The FFTC Journal of Agricultural Policy
http:/ap.fftc.org.tw/e-journal

Building Ecological, Social and Financial Resilience of Agricultural Communities Using SoCCs

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Received December 1, 2025; Accepted October 20, 2026

ABSTRACT

Agricultural communities worldwide face compounding pressures of soil degradation, water scarcity, biodiversity loss, and volatile commodity prices. These stresses disproportionately impact smallholder farmers, who produce one third of the world's food (FAO, 2021), yet most resilience interventions operate within single domains, either ecological, financial, or social, without integrating all three or addressing the behavioral incentives that drive farmer decision-making. This paper examines Social Capital Credits (SoCCs), a community currency developed by Social Capital Initiatives (SCI) to incentivize climate-smart, gender-inclusive, and ecologically restorative agricultural practices. Farmers earn SoCCs for verifiable actions such as adopting water-smart cultivation, reducing chemical inputs, planting trees or community knowledge-sharing etc., and redeeming them for seeds, tools, training, livestock, or revolving loans. A community multiplier mechanism (CommSoCCs) aggregates individual contributions into shared ecological and social infrastructure. Using Participatory Action Research, the study draws on six implementation sites: three in India (System of Rice Intensification in Maharashtra; watershed conservation in Jharkhand; livelihood strengthening in Odisha) and three in Taiwan (indigenous farming in Ceroh; pomelo cultivation in O'lalip; biodiversity enhancement in Matalim and Songpu), conducted in collaboration with the Taiwan Agricultural Research Institute (TARI). The paper makes three contributions. First, it documents SoCCs as an applied model that integrates community currency theory with Triple Bottom Line (TBL) accounting, arguing that TBL disclosure should be mandated across agricultural projects. Second, it provides comparative evidence showing how SoCCs adapt across diverse agroecological and cultural contexts while maintaining a consistent incentive system. Third, it proposes SoCCs as a community-administered Payment for Ecosystem Services (PES) mechanism that reaches smallholders that formal government programs often bypass. Findings show SoCCs consistently address the structural gap conventional extension cannot: the absence of immediate, tangible incentives for practices whose benefits accrue over time or at community level. SoCCs are most effective when embedded within existing civil society institutions and designed through genuine co-creation with communities. The paper concludes with policy recommendations to mandate TBL accounting, strengthen PES accountability frameworks, and scale SoCCs as a layer within existing agricultural development programs.

Keywords: social capital, community participation, community currency, regenerative farming, biodiversity, payment for ecosystem services

INTRODUCTION

Agricultural communities worldwide face compounding pressures of soil degradation, water scarcity, biodiversity loss, and volatile commodity prices driven by local and global markets. These stresses disproportionately affect smallholder farmers, who produce one third of the world's food (FAO, 2021) yet remain among the most economically marginalized. This vulnerability undermines not only food security but also rural livelihoods, gender equity, and the intergenerational continuity of farming knowledge, especially in the Global South.

Building resilience in this context requires approaches that address ecological, social, and financial dimensions simultaneously. While the literature on agricultural resilience is substantial, most interventions operate within single domains: either ecological (e.g., agroecology, agroforestry), financial (e.g., microcredit, value chain

integration, crop insurance), or social (e.g., cultural context, cooperative formation, extension services), without integrating the three. A recognized gap remains in scalable, community-driven mechanisms that can incentivize climate-smart practices while strengthening social capital and economic security for smallholder farmers. (Folke *et al.,* 2010).

Community currencies have emerged as one such mechanism, enabling value exchange outside conventional market structures and incentivizing behavior change toward locally defined social and ecological goals (Lietaer, 2001; Seyfang & Longhurst, 2013), as well as economic security. However, their application in the agricultural context, particularly for incentivizing ecological practices among smallholder farmers, remains understudied.

This paper addresses that gap by examining Social Capital Credits (SoCCs), a community currency developed by a non-profit organization Social Capital Initiatives to incentivize farmers to adopt climate-smart, gender-inclusive, and sustainable agricultural practices. Drawing on action research from implementation sites in India (Maharashtra, Jharkhand, Odisha) and Taiwan (Hualien Province), we ask: "How do SoCCs function as a mechanism for building ecological, social, and financial resilience in smallholder farming communities, and what conditions enable or constrain their effectiveness?"

The paper makes three contributions to literature. First, it documents SoCCs as an applied model integrating community currency theory with Triple Bottom Line (TBL) accounting principles in an agricultural context. Second, it provides comparative evidence from India and Taiwan on the design, uptake, and outcomes of SoCCs. Third, it examines the potential for linking SoCCs with Payment for Ecosystem Services (PES) frameworks to improve transparency, accountability, and farmer dignity in ecological compensation schemes.

