010](#); [Dasgupta, 2021](#)).

The framework also broadens the incentive lens beyond formal PES. Input subsidies tied to environmental performance, water-user contributions, landscape stewardship agreements, procurement premiums, cooperative incentives and public co-financing can all reward nature-positive management where conventional PES is not feasible ([TEEB, 2010](#); [OECD, 2021](#)).

6.3 Carbon, nature and blended finance

Carbon and nature finance can expand the financing envelope but should not dominate the ecological logic of the framework. AIRE positions these mechanisms as options within the market-and-finance pathway. Their suitability depends on additionality, permanence, leakage, rights, verification cost, scale, buyer demand and safeguards. Blended finance may be useful where public or concessional capital can absorb early transition risk, fund shared data infrastructure or aggregate smallholders until commercial participation becomes viable ([Dasgupta, 2021](#); [World Bank, 2021](#)).

6.4 Investment prioritization, packaging and scaling

The final investment package should be more than a list of practices. It should specify the problem, priority geography, natural-capital assets, ecosystem-service rationale, intervention bundle, beneficiaries, evidence plan, institutional roles, costs, risks, financing mechanism and scaling logic. In this sense, AIRE converts ecological diagnosis into an investment narrative without claiming that the framework itself performs detailed financial appraisal.

Investment-readiness test

An AIRE-informed concept is investment-ready when a decision maker can understand what ecological and productive problem is being addressed, where action is prioritized, what evidence supports the intervention, who implements and benefits, what risks remain, how performance will be monitored, and why the proposed financing mechanism is appropriate.

7. Illustrative application archetypes

AIRE is designed to be tested across different agrifood and natural-capital contexts. The following archetypes are generalized application patterns rather than claims of completed AIRE case studies. Their purpose is to show how the same architecture can organize different combinations of ecological function, evidence, incentives and investment.

Table 7. Illustrative AIRE application archetypes

Archetype	Natural-capital / ecosystem-service focus	Potential readiness pathway
Integrated crop-livestock circular systems	Soil fertility, nutrient cycling, biomass reuse, water quality, carbon and farm resilience.	Farm evidence + resource-efficiency savings + cooperative/SME investment; possible public support for transition.
Agroforestry and diversified landscapes	Habitat, biodiversity, soil protection, water regulation, carbon and livelihood diversification.	Spatial prioritization + restoration/public finance + market premiums or nature/carbon finance where credible.
Low-emission rice and water management	Water use, methane reduction, soil condition, climate resilience and productivity.	MRV + aggregation + results-based climate finance, procurement incentives or public irrigation investment.
Circular biomass and local bioeconomy	Residue reduction, nutrient recovery, energy, biochar/compost and local value addition.	Enterprise model + feedstock mapping + SME finance + enabling standards and market development.
Watershed and landscape restoration	Water regulation, erosion control, sediment reduction, habitat and downstream risk reduction.	Natural-capital screening + beneficiary mapping + public investment/PES/blended finance.
Coastal and blue-economy systems	Mangroves, wetlands, coastal protection, fisheries productivity, water quality and livelihoods.	Targeted NCA + ecosystem-service prioritization + restoration finance + blue/nature finance + public investment.
Digital evidence and advisory systems	Cross-cutting: spatial baselines, monitoring, traceability, climate services and decision support.	Shared digital public goods + MRV cost reduction + service-provider models + investment pipeline support.

7.1 Circular biomass and bioeconomy as a linking archetype

Circular biomass illustrates why AIRE combines ecological and economic flows. Residues can be burned or discarded, but they can also become compost, feed, bioenergy, biochar or processing inputs. The ecological case concerns nutrient retention, soil carbon, air quality and waste reduction; the enterprise case concerns feedstock aggregation, processing cost, product quality, market demand and local value retention. Investment readiness depends on both. AIRE therefore prevents circularity from being treated only as a waste-management issue or only as a business opportunity.

7.2 Natural capital and PES in agrifood landscapes

A second archetype begins with natural capital and ecosystem services rather than with a specific technology. In an upland watershed, for example, soil conservation, agroforestry and water management may improve infiltration, reduce erosion and stabilize production while benefiting downstream users. The readiness question is whether those services are sufficiently material, attributable and institutionally actionable to justify public investment, collective financing or PES. This is where ecological evidence, beneficiary mapping, governance and finance must be designed together (OECD, 2021; Bui, 2026a; Bui, 2026b).

7.3 Coastal and blue-economy project preparation

The same architecture can be extended to coastal and marine settings. A screening-level application would identify priority natural-capital assets such as mangroves, wetlands, estuaries or near-shore habitats; assess condition and pressures; identify ecosystem services such as coastal protection, fisheries support, water regulation and livelihood value; map spatial priorities; and screen nature-positive investment and financing options. The ecological methods would be domain-specific, but the integration challenge is the same: connect ecological, economic, spatial and social evidence to project design and investment prioritization (World Bank, 2017; United Nations et al., 2021).

8. Scaling, regional public goods and institutional learning

AIRE treats scaling as alignment rather than replication. Replicating a practice across locations can fail when ecological conditions, institutions, markets and evidence systems differ. Scaling therefore requires a common architecture that allows local adaptation while preserving comparable questions about natural capital, services, evidence, incentives and readiness (Barbon et al., 2021).

At regional level, several elements of AIRE can function as public goods: a common readiness vocabulary; screening questions; typologies of natural-capital assets and ecosystem services; spatial prioritization logic; guidance on proportional MRV; investment-pathway templates; and learning protocols that allow countries or projects to compare bottlenecks without imposing one standardized technical package (ADB, 2024; Barbon et al., 2021; Bui, 2026a; Bui, 2026b).

