

Circular Rural Economy and Economic Leakage Reduction: Insights from a Community-Based Resilience Framework from Rural India

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Abstract— Rural communities across the Global South are increasingly exposed to a convergence of climate variability, geopolitical instability, supply-chain disruptions, and economic volatility. While conventional rural development approaches have primarily focused on agricultural productivity, market integration, and income enhancement, these strategies often overlook structural vulnerabilities associated with economic leakage, external dependency, and limited adaptive capacity. This paper proposes the Circular Rural Economy (CRE) framework as an integrated approach to strengthening rural resilience through local value retention, economic diversification, and collective enterprise development.

Drawing upon resilience theory, circular economy principles, sustainable livelihoods, and local economic development literature, the study introduces the GLIDE (Group Livelihoods for Development) Framework as an operational model for translating Circular Rural Economy principles into practice. Using evidence from GLIDE pilot interventions across multiple Indian states, the paper demonstrates how economic leakage analysis can identify opportunities for local production, wealth retention, and community-led enterprise development. Findings suggest that significant proportions of village expenditures are directed toward externally sourced goods and services that can potentially be produced using local resources, skills, and institutions.

The paper further develops the concept of Economic Leakage Resilience Theory (ELRT), which posits that resilience increases as communities retain a greater share of locally generated wealth and reduce dependence on external supply chains. To support measurement and policy application, a Rural Resilience Index (RRI) is proposed, integrating economic, social, ecological, institutional, and adaptive dimensions of resilience while explicitly incorporating economic leakage as a key indicator.

The study argues that Circular Rural Economy should be viewed not only as a livelihood promotion strategy but also as a climate adaptation, economic localization, and geopolitical resilience framework. By strengthening local production systems, collective enterprises, and community institutions, the GLIDE framework offers a scalable pathway toward resilient, self-reliant, and sustainable rural development. The findings contribute to emerging debates on rural resilience, localization, and adaptive development, while providing practical policy insights aligned with India's Atmanirbhar Bharat agenda and the Sustainable Development Goals.

Keywords— Circular Rural Economy; Rural Resilience; Economic Leakage; Climate Adaptation; Community Enterprises; Local Economic Development; GLIDE Framework; Atmanirbhar Bharat; Sustainable Livelihoods; Rural Transformation.

I. INTRODUCTION

The twenty-first century has fundamentally altered the nature of rural vulnerability. Historically, rural development policies concentrated on increasing agricultural production, expanding infrastructure, facilitating credit access, and integrating villages

into broader market systems. These interventions were largely designed under assumptions of climatic stability, predictable market conditions, and uninterrupted economic globalization.

Today, those assumptions no longer hold.

Rural communities increasingly confront a convergence of environmental, economic, and geopolitical risks. Climate change has intensified droughts, floods, heatwaves, and rainfall variability. Simultaneously, geopolitical conflicts, global supply-chain disruptions, and commodity market volatility have increased the costs of agricultural production and household consumption. The COVID-19 pandemic, the Russia–Ukraine conflict, disruptions in maritime trade routes, and global inflationary pressures have demonstrated how events occurring thousands of kilometers away can profoundly affect village economies.

India's rural economy remains particularly vulnerable to such disruptions. Nearly half of India's cultivated land remains rain-fed, while a substantial proportion of the rural population continues to depend directly or indirectly on agriculture. Variability in monsoon performance therefore translates directly into fluctuations in rural incomes, food security, employment opportunities, and migration patterns.

The recent downward revision of monsoon forecasts by the India Meteorological Department further underscores the urgency of developing resilient rural economic systems capable of withstanding climatic uncertainty. However, climate variability alone does not explain contemporary rural vulnerability. Equally significant is the persistent outflow of financial resources from villages through the purchase of externally manufactured goods and services.

This phenomenon, commonly referred to as economic leakage, has received limited attention within mainstream rural development discourse despite its significant implications for local prosperity. Every year, substantial amounts of village income are transferred outside rural communities through expenditures on fertilizers, packaged foods, detergents, livestock feed, consumer goods, and other products that could potentially be produced locally.

This paper argues that reducing economic leakage constitutes an underexplored but critical pathway toward strengthening rural resilience.

Recent climate extremes, including the growing risk of Super El Niño events, demonstrate that rural resilience requires more than short-term relief measures. While crop insurance, weather advisories, and contingency plans provide temporary protection, Circular Rural Economy offers a long-term livelihood safety net by reducing dependence on external inputs and strengthening local economic circulation.

The Circular Rural Economy framework presented in this paper seeks to address this challenge by promoting localized production systems, community-owned enterprises, wealth retention mechanisms, and collective economic action. The framework is operationalized through the GLIDE (Group Livelihoods for Development) methodology, which has been piloted across several Indian states. The paper contributes to three bodies of literature:

- 1) Circular economy and local economic development
- 2) Climate adaptation and resilience studies
- 3) Rural livelihoods and community-based development

Most importantly, it proposes a novel perspective that conceptualizes economic leakage reduction as a climate adaptation and resilience strategy.

II. CIRCULAR ECONOMY AND RURAL DEVELOPMENT

The circular economy emerged as a response to the limitations of linear economic systems characterized by extraction, production, consumption, and disposal. While early circular economy scholarship focused primarily on industrial systems, contemporary research increasingly recognizes the relevance of circular principles to rural economies.

Circular systems seek to maximize resource productivity, minimize waste, regenerate ecological assets, and retain value within economic systems. In rural contexts, this includes local food processing, biomass utilization, composting, decentralized manufacturing, renewable energy production, and community enterprises. The application of circular economy principles in rural settings offers opportunities to strengthen local value chains, enhance resource efficiency, and reduce dependence on imported inputs.

However, much of the existing literature focuses on environmental outcomes rather than economic resilience. Consequently, there remains a need for frameworks that explicitly connect circular economic processes to rural adaptation and community resilience.

III. CONCEPTUAL FRAMEWORK: CIRCULAR RURAL ECONOMY

The Circular Rural Economy framework proposed in this paper is founded on a simple proposition: **Rural resilience increases when communities retain a greater proportion of locally generated wealth and reduce dependence on externally supplied goods and services.**

This represents a transition from a linear development model—where villages produce for external markets and spend incomes on externally manufactured goods—to a circular model where local resources, enterprises, and consumption continuously regenerate economic value within the community.

The framework consists of five interconnected components:

- 1) **Resource Mapping:** Identification of local resources, skills, institutions, ecological assets, and production capacities.
- 2) **Economic Leakage Analysis:** Assessment of financial outflows associated with externally sourced goods and services.
- 3) **Enterprise Opportunity Identification:** Identification of products and services that can be produced locally using available resources.
- 4) **Collective Enterprise Development:** Formation of producer groups, women's enterprises, youth enterprises, and community-owned business structures.
- 5) **Wealth Retention and Reinvestment:** Retention of financial resources within the local economy through repeated circulation and reinvestment.



FIGURE 1: Circular Rural Economy Framework

IV. CLIMATE CHANGE, MONSOON VARIABILITY, AND RURAL RISK

4.1 Climate Change and the Emerging Rural Development Challenge

Climate change has emerged as one of the most significant threats to rural livelihoods in the twenty-first century. While its impacts are global, rural communities in developing countries face disproportionate risks due to their dependence on natural resources, climate-sensitive livelihoods, and limited adaptive capacity. In India, where nearly half of cultivated land remains rain-fed and a large proportion of the workforce depends directly or indirectly on agriculture, climate variability has profound implications for economic stability, food security, and social well-being.