CONCEPT OF SOCIAL CAPITAL CREDITS (SoCCs)

The mission of Social Capital Initiatives (SCI), a non-profit organization headquartered in New York, is to strengthen communities' social capital by bringing people together for shared causes. SCI accomplished this through SoCCs (Social Capital Credits), a community currency for social good SCI has created. SoCCs are being implemented mostly in India, but also in projects in Nepal, Taiwan and the USA. In the cases described below, SoCCs incentivize farmers to work together toward sustainable farming and climate-smart, socially beneficial actions, such as switching to water-smart agriculture, organic composting, biodiversity conservation, and rejuvenation of local rivulets and watersheds, thereby integrating social and ecological impacts directly into the economic system. SoCCs thus earned can be redeemed for services like education, upskilling, farm equipment, seeds, and in some cases microcredit also. SoCCs earning and redeeming are based on hyper-local SoCC Earning and Redeeming menus co-created with communities during SoCCratic Dialogues. These dialogues are structured community facilitation sessions, inspired by the Socratic method, in which SCI practitioners and community members collaboratively identify local priorities and co-design the Earning and Redeeming menus, at the start of each project.

SCI, the implementing local partner, and community members collaboratively determine the credit value (SoCCs value) assigned to each earning and redeeming activity. These values are weighted according to locally agreed criteria including the effort required, frequency of the action, and its relative ecological or social benefit to the community. This participatory valuation process ensures that the values reflect community priorities rather than externally imposed metrics, and that participants perceive the menu as fair and meaningful from the outset. SoCCs menus are dynamic, and the number of SoCCs earned can be increased if a critical need is not being met with a lower SoCCs value, or decreased if an item is no longer the priority or has been completed. While some projects implement only individual SoCCs (hereafter iSoCCs), others also use CommSoCCs (Community SoCCs). CommSoCCs can be administered in two ways. In one way, for every five iSoCCs an individual earns, one additional SoCC is deposited in the community account. When enough CommSoCCs are collected, they enable the community to undertake larger projects such as infrastructure, which are beyond the capacity of individuals but can benefit all. In the second method, all villagers collectively dig a pond etc., and only CommSoCCs are earned and spent on larger community projects.



Diagram 1. Diagram showing how SoCCs (Social Capital Credits) work

METHODOLOGY

Research design

This study employs a Participatory Action Research (PAR) design, in which the researchers were directly embedded in the design, implementation, and iterative refinement of the SoCCs intervention across multiple field sites. PAR was chosen because the research questions concern the co-production of community-level change, where knowledge is generated through practice rather than external observation (Reason & Bradbury, 2008). The research is longitudinal, spanning *2016–2024*, allowing for observation of behavioral change and resilience outcomes over time.

Case selection

Field sites were selected using purposive sampling based on three criteria: (1) prevalence of marginalized smallholder farming households; (2) presence of an existing civil society partner organization capable of facilitating community engagement; and (3) diversity in agroecological context and gender dynamics, to test SoCCs' adaptability across conditions. The sites in India include Yavatmal district in Maharashtra, Koderma District in Jharkhand, and Mayurbhan District in Odisha. These represent rain-fed, watershed-dependent, and dryland farming contexts respectively. The Taiwan site in Hualien Province was selected through an institutional partnership with the Taiwan Agricultural Research Institute (TARI), which identified it as a priority zone for climate-adaptive and tribal supportive agriculture policy.

Data sources and fieldwork process

Data were collected through multiple sources: structured and semi-structured interviews with 2400 farmers; focus group discussions conducted during Socratic dialogue sessions; SoCCs transaction records tracking earnings and redemption patterns on the SoCCs App and Web Platform; pre- and post-intervention agricultural practice surveys; and field observations documented by the implementation team. In India, fieldwork was conducted in collaboration with partner organizations, including Dilasa Janvikas Pratishthan in Maharashtra, Savera Foundation in Jharkhand, and NYDHEE (Network for Youth Development and Healthy Environment) in Odisha. These involved 2400 community members across 47 villages in India. In Taiwan, TARI researchers coordinated data collection at four sites in Hualien Province. Data collection periods were as follows: Maharashtra (January–December 2025), Jharkhand (August 2023–August 2024), and Odisha (January–December 2025). Taiwan fieldwork was conducted from January 2022- December 2025, and included three researcher visits to the site in 2022, 2024, and 2025.

Assessment framework

Resilience was assessed across three dimensions corresponding to the Triple Bottom Line framework:

Ecological resilience was evaluated through indicators including soil organic matter, water use efficiency, adoption rates of chemical-free inputs, and reported changes in biodiversity (e.g., pollinator presence, crop variety diversity). These were measured through field surveys and self-reported farmer logs verified by partner organizations.