Regional dialogue on natural capital, PES, circular biomass, digital MRV and climate-resilient investment reinforces the importance of this architecture. The value of such dialogue is not to convert AIRE into an event product, but to test whether the framework can accommodate the recurring implementation gaps identified by practitioners: fragmented evidence, weak institutional coordination, uncertain benefit-sharing, high transaction costs, limited farmer incentives and difficulty moving from pilots to investable programs (ADB, 2024; Bui, 2026a; Bui, 2026b).

The framework can also support portfolio thinking. Rather than asking which single practice should be scaled, planners can identify a portfolio of landscape and value-chain interventions with different readiness profiles. Some may be ready for immediate public investment; some may need better data or institutional clarification; some may require aggregation and business-model development; and some may not yet justify a financing mechanism. This creates a more realistic pipeline for project preparation.

8.1 Institutional coordination as an investment variable

Institutional coordination is often treated as a soft implementation issue. AIRE treats it as a core readiness variable because fragmented mandates can directly increase transaction costs, delay data access, weaken monitoring and undermine benefit-sharing. For complex natural-capital projects, the ability to coordinate ecological, economic, spatial and social workstreams can be as important as the quality of any single technical study.

This is particularly relevant where project design must integrate agriculture, environment, water, planning, finance, local government and private-sector actors. AIRE can provide a common decision architecture across these groups while allowing each discipline to retain its own technical methods.

9. Discussion: contribution, boundaries and future development

9.1 What AIRE contributes

AIRE's main contribution is the explicit connection between natural-capital condition and investment readiness in agrifood systems. Existing approaches often specialize in one part of this chain: agroecological practice, ecosystem-service valuation, natural-capital accounting, MRV, PES design, investment appraisal or landscape planning. AIRE does not seek to replace these methods. It provides a systems architecture that helps determine when and how they should connect (Millennium Ecosystem Assessment, 2005; Natural Capital Coalition, 2016; United Nations et al., 2021; IUCN, 2020; World Bank, 2021).

Three features are particularly important. First, the framework retains physical and ecological flows rather than starting from finance. Second, it makes assessment and prioritization an explicit stage between ecosystem services and investment, strengthening the role of spatial evidence and decision-oriented natural-capital assessment. Third, it treats resilient productive systems—not finance itself—as the outcome. Investment is therefore a means of sustaining ecological and livelihood performance, not the endpoint of the framework.

9.2 What AIRE does not replace

AIRE is not a substitute for SEEA Ecosystem Accounting, formal natural-capital accounting, detailed ecological field surveys, biodiversity standards, carbon-credit methodologies, hydrological models, economic valuation protocols, environmental and social safeguards, certification systems or financial due diligence. Where a project requires these, AIRE should help identify the need and position the specialized method within the broader readiness pathway (United Nations et al., 2021; Natural Capital Coalition, 2016).

The framework also does not imply that every ecosystem service should be monetized. Some services should remain protected through regulation, public investment, collective management or rights-based governance. AIRE's role is to clarify the decision logic and incentive structure, including cases where the appropriate conclusion is that no market mechanism is needed (TEEB, 2010; Dasgupta, 2021).

9.3 Authorship, evidence and claims

AIRE should be presented as an author-led conceptual framework. External assignments, events and projects may inform its development, but they should be cited as sources of experience or evidence rather than as institutional ownership of the framework. Illustrative archetypes should be clearly distinguished from validated AIRE applications until formal testing has been completed. This protects both methodological credibility and authorship while allowing the framework to learn from applied work.

The current figures are conceptual visualizations. The revised figures should carry a clear authorship statement and should distinguish framework architecture from illustrative landscape elements. Where AI-assisted or adapted visual elements are used, the final publication should disclose their illustrative role and avoid implying that they are independently verified technical designs.

9.4 Priorities for further development

- Develop an AIRE screening checklist and readiness matrix that can be used in project preparation without forcing a single composite score.
- Test the framework in at least two contrasting settings—one agrifood landscape and one natural-capital/restoration or coastal setting—to assess transferability.
- Develop guidance for proportional evidence and MRV, including when existing secondary data are sufficient and when primary measurement is required.
- Strengthen the spatial-prioritization module by linking ecosystem condition, services, beneficiaries, climate risk, feasibility and investment opportunity.
- Develop investment-package templates that distinguish public-good, PES, blended-finance and commercially oriented pathways.
- Document safeguards, inclusion and benefit-sharing questions more explicitly, particularly for smallholders, women, ethnic minorities and resource-dependent communities.

10. Conclusion

The central challenge in nature-positive agrifood transformation is not simply to identify better practices. It is to connect ecological assets, management, ecosystem services, evidence, priorities, incentives and finance in ways that are credible enough for decisions and practical enough for implementation. AIRE provides a systems architecture for making those connections visible.

The revised framework moves from Natural Capital to Nature-positive Management, Ecosystem Services, Assessment & Prioritization, Investment Readiness and ultimately Resilient Productive Systems. Seven system flows explain how ecological and livelihood value is generated; five cross-cutting readiness conditions explain whether the enabling environment can support transformation; and three investment pathways explain how evidence, incentives and packaging can translate ecological value into implementation.

This structure allows AIRE to serve several purposes without becoming captive to any one of them. It can frame regional dialogue on natural capital and PES, organize screening-level natural-capital assessment, support spatial and investment prioritization, guide project preparation and help diagnose why promising agroecological or nature-positive practices fail to scale. At the same time, it remains an independent conceptual contribution whose primary purpose is to bridge the missing middle between ecosystem functions and investment-ready systems.

AIRE in one sentence

Natural Capital → Nature-positive Management → Ecosystem Services → Assessment & Prioritization → Investment Readiness → Resilient Productive Systems, enabled by evidence, capacity, governance, coordination, markets and finance.

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