Historically, agricultural planning and rural development strategies were designed around relatively predictable monsoon patterns. However, increasing scientific evidence indicates that climate change is altering both the intensity and distribution of rainfall, increasing the frequency of droughts, floods, heatwaves, and extreme weather events. These changes challenge conventional assumptions regarding agricultural productivity and expose the vulnerability of communities whose livelihoods remain heavily dependent on seasonal climatic conditions.

Recent assessments by the Intergovernmental Panel on Climate Change (IPCC) suggest that South Asia will experience increasing rainfall variability, rising temperatures, more frequent heat stress events, and intensified hydrological extremes over the coming decades. These trends are expected to disproportionately affect smallholder farmers, tribal communities, and economically marginalized rural populations.

The challenge facing rural India is therefore not merely one of adapting agricultural practices but of strengthening the overall resilience of rural economic systems.

4.2 Monsoon Variability and Rural Vulnerability

The Indian monsoon remains the most critical determinant of rural economic performance. It influences crop yields, groundwater recharge, livestock productivity, labor demand, and household incomes. Even sectors not directly engaged in agriculture often depend upon monsoon-induced economic activity. Traditionally, monsoon performance was evaluated through seasonal rainfall totals. However, emerging climate research demonstrates that aggregate rainfall figures often mask significant variations in timing, intensity, and distribution.

Three forms of climate risk are particularly relevant:

- **Variability in monsoon onset and withdrawal:** Delayed or early monsoon onset disrupts planting schedules, affecting crop establishment and yields.
- **Intra-seasonal dry spells:** Extended dry periods during critical crop growth stages can significantly reduce yields even when total seasonal rainfall is normal.
- **Extreme rainfall events:** Heavy downpours cause flooding, soil erosion, and crop damage, while also reducing the effectiveness of rainfall for groundwater recharge.

These changes complicate agricultural planning and increase uncertainty for rural households. The downward revision of monsoon forecasts by meteorological agencies in recent years has heightened concerns regarding future agricultural stability. While climate forecasts cannot predict localized impacts with certainty, they reinforce the need for development strategies that reduce dependence on a single seasonal livelihood source.

4.3 Climate Change Beyond Agriculture

Climate impacts extend far beyond crop production. The consequences of climate variability cascade through entire rural economies. Crop failure reduces household income, which subsequently affects consumption, education expenditures, healthcare access, and local market demand. Reduced agricultural activity decreases wage employment opportunities for landless labourers and seasonal workers. Livestock productivity may decline due to fodder shortages, water scarcity, and heat stress. These interconnected impacts create what may be described as a rural vulnerability cascade.

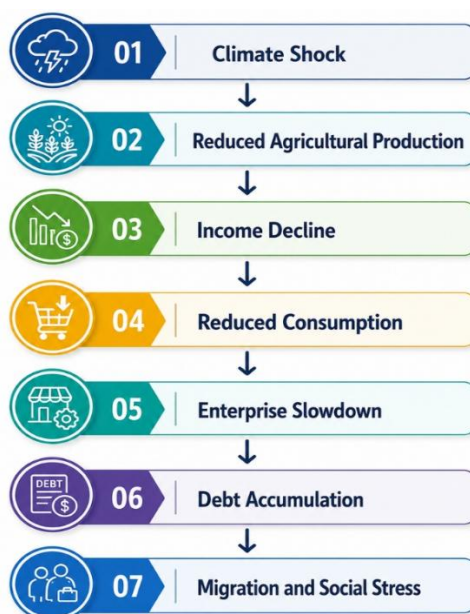


FIGURE 2: Climate Vulnerability Cascade

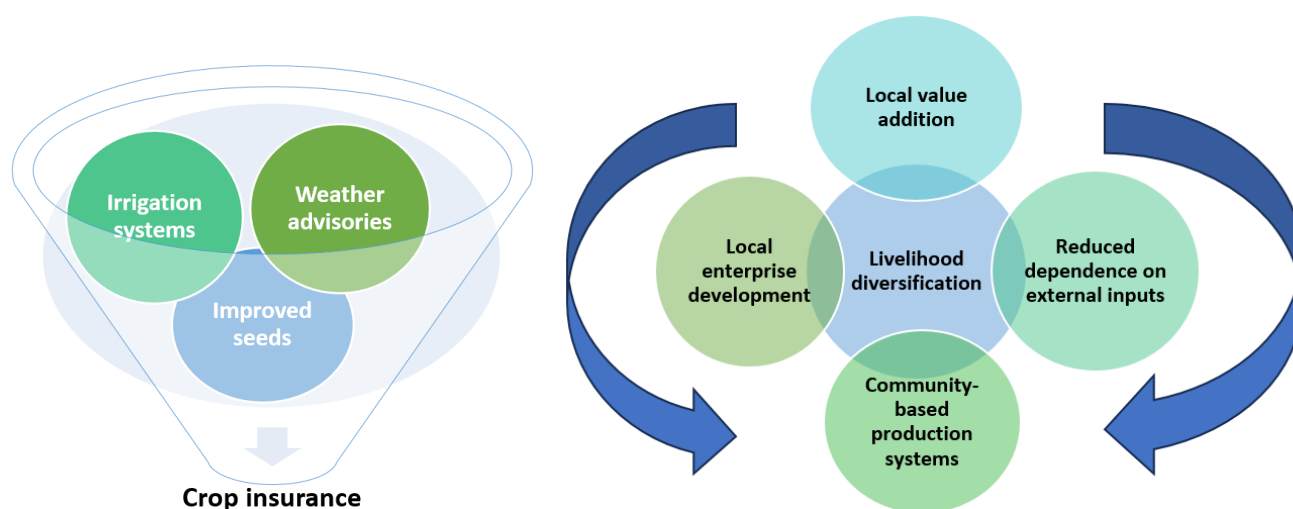
This cascade demonstrates why climate adaptation cannot be restricted to agriculture alone. Resilient rural economies require diversified livelihood systems capable of absorbing shocks without triggering systemic economic decline.

4.4 Climate Adaptation Through Economic Diversification

Conventional climate adaptation strategies often focus on:

- Improved crop varieties and agricultural practices
- Water harvesting and irrigation infrastructure
- Weather-based crop insurance
- Early warning systems and climate advisories

While these interventions are important, they do not address the fundamental vulnerability created by dependence on a single livelihood source. Diversified economic systems are generally more resilient because losses in one sector can be compensated by activities in others. For example, local food processing, livestock-based enterprises, non-timber forest product value addition, soap production, composting, and decentralized manufacturing can continue generating income even during periods of agricultural stress.



From this perspective, community enterprises function not merely as income-generating activities but as adaptive mechanisms that enhance resilience.

4.5 Climate Resilience as a Community Property

Climate resilience is frequently conceptualized at the household level. However, resilience is also a collective characteristic of communities and institutions. A village possessing strong producer groups, active women's organizations, local enterprises, and robust social networks is often better able to recover from shocks than a collection of isolated households. Community institutions facilitate resource sharing, collective action, knowledge exchange, and mutual support during crises. The Circular Rural Economy framework therefore emphasizes collective entrepreneurship and local economic ecosystems rather than individual enterprise promotion alone.

In this context, resilience emerges not solely from technological adaptation but from strengthened social, economic, and institutional relationships.