Social resilience was assessed through indicators of social capital, including community cohesion, women's participation in decision-making, youth engagement, and peer-to-peer knowledge transfer, captured through focus groups and post-intervention interviews.

Financial resilience was evaluated using changes in input costs, crop yields, household income stability, and access to non-cash resources (seeds, tools, training) redeemed through the SoCCs Earning and Redeeming menus. SoCCs transaction data provided a direct record of economic activity outside the formal monetary system.

Data was analyzed using mixed methods to identify patterns in adoption, barriers, and outcomes across sites, with lessons synthesized iteratively with community partners as part of the PAR process.

CASE STUDIES IN INDIA: BUILDING FARMER RESILIENCE WITH SoCCs

Three cases of SoCCs implementation in India are given below. The cases in Taiwan follow these.

India case 1: System of Rice Intensification (SRI) in Maharashtra

Social Capital Initiatives partnered with Dilasa Janvikas Pratishthan in Maharashtra to train 500 women farmers across 25 villages of Sindhudurg district in eco-friendly SRI methods, reducing input costs and back-breaking labour while improving yields. Henri de Laulanie developed this system in Madagascar, and other organizations, including the International Rice Research Institute in the Philippines, popularised it (Bouman *et al.*, 2002). SoCCs were earned for switching to SRI and teaching others, and redeemable for seeds, farm machinery, equipment, and further training.

Table 1. Maharashtra SRI project iSoCCs earning menu, 2024

Earning menu	SoCCs for each action	Frequency
Preparation of seed balls for reforestation	50	3/Year
Planting of prepared seed balls	100	1/Year
Glyricidia planting on farm bunds for soil fertility and green manure	50	2/Year
Preparation of green manure from leaves	50	1/Monthly
Contributing local variety seeds of rice to the Seed Bank	100	1/Year



Figure 1. Women farmers practicing the System of Rice Intensification (SRI) in Sawantwadi, Maharashtra, India, 2024.

Table 2. Maharashtra SRI project iSoCCs redeeming menu in 2024

Redeeming menu	SoCCs
Seed packets (2kgs)	200
Cono weeder (1)	200
Potash packets (1 Kg)	100
Markers (2)	100
Micro-nutrients(500ml)	100
Vaibhav Sickle (1)	100
Biofertilizer packets (10 Kg)	100

The SoCCs implementation addressed a well-documented barrier to SRI adoption, that farmers understand the agronomic benefits in principle but face real short-term costs and uncertainty before yields improve. By rewarding each small step, from seedling spacing to chemical-free input use, the earning menu provided tangible, immediate value that offset adoption risk. Inputs were redeemed once per growing season, ensuring the incentive structure rewarded sustained seasonal engagement rather than isolated actions. This is what conventional agricultural extension, which offers knowledge but no direct incentive, typically cannot do.

Outcomes across the 2025 program cycle were measurable across all three resilience dimensions. Ecologically, all 500 participants adopted SRI practices including chemical-free inputs, green manure preparation, and *Gliricidia* plantation on farm bunds, collectively planting 10,000 *Gliricidia* saplings and contributing local rice variety seeds to community seed banks. Women reported reduced dependence on chemical inputs and improved crop performance. Together, the participants cumulatively earned 5,25,000 SoCCs points, an average of 1,050 per participant, demonstrating sustained year-round engagement beyond the cropping season. Women reported increased confidence and a stronger decision-making role within their households, building social resilience alongside ecological gains. Financially, each participant redeemed an average of 900 SoCCs points for agricultural inputs including seeds, cono-weeders, biofertilizers, potash, micro-nutrients, markers, and Vaibhav sickles, tools that directly reduced production costs and labor burden.

A key limitation of SRI is that it requires more precise water management than conventional transplanting, making adoption more difficult in villages with erratic irrigation access. Future iterations of the SoCCs menu could reward investment in water infrastructure as a prerequisite step where this is an issue. Across all three resilience dimensions, the Maharashtra case demonstrates SoCCs' core logic: aligning individual farmer incentives with ecological outcomes that benefit the broader community.

India case 2: watershed conservation in Jharkhand

Social Capital Initiatives partnered with Savera Foundation and helped women in ten villages restore the Barki River and its watershed through check dams, tree planting, and pond construction. Over 1,400 women participated, benefiting 413 households with improved water security in this severely drought-prone area. SoCCs were earned for helping to dig ponds, grass pitching to slow down the silting of ponds, construction of sand bag dams, organic composting, attending monthly meetings, preparing ground to gather *Mahua* flowers during *Mahua* flowering season, and making traditional wall paintings to support cultural and art form continuity. SoCCs are redeemed for funds and machinery rental for pond construction, and materials needed for grass pitching and plantings to preserve ponds.



Figure 2. SoCCs participants constructed sand bag dams in villages of Kodarma district, Jarkhadh, India, in SCI watershed project (2024).

The outcomes of the watershed program were concrete and community-wide. Ecologically, 22 ponds were constructed across 10 villages (each 60ft × 60ft × 10ft), conserving 14,630 cubic meters of water during 2023–24. This enabled irrigation for rice and maize, a significant shift in a watershed where water bodies previously covered only a fraction of the agricultural land, far below what irrigation demands. Over 3,000 seed balls were planted in deforested areas, and community members protected and maintained 150 established plants. Socially, 1,400 women participated in SoCCs earning and redeeming activities, forming community groups to monitor forest logging and driving regular sanitation drives across villages. Youth who had previously planned to migrate out in search of employment were re-engaged in agricultural activities.

This watershed case demonstrates that CommSoCCs can mobilize collective action for ecological infrastructure at a scale beyond individual capacity and help strengthen communities' social capital. The conversion of 1,400 individual contributions into shared pond and dam construction illustrates the community multiplier effect distinctive to SoCCs. However, the dependence on partner organization facilitation, i.e., Savera Foundation in this case, raises questions about replicability in contexts without such strong civil society infrastructure.

India case 3: building livelihood through SoCCs in Odisha

With local partner NYDHEE (Network for Youth Development and Healthy Environment), Social Capital Initiatives has helped over 1,000 women goat-rearing farmers engage in a range of activities that strengthen their livelihoods, civic institutions, and social capital. Women earned SoCCs for repairing and maintaining goat sheds, mapping fodder and forage areas to ensure sustainable grazing, and establishing community-level fodder nurseries. They also formally joined the local cooperative, the Farmer Producer Organization (FPO), an entity entitled to avail of several government programs, and made timely repayment of interest on loans taken from the FPO. They also participated in buyer-seller meets, attended SoCCs Cascade of Up-skilling training sessions so

that they could train other goat farmers, and regularly reported goat sales to the FPO. In addition, members supported their community by contributing their first baby goat to the goat bank. For completing these tasks, participants redeemed SoCCs to build sustainable goat-rearing enterprises and received microloans and veterinary support for their goat farms, enabling them to expand their livelihoods, resilience and financial security.

Table 3. Odisha livelihood project SoCCs earning menu, 2024

SoCCs earning menu	SoCCs
Repair and maintenance of goat shed	100
Practicing fodder and forage cultivation	50
Participation in community fodder and forage mapping	100
Timely repayment of loans from FPO revolving fund	25
Participating in buyer-seller meets	50
Participating in Cascade of upskilling training	100
Reporting goat sales to FPO	150
Contribution of one baby goat to goat bank	200
Joining FPO as a member	250

Table 4. Odisha livelihood project SoCCs redeeming menu, 2024

SoCCs redeeming menu	SoCCs
Getting a loan from the revolving fund	1000
New baby goat from goat bank	500



Figure 3. Women received goats as a redemption for the SoCCs in Mayurbhanj district, Odisha, India. 2024.

The program delivered measurable outcomes across all three resilience dimensions during the 2025 reporting cycle. Ecologically, 500 households established fodder and forage units, and community-level fodder nurseries were created to reduce seasonal feed shortages, integrating goat rearing into sustainable land stewardship practices. Near-zero livestock mortality was achieved through adoption of preventive veterinary care and scientific management. Socially, all 500 participants completed the full SoCCs earning cycle across 12 villages of Bangriposi block, with 222 women making timely loan repayments to the FPO, strengthening the FPO's working capital base and its credibility as a community financial institution. Women transitioned from individual sellers to organized producer entrepreneurs, and FPO business turnover increased by 45%, reflecting stronger collective market engagement. Financially, 222 women accessed revolving fund loans of ₹5,000 each through the SoCCs redemption mechanism, and all 500 received productive livestock assets (baby goats) from the Community Goat Bank. Average household income from goat rearing increased by approximately 60%. Individual case evidence illustrates the scale of change: one participant-built savings of ₹40,000–45,000 within 15 months of joining the programme; another household that previously earned only ₹12,000–15,000 annually from seasonal farming alone earned enough from the additional goat-rearing income in their daughter's private school fees.