V. GEOPOLITICAL RISK AND RURAL VULNERABILITY

5.1 The Globalization of Rural Risk

The contemporary rural economy is increasingly influenced by global events. Although villages may appear geographically distant from international conflicts and geopolitical tensions, their economic systems are deeply interconnected with global markets.

Over the past three decades, globalization has expanded access to goods, technologies, and markets. However, it has also increased dependence on external production systems and international supply chains.

The COVID-19 pandemic revealed the fragility of these systems. Restrictions on transportation, labor movement, and manufacturing disrupted supply chains across the world. Rural communities experienced shortages of agricultural inputs, increased transportation costs, and reduced market access.

Similarly, geopolitical conflicts have exposed vulnerabilities associated with dependence on imported fertilizers, fuel, and industrial inputs. The result is a new form of rural risk in which local livelihoods are influenced by events occurring far beyond local control.

5.2 Fertilizer, Fuel, and Agricultural Dependency

Modern agriculture depends heavily on industrial inputs. Among the most significant are:

- Chemical fertilizers
- Diesel fuel
- Agrochemicals
- Agricultural machinery
- Processed livestock feed

Many of these inputs are linked directly or indirectly to global commodity markets. When international conflicts disrupt production or transportation systems, rural producers experience higher costs regardless of local conditions. For smallholder farmers, rising input prices reduce profitability and increase indebtedness. In many cases, farmers are unable to transfer increased costs to consumers because commodity prices remain volatile and market power is concentrated among intermediaries.

Consequently, geopolitical instability translates into economic vulnerability at the village level.

5.3 Economic Leakage and Structural Vulnerability

While climate change and geopolitical instability are often discussed separately, they interact through a common mechanism: economic dependency. Most rural communities import a substantial proportion of the goods they consume, including:

- Food products (processed foods, edible oils, packaged snacks)

- Agricultural inputs (fertilizers, pesticides, seeds, feed)
- Household consumables (detergents, soaps, toiletries, kitchenware)
- Building materials (cement, tiles, paint, fittings)
- Clothing and textiles

Every purchase transfers financial resources outside the village economy. This continuous outflow of wealth weakens local economic resilience and reduces the community's capacity to absorb external shocks.



FIGURE 3: Economic Leakage Pathway

From a resilience perspective, economic leakage represents a hidden but significant driver of rural vulnerability.

5.4 Geopolitical Resilience Through Localization

The Circular Rural Economy framework proposes localization as a strategy for reducing exposure to external shocks. Localization does not imply economic isolation. Rather, it refers to increasing the proportion of essential goods and services produced within the local economy while maintaining selective engagement with broader markets. Examples include:

- Community compost enterprises reducing fertilizer dependency
- Local feed production reducing livestock input costs
- Village-based food processing reducing reliance on external suppliers
- Women's enterprises producing household consumables for local markets

Such activities strengthen local economic circulation and reduce vulnerability to supply-chain disruptions. Importantly, localization also creates employment opportunities, increases community ownership, and enhances adaptive capacity.

5.5 Economic Swaraj in the Twenty-First Century

The concept of Economic Swaraj, rooted in Gandhian thought, emphasized local self-reliance and decentralized production systems. Historically, this concept was often interpreted as a philosophical or ethical ideal.

However, climate change, supply-chain disruptions, and geopolitical instability have renewed its practical relevance. Economic Swaraj should not be understood as isolation from national or global markets. Rather, it represents the capacity of communities

to meet a significant proportion of their essential needs through local production while engaging external markets from a position of strength rather than dependency.

In the context of contemporary rural development, Economic Swaraj can be viewed as a resilience strategy that simultaneously addresses climate adaptation, economic vulnerability, and community empowerment. The GLIDE framework operationalizes this principle by transforming villages from passive consumers within external economic systems into active participants in localized value creation and wealth retention.

In this context, Economic Swaraj becomes not merely a philosophical aspiration but a practical resilience strategy. Local production of essential goods acts as an economic shock absorber, protecting communities from supply-chain disruptions, input price volatility, and global market uncertainties.

VI. THE GLIDE FRAMEWORK AS AN OPERATIONAL MODEL FOR CIRCULAR RURAL ECONOMY

The Group Livelihoods for Development (GLIDE) Framework operationalizes the Circular Rural Economy approach by helping communities identify local economic opportunities through economic leakage analysis, resource mapping, and collective enterprise development. Unlike conventional livelihood programmes that focus primarily on production enhancement or market linkage, GLIDE begins by examining household expenditure patterns to identify goods and services that are routinely imported into the village economy.

The framework consists of five interrelated stages:

- 1) **Resource Mapping:** Identifying local resources, skills, institutions, and production capacities
- 2) **Economic Leakage Analysis:** Assessing financial outflows through household expenditure surveys
- 3) **Enterprise Opportunity Identification:** Identifying locally producible goods and services
- 4) **Collective Enterprise Development:** Forming producer groups and community-owned enterprises
- 5) **Wealth Retention and Reinvestment:** Strengthening local economic circulation