The Odisha case demonstrates SoCCs' potential as a non-cash credit pathway in contexts where women lack the collateral required for formal microfinance. By linking revolving loan access and livestock to demonstrated community contributions and social capital, rather than repayment capacity, SoCCs reduced the financial exclusion that conventional credit instruments reinforce. The 500 women who received baby goats through redemption gained productive assets that generated ongoing income as their goats multiplied, representing a form of financial resilience that compounds over time rather than waiting for continued program funding. Social capital and resilience were simultaneously strengthened through women's engagement in Farmer Producer Organizations (FPOs), which were able to build institutional capacity for collective bargaining and market access beyond the SoCCs program itself.

A notable challenge is organizational sustainability: the program's effectiveness depends significantly on NYDHEE's facilitation capacity and ensuring that community-level SoCCs management can continue independently after external support ends remains an open question that the 2024 menu began to address. The Odisha case suggests that SoCCs are most durable when embedded within existing community institutions rather than operating as a parallel structure.

Table 5. Comparative analysis table for the three case studies in India

Dimension	Maharashtra (SRI)	Jharkhand (Watershed)	Odisha (Livelihoods)
Primary focus	Ecological / crop productivity	Ecological / water security	Financial / livelihood diversification
Participants	500 women farmers	1,400 women, 413 Household	1,000+ women farmers
SoCCs type	iSoCCs	CommSoCCs	iSoCCs + FPO linkage
Key ecological outcome	10,000 *Glyricidia* saplings and 3,000+ seed balls planted; chemical input reduction; seed banks established	22 ponds built; 14,630 cu.mt water saved; 3,000+ seed balls planted; 150 plants maintained	500 fodder units established; near-zero livestock mortality; goat rearing integrated into farm ecosystem
Key social outcome	5,25,000 SoCCs points earned; 500 women trained; increased household decision-making	1,400 women mobilized; youth re-engaged; community forest monitoring groups formed	222 FPO loan repayments; 45% FPO turnover increased; women became producer entrepreneurs
Key financial outcome	450,000 SoCCs redeemed for farm inputs; reduced input costs and labor burden	413 families gained water access enabling double cropping	222 revolving loans 5,000 each availed; 500 goats distributed; Approx 60% average income increase
Resilience dimension most strengthened	Ecological+ Social	Ecological + Social	Financial + Social

CASE STUDIES IN TAIWAN OF BUILDING FARMER RESILIENCE WITH SoCCs

Since 2022, Social Capital Initiatives (SCI) has collaborated with Taiwan Agricultural Research Institute (TARI) to implement SoCCs in Amis tribal communities in Ceroh, Matalim and Makotaay villages in Yuli Township, and O'lalip village in Ruisui Township. The overarching goal in all projects is to support biodiversity, preserve traditional cultural activities and promote water-smart agriculture. These activities also bring people together and help strengthen their social capital. The three villages in Yuli Township mainly grow rice, with a total rice

cultivation area of about 3,000 hectares. All study sites are large-scale monoculture agricultural areas. O'lalip village primarily cultivates pomelos over approximately 650 hectares of farmland, accounting for 10% of Taiwan's total cultivation area.

Teams from Social Capital Initiatives have visited each one of these sites three times (in 2022, 2024 and 2025) with TARI, to understand the needs and aspirations of the farmers, to explain the SoCCs concept to communities, and to understand the efficacy of the SoCCs program from the perspective of the farmers.

Taiwan case 1: encouraging biodiversity and cultural contributions in Ceroh tribe

Since 2023, the SoCCs program with Ceroh Tribe has empowered the community by linking social and cultural contributions to tangible rewards through the SoCCs system. SoCCs are earned through cultural data collection and agricultural up-skilling per the SoCCs menu co-created with the community during SoCCratic Dialogues. As a result of this, 44 sessions on cultural heritage data collection were held, 8 tourist guide boards and one session on tour guide training were conducted. In addition, 100 ethno-plants were planted.

Table 6. Ceroh community's SoCCs earning menu, 2023

SoCCs earning menu items	SoCCs
Cultural heritage documentation, collecting and publishing data, stories, and traditions, and skill-sharing	20 SoCCs/ session
Teaching and training farming skills	20 SoCCs/session
Ethnoplants planting	30 SoCCs/plant
Help with tourist guide board making, slip hats	20 SoCCs/session
Teaching traditional skills: Wool knitting, natural dye making, and producing cultural artifacts	20 SoCCs/session

Table 7. Ceroh community SoCCs redeeming menu 2023

Redeeming menu	Results
Marketing & tour guide course training	15 sessions were held
Ethnoplants saplings	10 planting events were organized
Publishing of cultural data book	50 information books were prepared
Contemporary art sessions	20 art sessions were held
Wool for traditional clothing	20 people received wool

SoCCs menus are dynamic and can be revised as a community's needs and focus change. This flexibility helps make the project self-sustaining after TARI intervention ends. Selection and training of a local SoCCs manager from within the community was also undertaken, who can continue the work, supported by the community itself.

Taiwan case 2. Matalim and Songpu communities

These are rice-growing farm communities, and practice monocropping. Discussions were held with them about planting trees along farm edges to increase biodiversity and bird populations, reducing the use of chemical pesticides. Examples of successful implementation of this strategy elsewhere were shared. However, the farmers insisted that shade from the trees and their roots would be detrimental to the rice crops. However, the community was enthusiastic about growing grass cover on bunds to introduce some biodiversity.

Table 8. Matalim and Songpu SoCCs earning menu in 2024

Earning menu	SoCCs
Establish grass cover	30
Maintain grass cover	50

Table 9. Matalim and Songpu SoCCs redeeming menu in 2024

Redeeming menu	SoCCs
Seeding training course	35
Receive grass plants	46

Taiwan case 3. pomelo farmers in O'lalip community

Social Capital Initiatives team visited with the Pomelo farmers in 2023, 2024, and 2025 to observe the water scarcity issues and the organic pest control and grass cover strategies they are practicing, and how SoCCs are incentivizing positive change.

Table 10. O'lalip Tribe's SoCCs earning menu, 2024

Earning menu	SoCCs
Establishing grass cover on bunds	30
Auto camera for birds and wildlife monitoring	15
Pomelo soap making course participation	20
Managing grass cover	50

Table 11. O'lalip Tribe's SoCCs redeeming menu, 2024

Redeeming menu	SoCCs
Seeding training course	35
Pest control training course	20
Pomelo soap making material	15
Receive ethno-plants	45

Analysis of Taiwan cases

The Taiwan cases collectively demonstrate that SoCCs can adapt to cultural and institutional contexts that differ substantially from South Asian smallholder farmer context, and that the mechanism's value lies precisely in its flexibility. In Ceroh, SoCCs bridged cultural heritage preservation and ecological farming from ethnoplant cultivation to oral history documentation, rewarding contributions that no agricultural extension program would conventionally recognize as within its remit. In O'lalip, the earning menu formalized organic pest control and grass cover practices that farmers were already pursuing, strengthening motivation to sustain those practices under economic pressure, and translating ecological stewardship into an exchangeable currency.

However, in Matalim and Songpu, SoCCs failed to incentivize tree-planting along farm edges in rice monoculture communities, although it would have been a low-cost, high-impact intervention for restoring biodiversity and reducing chemical pesticide dependence by attracting natural predators. As mentioned above, this hesitation was due to the farmers believing that tree shade and roots would hinder the rice crop.

The collaboration with TARI has been essential in each case. The institute's agronomic credibility facilitated community trust in the process, while SCI's SoCCs architecture provided the incentive structure TARI's extension work previously lacked. A shared limitation across all four Taiwan sites is that longitudinal ecological outcome data on pollinator populations, water retention, and soil quality are not yet available. The iterative menu revisions conducted in 2024 and 2025, which progressively built in local management capacity, suggest a promising trajectory toward program self-sufficiency after external facilitation ends.

CROSS-CASE COMPARISON

Table 12. Cross-case comparison of SoCCs implementation across India and Taiwan

Site	Primary challenge	SoCCs mechanism	Ecological outcomes	Social outcomes	Financial outcomes	Key limitation
Maharashtra, India (SRI Adoption)	Low uptake of water-smart rice cultivation despite agronomic evidence	iSoCCs earning menu tied to each SRI practice step	Reduced chemical use; improved water use; seed banks established	Women's increased participation in household decision-making	reduced input costs and labor burden;	Requires precise water management; difficult in erratic irrigation villages
Jharkhand, India (Watershed revival)	Degraded river watershed; limited capacity for collective infrastructure building	Comm SoCCs multiplier (5 iSoCCs → 1 CommSoCC)	Check dams, tree planting, ponds across 10 villages; groundwater recharge	women's collective action strengthened community institutions	Improved water access for agriculture and domestic use	Long-term watershed outcomes require multi-year monitoring
Odisha, India (improved livelihood)	Women excluded from formal credit; productive asset ownership	iSoCCs linked to revolving loans and livestock redemption	Goat rearing integrated into farm ecosystem;	Women's leadership in FPOs; peer knowledge transfer	500 women received (goats + revolving loans)	Depends on NYDHEE facilitation;
Ceroh, Taiwan (Cultural Heritage + Ecological Farming)	Erosion of indigenous cultural knowledge; ecological farming decline	iSoCCs for cultural documentation and agricultural up-skilling	ethno-plants planted; traditional agro-eco practices documented	44 cultural heritage sessions; 8 tourist guide boards; tour-guide training	Diversified income through tourism and traditional crafts	Early-stage program; longitudinal ecological data not yet available
O'lalip, Taiwan (Pomelo Farming)	Water scarcity; pressure to maintain chemical-free practices under market competition	iSoCCs for organic pest control, grass cover, and water conservation practices	Organic pest management and grass cover adopted as community norm	Community knowledge-sharing sessions; strengthened farmer peer networks	Improved pomelo market through verified organic practices	Small community scale; expansion pathway not yet defined
Matalim & Songpu, Taiwan (Rice Monoculture)	Monoculture with high pesticide dependence; low biodiversity	iSoCCs for tree-planting along farm edges and biodiversity-supporting practices	Tree planting along farm edges; bird population recovery for natural pest control	Community engagement in biodiversity practices on community lands	Reduction in pesticide costs as bird population recovers (anticipated)	Biodiversity recovery requires multi-season observation;