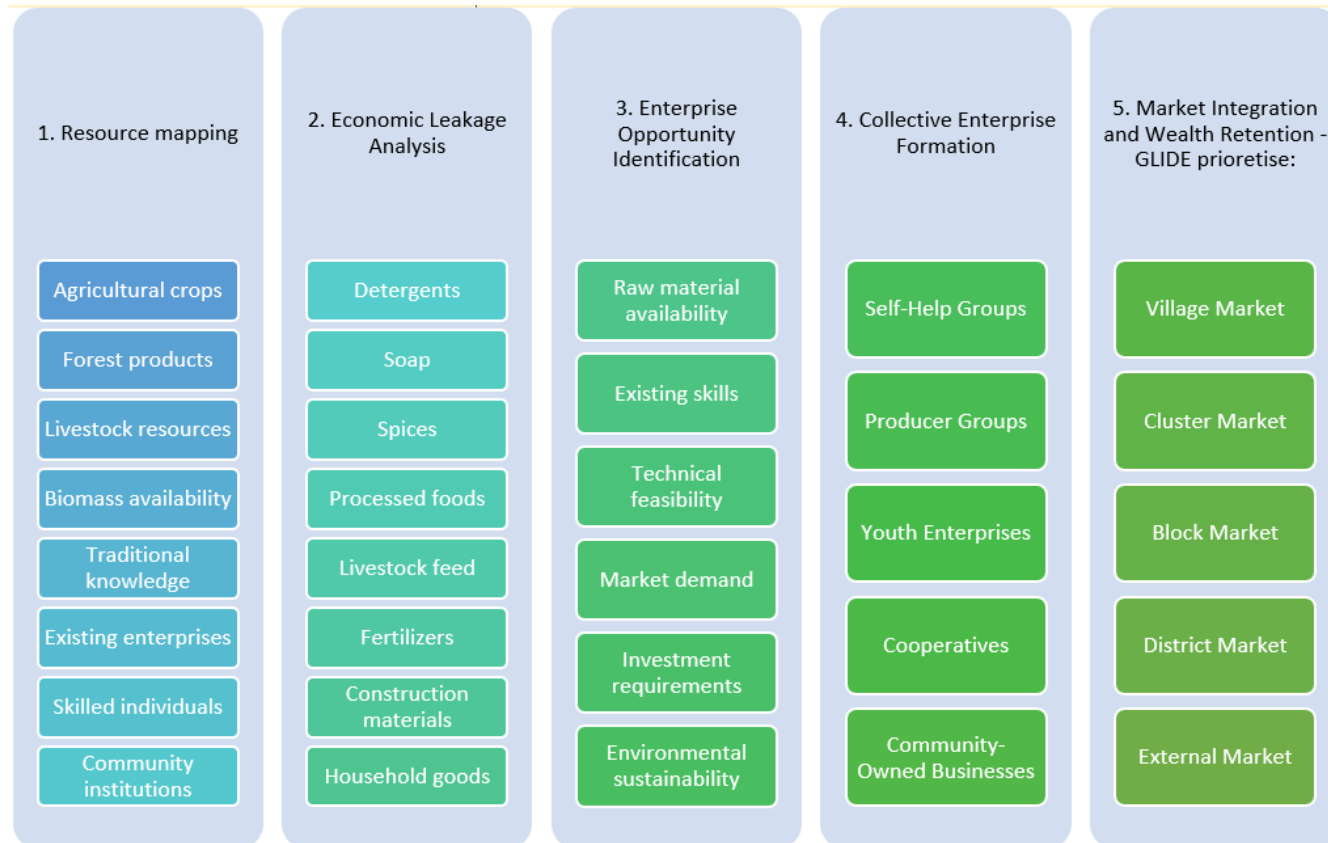


FIGURE 4: GLIDE Framework Stages

Through participatory exercises, communities identify products currently purchased from external markets and assess their feasibility for local production using available resources, skills, and institutions. A distinguishing feature of GLIDE is its emphasis on group-based enterprises involving women's self-help groups, youth collectives, producer groups, and community organizations. These collective structures reduce risk, improve resource mobilization, and strengthen social capital.

Beyond enterprise creation, GLIDE functions as a grassroots business incubator where rural youth and women gain practical skills in financial literacy, cost analysis, pricing, and market assessment, enabling them to convert local resources into viable enterprises. The framework also transforms the role of NGOs and civil society organisations from resource providers to ecosystem facilitators and enterprise mentors, ensuring greater community ownership and long-term sustainability.

From a resilience perspective, GLIDE extends beyond livelihood promotion. By encouraging local production of essential goods such as food products, agricultural inputs, household consumables, and livestock feed, the framework reduces dependence on external supply chains and enhances local adaptive capacity. In this sense, community enterprises function as decentralized resilience assets capable of mitigating climate, market, and geopolitical shocks.

Implementation Lessons from GLIDE Adoption: Field experiences indicate three pathways of adoption: hybrid integration with conventional livelihood programmes, funder-driven implementation constrained by external targets, and full adoption of the circular model. The strongest outcomes emerged where GLIDE was implemented as a standalone community-led ecosystem, highlighting the importance of institutional alignment and local ownership.

VII. MULTI-STATE EVIDENCE FROM GLIDE PILOTS

The GLIDE framework has been implemented across several Indian states, including Maharashtra, Madhya Pradesh, Odisha, Gujarat, Andhra Pradesh, Tamil Nadu, Chhattisgarh, and Uttar Pradesh. Although long-term impact evaluations are still evolving, pilot experiences demonstrate the framework's potential to identify economic leakages, mobilize local resources, and stimulate community enterprise development.

The following cases illustrate the diversity and potential of the GLIDE approach.

TABLE 1
GLIDE PILOT IMPLEMENTATION DATA

Location	Households	Identified Market Leakage	Replacement Opportunity	Groups Formed
Adgaon Khurd, Maharashtra	400	₹18.24 crore annual expenditure; 80 locally producible products	₹4.22 crore	7
Ujjain, Madhya Pradesh	800	₹47.42 crore annual expenditure; 110 locally producible products	₹6.16 crore	—
Dryland village cluster	300	₹13.96 crore annual expenditure; 131 locally producible products	₹1.10 crore	—
Wardha, Maharashtra	70–300 HH cluster	₹3.12 crore annual expenditure; 70 locally producible products	₹2.20 crore	—

Several common findings emerged across pilot locations. First, economic leakage was found to be substantial regardless of geography or livelihood system. Second, local production potential was consistently underestimated by communities prior to the exercise. Third, women's groups emerged as critical drivers of enterprise development and local economic circulation. Finally, collective enterprises enhanced both economic viability and community participation.

Several communities also demonstrated the capacity to continue enterprise development with minimal external support, suggesting that GLIDE can evolve from a project intervention into a self-replicating model driven by local leadership.

These findings suggest that economic leakage analysis can serve as a powerful development planning tool. Rather than focusing solely on increasing production, the GLIDE framework emphasizes retaining wealth within local economies, thereby strengthening livelihood diversification, community self-reliance, and resilience to external shocks.

VIII. EXPERIENCE FROM CASE STUDIES

The principles underlying the Circular Rural Economy framework are not unique to India. Across the world, communities have experimented with localized economic systems, cooperative enterprises, and resilience-oriented development models that emphasize local production, collective ownership, and resource circulation.

8.1 Anchoring Resilience: How a Women Enterprise Group is Rewriting the Rules of Climate-Smart Agriculture

When the rains stop coming on time, it isn't just soil that cracks. It's the quiet dread in a mother's chest as she watches her child's dinner pot thin out. It's the way a farmer's hands tremble over a field that gave life to her grandmother, but might fail her now. Across villages like Amarpur, Super El Niño isn't a headline. It's the neighbor who sold her last goat. It's the season that took too much.

But in Amarpur, something different is taking root. Udyogini's guidance, a Women Enterprise Group of smallholder farmers decided they were done waiting for rescue. Done with the loneliness of farming alone, season after season, watching the sky and praying. They chose each other.

It starts with gathering, not just planning: Before a single mustard seed is sown, the women sit together on woven mats. Kids play nearby. Someone brings tea. And they map their future out loud—how many hectares, what yields they need to feed their families *and* their dreams. This isn't corporate strategy. It's survival made sacred. They agree to grow organic, MRL-safe mustard because they want their oil to be something they're proud to feed their own children. The cold-pressed oil unit isn't just a machine to them. It's proof they can own the whole chain, from soil to shelf. Every planned hectare whispers: *we won't be caught off guard again.*

They're healing the land with memory and courage: Monoculture broke hearts here before. One failed crop meant empty plates. So they brought back diversity—and dignity. The seeds they sow now are drought-resilient, chosen for Amarpur's stubborn soil. But the real revolution? Their community seed bank. It means no more begging seed dealers when the rains fail. No more debt traps. It's a clay pot full of next year's hope, kept in the hands of women who've been told for generations that they couldn't manage resources. Now they're preserving ancestral traits and their own autonomy, one seed at a time.

Ancestral hands, scientific tools: These women know compost. Their mothers knew compost. But now, vermibags turn that knowledge into precision. Kitchen scraps become black gold, and they watch their soil come alive again—a small, stubborn miracle. And when storms gather, the warnings don't come too late. A WhatsApp ping. A voice call in the local dialect. *"Cover the seedlings by evening."* That message can mean the difference between despair and a harvest. It means someone, somewhere, is watching the weather for *her*.

No one farms alone anymore: In the fields, you'll see it: a woman helping her neighbor tie up mustard stalks, even though her own plot needs work. They follow shared SOPs not because a manual said so, but because trust tastes better than chemicals. When harvest comes, the relief is collective. Some seed goes back to the bank—an offering to next season, a promise to each other. The rest becomes oil, sold with the quiet confidence of women who know exactly what went into it.

This is what resilience looks like. Not a report. Not a buzzword. It's the easing of shoulders when the weather app pings. It's the sound of their own oil unit humming. It's knowing that if the rains fail, they won't fail each other. Backed by Udyogini, these women aren't just adapting to climate shocks. They're rewriting what security feels like—one shared decision, one saved seed, one bottle of oil at a time. And that's something worth feeling.

8.2 Additional Examples from India

India also offers several examples that align with Circular Rural Economy principles. The Kudumbashree Mission in Kerala has demonstrated the transformative potential of women-led collective enterprises. Through self-help groups, micro-enterprises, and local economic activities, Kudumbashree has strengthened women's participation, enhanced incomes, and contributed to community development.

The cooperative dairy movement led by Amul in Gujarat remains one of the most successful examples of localized value addition and producer-owned economic development. By integrating millions of small producers into a cooperative network, Amul enabled wealth retention within rural communities while achieving national-scale market success.

The transformation of Hiware Bazar demonstrates how community participation, natural resource management, and local planning can reverse rural decline. Through watershed development, collective action, and livelihood diversification, the village significantly improved economic and ecological outcomes.

These examples demonstrate the broader economic multiplier effect of localized economies, where financial resources circulate repeatedly within communities, generating employment, entrepreneurship, and greater adaptive capacity.

IX. METHODOLOGY AND RURAL RESILIENCE INDEX (RRI)

This paper adopts a conceptual and practice-informed approach by integrating insights from circular economy literature, resilience theory, and implementation experiences from the GLIDE (Group Livelihoods for Development) framework across rural India. The analysis is based on economic leakage assessments, participatory resource mapping exercises, and documented experiences from GLIDE pilot locations. Rather than presenting a formal impact evaluation, the paper proposes an analytical framework for understanding how local value retention and collective enterprise development can contribute to climate and economic resilience.

To support future empirical assessment of Circular Rural Economy interventions, this paper proposes a Rural Resilience Index (RRI) comprising five interconnected dimensions: economic resilience, social resilience, ecological resilience, institutional resilience, and adaptive capacity, with economic leakage incorporated as a cross-cutting indicator of community vulnerability and resilience.

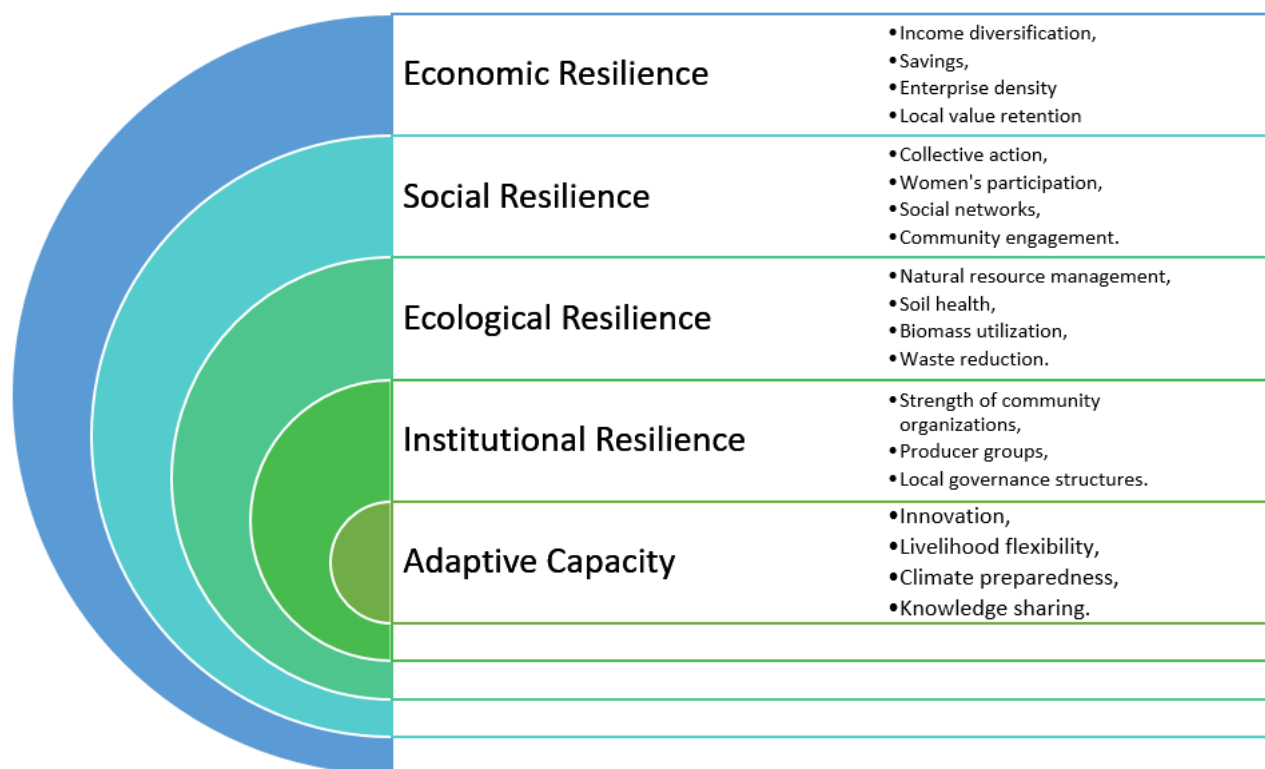


FIGURE 9: Rural Resilience Index (RRI) Framework

Proposed Rural Resilience Index (RRI):

$$RRI = (ER + SR + EcR + IR + AC) / 5 - EL$$

(1)

Where:

- ER = Economic Resilience
- SR = Social Resilience
- EcR = Ecological Resilience
- IR = Institutional Resilience

- AC = Adaptive Capacity
- EL = Economic Leakage (cross-cutting indicator)

Indicators for Each Dimension:

Dimension	Potential Indicators
Economic Resilience	Income diversification, local enterprise density, employment generation, asset ownership
Social Resilience	Social capital, community networks, collective action, trust, gender equity
Ecological Resilience	Natural resource health, biodiversity, soil quality, water availability
Institutional Resilience	Local governance, rule of law, institutional capacity, community organizations
Adaptive Capacity	Skills, education, information access, innovation, flexibility
Economic Leakage	Proportion of household expenditure on locally sourced goods, local value retention

The inclusion of economic leakage (EL) distinguishes the index from existing resilience frameworks by recognizing that communities retaining a greater proportion of local wealth are likely to exhibit stronger adaptive capacity and reduced vulnerability to external shocks. Consequently, the RRI provides a practical tool for assessing the resilience outcomes of Circular Rural Economy interventions such as GLIDE.

X. DISCUSSION

The findings presented in this paper suggest that the Circular Rural Economy (CRE) framework offers a promising alternative to conventional rural development approaches in an era characterized by climate uncertainty, economic volatility, and geopolitical instability. While traditional development models have focused primarily on increasing production, improving market access, and integrating rural producers into larger value chains, the CRE framework shifts attention toward local value retention, economic diversification, and resilience building.

A central contribution of this study is the recognition of economic leakage as an important but underexplored determinant of rural vulnerability. Most rural development interventions focus on increasing income generation without examining how quickly income exits the local economy through purchases of externally produced goods and services. The GLIDE framework demonstrates that substantial portions of rural expenditure are directed toward products that could potentially be produced locally. This finding suggests that rural development strategies should not only focus on increasing incomes but also on strengthening mechanisms that retain wealth within local economies.