Cross-case synthesis

Across six implementation sites in India and Taiwan, SoCCs consistently addressed a structural gap that conventional agricultural interventions leave open: the absence of immediate, tangible incentives for practices whose benefits accrue over time or at the community level. Whether rewarding SRI adoption in Maharashtra, watershed restoration in Jharkhand, or ethnoplant cultivation in Ceroh, the earning-and-redemption architecture converted socially and ecologically valuable actions into a community currency redeemable for goods and services that communities identified as priorities. This hyperlocal co-design, evident in the evolution of earning and redeeming menus across sites, is what distinguishes SoCCs from top-down extension programs and standardized PES frameworks.

The cases also reveal important variation in which resilience dimension SoCCs most directly strengthened. In Jharkhand and Ceroh, social resilience, i.e., collective action capacity and institutional knowledge, was the primary gain, with ecological outcomes flowing from it. In Maharashtra and O'lalip, ecological resilience was the direct target, with financial resilience as the secondary benefit. In Odisha, financial resilience through non-cash asset accumulation was central, supported by social resilience mechanisms (FPO participation) that ensure those gains persist. This variation is not a weakness of the model but a feature, as SoCCs adapt to the most pressing resilience deficit in each context while maintaining a consistent underlying architecture. The shared limitation across all sites is the current dependence on external facilitation organizations; the 2024–2025 menu revisions, which progressively built in and rewarded local SoCCs manager roles, represent the most important structural step toward program durability.

AGRICULTURAL POLICY RECOMMENDATIONS

Triple Bottom Line (TBL) accounting

All corporations depend on social and ecological infrastructure, making their responsibility to support these events. Yet current GDP and agricultural metrics focus almost exclusively on financial outputs, failing to capture the full value farming communities contribute to society and the environment (World Bank, 2023). Mandating Triple Bottom Line (TBL) accounting, i.e., requiring financial, social, and ecological disclosures for both corporate and public projects, would change this. An organic farm, for example, may show lower immediate profits than an industrial farm, but its contributions to soil fertility, water quality, and community health represent substantial long-term value that conventional accounting renders invisible. TBL accounting makes those contributions count.

When applied to agriculture, the key indicators to measure alongside financial returns include soil health (organic matter, erosion, regenerative capacity, reduced chemical residues), water stewardship (irrigation efficiency, groundwater recharge), biodiversity (pollinator presence, crop variety), carbon footprint (emissions reductions and sequestration through agroforestry), and community and disaster resilience (cooperative strength, access to local markets, and preparedness for climate or financial shocks).

SoCCs operationalize TBL principles at the community level by making social and ecological contributions visible, measurable, and rewardable, thus functioning as a grassroots accounting system that complements the top-down frameworks.

The externalities that conventional agricultural metrics omit are measurable and significant. Key indicators include soil carbon depletion (estimated at 24–28 Pg globally since the onset of industrial agriculture), groundwater drawdown rates (over 20% of irrigated farmland now draws on non-renewable aquifers), and pesticide load per hectare (average 2.6 kg active ingredient/ha in South Asia per FAO data). The System of Environmental-Economic Accounting (SEEA), a UN-endorsed framework that integrates natural capital into national and enterprise accounting, provides a complementary methodology to TBL for quantifying these externalities. SoCCs operationalize a community-level equivalent of SEEA logic by making these ecological contributions locally visible and rewardable.

Accountability in Payment for Ecosystem Services (PES) using SoCCs

Payments for Ecosystem Services (PES) are increasingly recognized as a mechanism to incentivize farmers to protect the environment while sustaining their livelihoods, compensating them for carbon sequestration, watershed conservation, biodiversity protection, and soil health practices that benefit society but generate no direct crop sale income.