The concept of economic leakage is particularly relevant in the context of climate change. Climate shocks often reduce agricultural production and household incomes. Communities that depend heavily on external suppliers for essential goods become doubly vulnerable because reduced incomes coincide with rising costs and supply-chain disruptions. In contrast, communities with diversified local enterprises are better positioned to absorb shocks because they possess alternative income sources and local production capabilities. Thus, economic localization can be viewed as a form of climate adaptation.

The study also highlights the importance of collective entrepreneurship as a resilience mechanism. Across the GLIDE pilots, women's groups, youth collectives, producer organizations, and community enterprises emerged as critical actors in identifying opportunities and mobilizing local resources. This finding aligns with resilience literature, which emphasizes the role of social capital, collective action, and community institutions in responding to crises. Collective enterprises not only generate economic benefits but also strengthen social networks that facilitate cooperation and knowledge sharing during periods of stress.

Another significant implication concerns the relationship between localization and globalization. The Circular Rural Economy framework does not advocate economic isolation or withdrawal from broader markets. Rather, it promotes a balanced approach in which communities satisfy a greater proportion of essential needs locally while engaging external markets strategically. Such an approach enhances resilience without sacrificing opportunities for growth and innovation.

The proposed Rural Resilience Index (RRI) further contributes to the literature by integrating economic, social, ecological, institutional, and adaptive dimensions of resilience while explicitly incorporating economic leakage. Existing resilience frameworks often emphasize ecological and social variables but rarely account for the circulation of financial resources within local economies. The inclusion of economic leakage therefore provides a novel perspective for assessing community resilience.

At a broader level, the findings support emerging arguments that resilience should be viewed not merely as the ability to recover from shocks but as the capacity to reorganize economic systems in ways that reduce future vulnerabilities. From this perspective, the GLIDE framework represents more than a livelihood intervention; it constitutes a community-based strategy for adaptive transformation. By linking local enterprise development, resource utilization, and wealth retention, the framework offers a practical pathway toward sustainable rural development.

XI. POLICY IMPLICATIONS: FROM RURAL DEVELOPMENT TO RURAL RESILIENCE

The findings of this study suggest that rural development policy must evolve from a narrow focus on income generation and productivity enhancement toward a broader framework of resilience-building. Climate change, monsoon uncertainty, global supply-chain disruptions, fertilizer price volatility, and geopolitical instability collectively reveal the limitations of development models dependent on external markets and imported inputs.

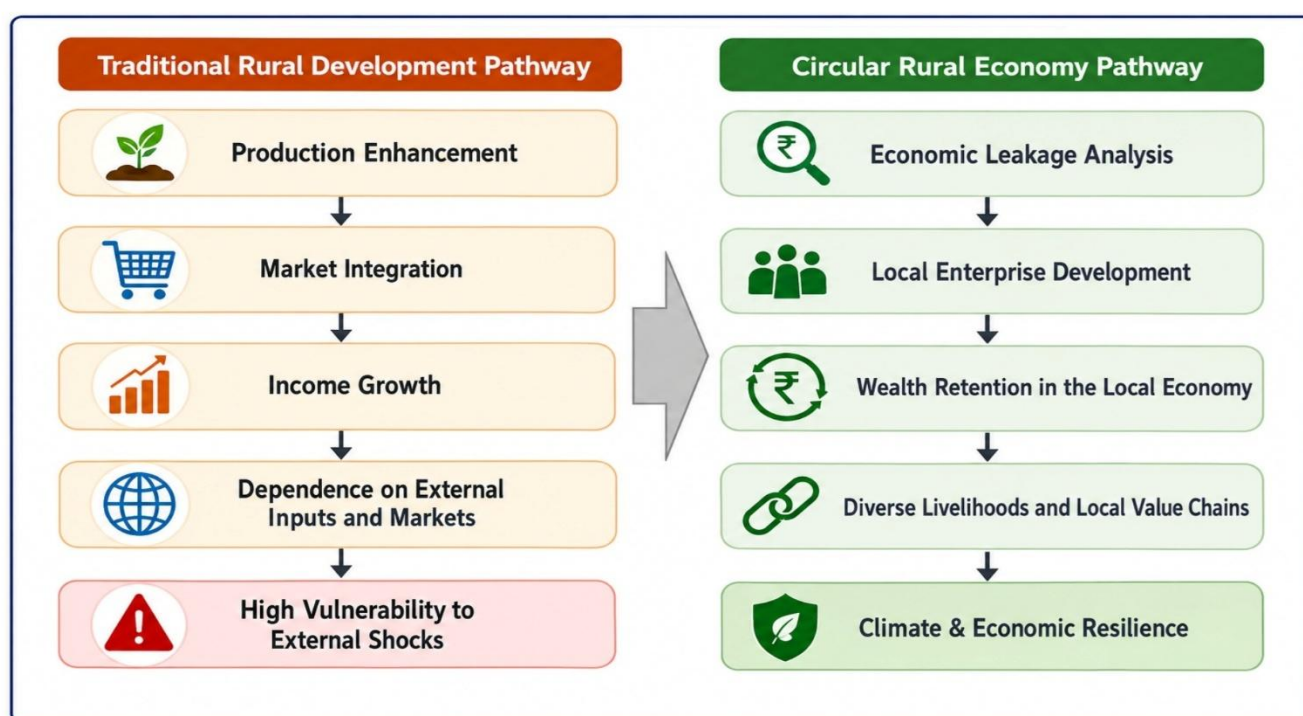


FIGURE 8: Policy Transformation Pathway

The Circular Rural Economy framework offers a practical pathway for strengthening local adaptive capacity by reducing economic leakage, promoting community enterprises, and enhancing local wealth circulation. Rather than treating livelihood promotion, climate adaptation, and economic self-reliance as separate policy domains, the framework integrates them within a single rural resilience strategy.

Alignment with Atmanirbhar Bharat: The emphasis on localized production and reduced external dependency aligns closely with the vision of Atmanirbhar Bharat. By promoting village-level enterprise ecosystems, the framework contributes to economic self-reliance while generating employment and strengthening local value chains.

Alignment with National Rural Livelihoods Mission (NRLM): GLIDE provides an operational mechanism through which Self-Help Groups (SHGs) can move beyond microcredit and engage in structured economic planning. Economic leakage assessments can help SHGs identify viable enterprise opportunities linked to existing local demand.

Alignment with Climate Adaptation Policies: Most adaptation programmes focus on agriculture, irrigation, and infrastructure. The findings suggest that local enterprise development should be recognized as an adaptation strategy because diversified livelihoods reduce dependence on climate-sensitive activities.

Alignment with Sustainable Development Goals: The framework contributes simultaneously to:

- SDG 1: No Poverty

- SDG 2: Zero Hunger
- SDG 5: Gender Equality
- SDG 8: Decent Work and Economic Growth
- SDG 11: Sustainable Communities
- SDG 12: Responsible Consumption and Production
- SDG 13: Climate Action

A Rural Resilience Policy Framework: Instead of measuring success only through income growth, policymakers should track:

- Economic leakage reduction
- Local enterprise density
- Women's enterprise participation
- Wealth retention rates
- Livelihood diversification
- Rural Resilience Index (RRI)

This would shift development planning from short-term welfare outcomes toward long-term resilience outcomes.

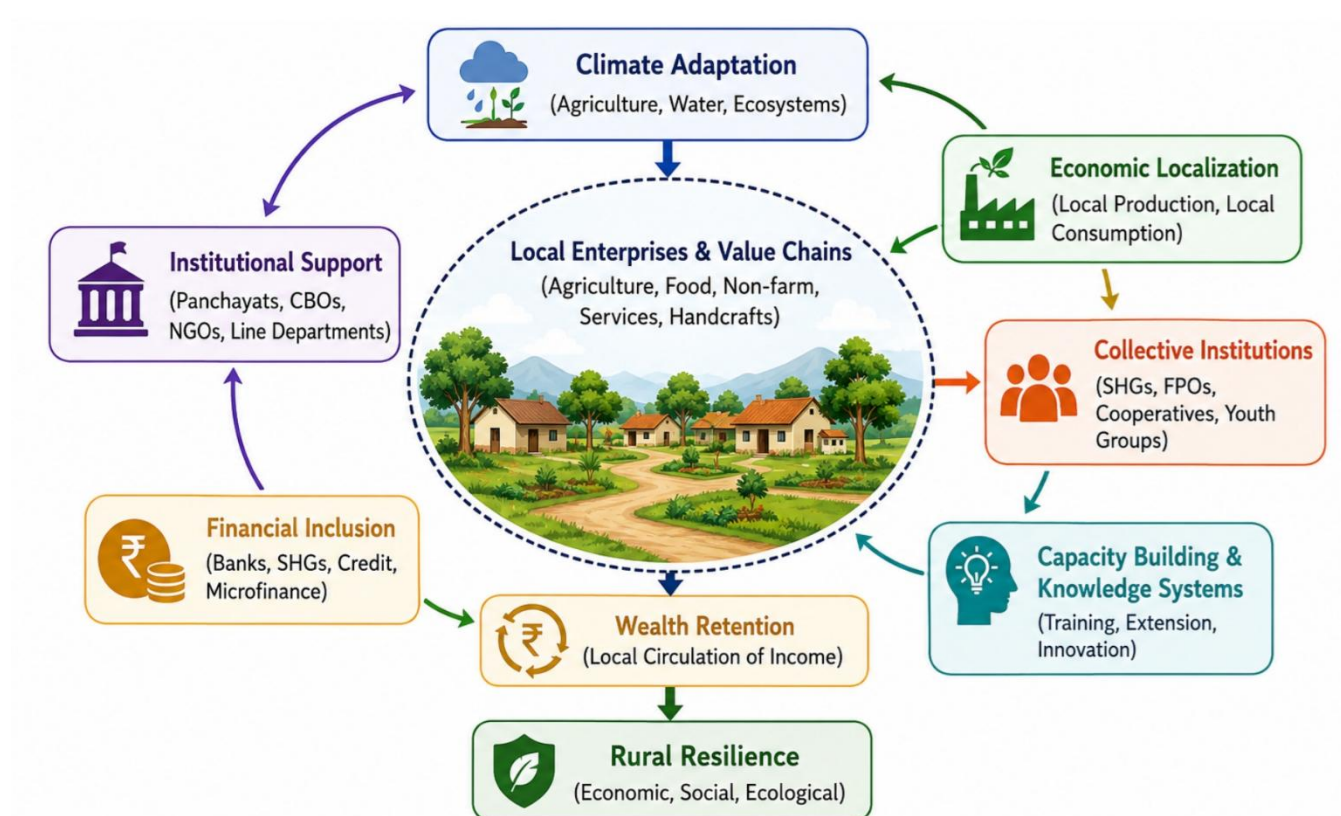


FIGURE 9: Policy Integration Framework

Limitations and Future Research: This paper presents a conceptual and practice-informed framework based on implementation experiences from GLIDE interventions across rural India. While the findings offer important insights into the relationship between economic leakage reduction and community resilience, future empirical research is required to validate

the proposed Economic Leakage Resilience Theory and operationalize the Rural Resilience Index across diverse geographical and socio-economic contexts.

XII. CONCLUSION: CIRCULAR RURAL ECONOMY AS A RESILIENCE PARADIGM

This paper has argued that climate change, geopolitical instability, and economic globalization are transforming the nature of rural vulnerability. Contemporary rural communities face risks that extend beyond agricultural productivity and increasingly involve supply-chain disruptions, input price shocks, market volatility, and climate uncertainty.

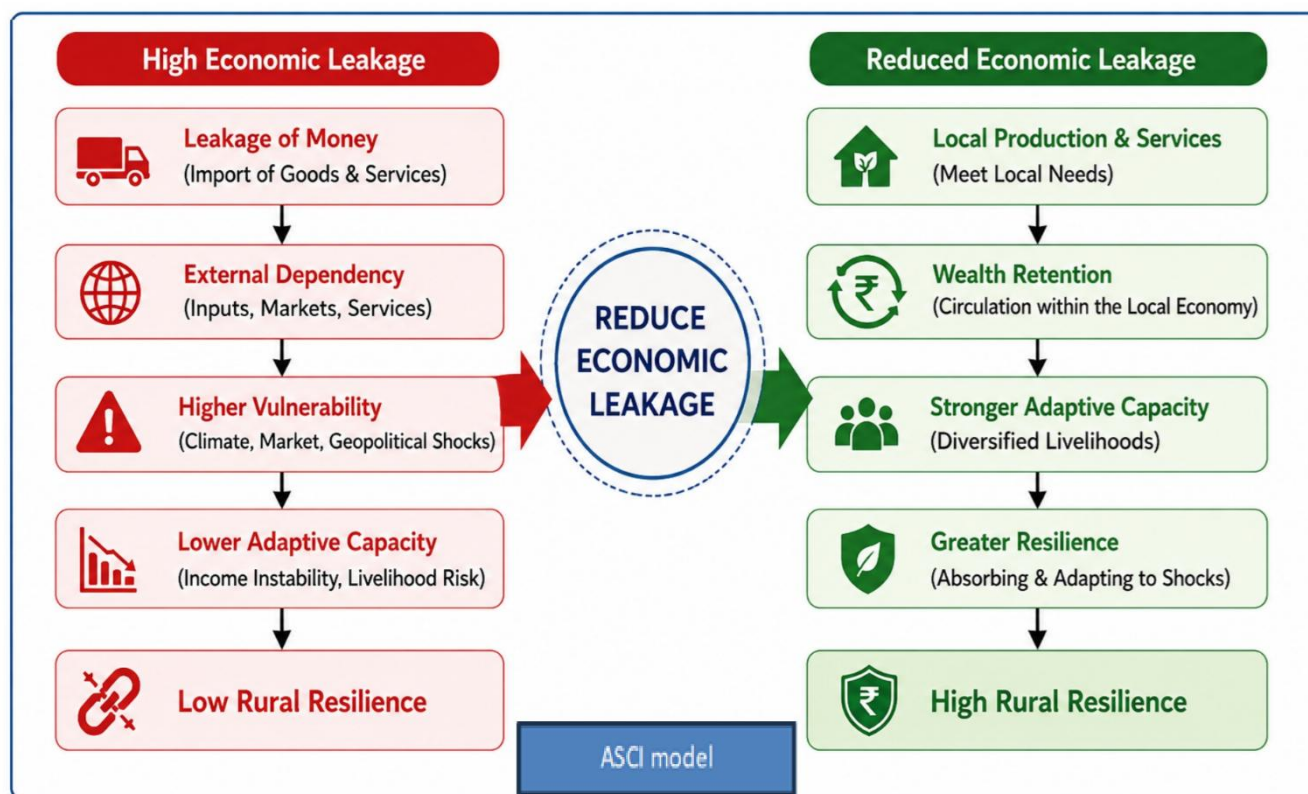


FIGURE 10: Economic Leakage Resilience Theory (ELRT)

In this context, conventional development models focused primarily on production enhancement and market integration are no longer sufficient. While these interventions remain important, they do not adequately address the structural vulnerabilities created by economic dependency and wealth leakage from rural economies.

The Circular Rural Economy framework offers an alternative development paradigm centered on local value retention, collective entrepreneurship, and economic resilience. Rather than viewing villages merely as production sites linked to external markets, the framework conceptualizes them as economic ecosystems capable of generating, circulating, and reinvesting value internally.

Evidence emerging from GLIDE pilots across multiple Indian states demonstrates that significant opportunities exist for local enterprise development and wealth retention. Communities consistently identified products currently imported into villages that could potentially be produced locally using existing resources, skills, and institutions. These findings suggest that rural resilience can be strengthened not only by increasing income but also by reducing economic leakage. The study introduces the concept of Economic Leakage Resilience Theory (ELRT), which proposes that resilience increases as communities retain a greater proportion of locally generated wealth.

The proposed Rural Resilience Index further extends existing resilience frameworks by integrating economic, social, ecological, institutional, and adaptive dimensions while explicitly incorporating economic leakage as a measurable indicator.

Resilience Transformation Pathway: The transformative potential of GLIDE lies in shifting rural development from charity to capacity-building, from individual livelihoods to collective enterprises, and from external dependency to localized resilience.

Ultimately, the significance of the GLIDE framework extends beyond livelihood promotion. It represents a practical model for building decentralized resilience infrastructure within rural communities. By integrating economic localization, climate adaptation, community institutions, and collective enterprise development, Circular Rural Economy provides a pathway toward sustainable and self-reliant rural futures.



FIGURE 11: Resilience Transformation Pathway

As climate and geopolitical uncertainties continue to intensify, the challenge for policymakers is no longer simply how to increase rural production, but how to build rural systems capable of enduring, adapting, and thriving amid uncertainty. The

Circular Rural Economy framework offers one such pathway and positions GLIDE as a scalable model for resilience-centered rural transformation in India and beyond.

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CONFLICT OF INTEREST

The authors declare that they have no competing financial interests or personal relationships that could have influenced the work reported in this paper.

REFERENCES

- [1] Adger, W. N. (2000). Social and ecological resilience: Are they related? *Progress in Human Geography*, 24(3), 347–364. <https://doi.org/10.1191/030913200701540465>
- [2] Adger, W. N. (2006). Vulnerability. *Global Environmental Change*, 16(3), 268–281. <https://doi.org/10.1016/j.gloenvcha.2006.02.006>
- [3] Berkes, F., & Ross, H. (2013). Community resilience: Toward an integrated approach. *Society & Natural Resources*, 26(1), 5–20. <https://doi.org/10.1080/08941920.2012.736605>
- [4] Carpenter, S. R., Walker, B., Anderies, J. M., & Abel, N. (2001). From metaphor to measurement: Resilience of what to what? *Ecosystems*, 4(8), 765–781. <https://doi.org/10.1007/s10021-001-0045-9>
- [5] Chambers, R., & Conway, G. (1992). *Sustainable rural livelihoods: Practical concepts for the 21st century*. IDS Discussion Paper 296. Brighton: Institute of Development Studies.
- [6] Ellen MacArthur Foundation. (2015). *Towards the circular economy: Economic and business rationale for an accelerated transition*. Cowes: Ellen MacArthur Foundation.
- [7] Flora, C. B., & Flora, J. L. (2013). *Rural communities: Legacy and change* (4th ed.). Boulder, CO: Westview Press.
- [8] Folke, C. (2006). Resilience: The emergence of a perspective for social–ecological systems analyses. *Global Environmental Change*, 16(3), 253–267. <https://doi.org/10.1016/j.gloenvcha.2006.04.002>
- [9] Geels, F. W. (2011). The multi-level perspective on sustainability transitions: Responses to seven criticisms. *Environmental Innovation and Societal Transitions*, 1(1), 24–40. <https://doi.org/10.1016/j.eist.2011.02.002>
- [10] Gunderson, L. H., & Holling, C. S. (Eds.). (2002). *Panarchy: Understanding transformations in human and natural systems*. Washington, DC: Island Press.
- [11] Hickel, J. (2020). *Less is more: How degrowth will save the world*. London: Penguin Random House.
- [12] Hopkins, R. (2008). *The transition handbook: From oil dependency to local resilience*. Totnes: Green Books.
- [13] Intergovernmental Panel on Climate Change (IPCC). (2023). *Climate change 2023: Synthesis report*. Geneva: IPCC.
- [14] Jacobs, J. (1969). *The economy of cities*. New York: Random House.
- [15] Kumar, N., & Kumar, P. (2020). Climate change and Indian agriculture: A review of impacts and adaptation. *Current Science*, 118(3), 344–350.
- [16] Latouche, S. (2009). *Farewell to growth*. Cambridge: Polity Press.
- [17] Meadows, D. H. (2008). *Thinking in systems: A primer*. White River Junction, VT: Chelsea Green Publishing.
- [18] Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge: Cambridge University Press. <https://doi.org/10.1017/CBO9780511807763>
- [19] Ostrom, E. (2009). A general framework for analyzing sustainability of social-ecological systems. *Science*, 325(5939), 419–422. <https://doi.org/10.1126/science.1172133>
- [20] Pelling, M. (2011). *Adaptation to climate change: From resilience to transformation*. London: Routledge.
- [21] Pretty, J. (2008). Agricultural sustainability: Concepts, principles and evidence. *Philosophical Transactions of the Royal Society B*, 363(1491), 447–465. <https://doi.org/10.1098/rstb.2007.2163>
- [22] Putnam, R. D. (2000). *Bowling alone: The collapse and revival of American community*. New York: Simon & Schuster.

- [23] Raworth, K. (2017). *Doughnut economics: Seven ways to think like a 21st-century economist*. London: Chelsea Green Publishing.
- [24] Sachs, J. D. (2015). *The age of sustainable development*. New York: Columbia University Press.
- [25] Scoones, I. (1998). *Sustainable rural livelihoods: A framework for analysis*. IDS Working Paper 72. Brighton: Institute of Development Studies.
- [26] Sen, A. (1999). *Development as freedom*. Oxford: Oxford University Press.
- [27] Shucksmith, M. (2018). Re-imagining the rural: From rural idyll to rural resilience. *Journal of Rural Studies*, 59, 163–172.
- [28] TEEB (The Economics of Ecosystems and Biodiversity). (2010). *Mainstreaming the economics of nature: A synthesis of the approach, conclusions and recommendations of TEEB*. Geneva: TEEB.
- [29] United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development*. New York: United Nations.
- [30] United Nations Development Programme (UNDP). (2022). *Human development report 2021/2022: Uncertain times, unsettled lives*. New York: UNDP.
- [31] United Nations Office for Disaster Risk Reduction (UNDRR). (2015). *Sendai framework for disaster risk reduction 2015–2030*. Geneva: UNDRR.
- [32] Walker, B., & Salt, D. (2006). *Resilience thinking: Sustaining ecosystems and people in a changing world*. Washington, DC: Island Press.
- [33] World Bank. (2022). *Climate and development report: India*. Washington, DC: World Bank.