SoCCs offer a complementary, community-administered PES pathway. Where government PES programs require bureaucratic verification and formal payment infrastructure that often bypasses smallholders, SoCCs can function as a local PES instrument in that farmers earn credits for verifiable ecological actions such as planting trees along field edges, building check dams, reducing chemical inputs etc. They can then redeem them for seeds, tools, up-skilling, or revolving loans. The Jharkhand watershed case in this paper illustrates this directly: 1,400 women earned SoCCs for restoring the Barki River watershed and received community goods in return. This is, in effect, a PES arrangement mediated by community trust rather than a government cash transfer that does not incentivize ecological benefits. SoCCs can also be designed to interface with formal PES frameworks, providing the verified activity records that government programs require while ensuring benefits reach participating households and local capacity is enhanced.

Farm-to-table supply chains

There is also a need to create more effective farm-to-table supply chains. Agricultural supply chains remain dominated by large processors and retailers, marginalizing smallholders. A farm-to-table paradigm can restore fairness and ecological balance. Building such supply chains requires farmer cooperatives, local value addition and processing units, and consumer education about fresh, chemical-free food. Integrating SoCCs into this system can reward climate-smart actions while ensuring fairer market access. Integrating SoCCs into agricultural policy offers multiple benefits including accountability, inclusivity, resilience, fairness, and leadership.

Digitization and artificial intelligence as an enabler for farmers

In most countries in the Global South, a significant digital divide marginalizes farmers. Digitalization and artificial intelligence infrastructure and up-skilling can enable farmers to optimize resource use, increase production, and support climate-smart agriculture (CSA) in critical ways (Ramaprasad 2023). They can enhance climate sensing, monitoring, processing, translating various local languages, communicating with markets, and archiving data etc. Artificial intelligence can also deliver personalized extension services. Skill enhancement in digital and artificial intelligence can create a virtuous cycle of verifiable ecological practices that can enable accountability and scalability.

CONCLUSION

This paper has examined Social Capital Credits (SoCCs) as a community currency mechanism for building ecological, social, and financial resilience among smallholder farming communities in India and Taiwan. The evidence from three implementation sites in India, i.e. SRI adoption in Maharashtra, watershed restoration in Jharkhand, and livelihood diversification in Odisha, and from the projects in Hualien Province, Taiwan, yields several findings relevant to both practice and policy.

First, SoCCs demonstrate that non-monetary incentive structures can effectively shift farmer behavior toward climate-smart and ecologically restorative practices, in contexts where conventional financial instruments have limited reach. The earning and redemption architecture enables communities to assign value to actions such as organic composting, water conservation, and peer training that markets do not price, addressing a structural gap in agricultural incentive design.

Second, the cases show that the social dimension of resilience is not incidental to SoCCs but central to its functioning. Participation in SoCCratic dialogues, co-design of earning and redeeming menus, and the CommSoCCs multiplier effect for collective infrastructure all build institutional capacity within communities that persist beyond individual transactions. This finding aligns with scholarship on social capital and collective action in natural resource management (Uphoff, 2002; Folke *et al*., 2010).

Third, the integration of SoCCs with existing frameworks, FPOs in Odisha, TARI's agricultural research infrastructure in Taiwan, and the proposed linkage with Payment for Ecosystem Services and Triple Bottom Line accounting, suggests that SoCCs have the potential to be a coordinated layer that can amplify existing institutional structures.

This transformation is not merely an agricultural reform; it is a societal reimagination of what constitutes 'capital' and how humanity chooses to preserve its future.

Limitations

Several limitations of SoCCs should be noted. The India case studies are drawn from action research in which the authors were directly involved in implementation, which, while providing depth of insight, introduces the possibility of observer bias. Quantitative outcome data across sites varies in completeness, limiting the strength of cross-site comparisons. For the Maharashtra SRI case, longitudinal yield data comparing pre- and post-SRI productivity in quantitative terms will be collected during the 2026 cropping season assessment; this represents a gap in the current evidence base that future reporting will address. The Taiwan case deals with a smaller number of farmers compared to cases in India, and the final assessment for 2026 is still awaited. Additionally, the long-term financial sustainability of SoCCs programs, particularly their dependence on partner organizations for facilitation, has not yet been systematically evaluated.

Practical implications

For practitioners, the findings suggest that community currency design benefits from hyper-local co-creation, dynamic menus that respond to unmet needs, and strong civil society partnerships with embedded community trust. For policymakers, the Triple Bottom Line accounting framework, including SoCCs, proposed here offers a basis for incorporating ecological and social returns into agricultural subsidies and support schemes. Taiwan's institutional readiness, through TARI and existing agri-policy infrastructure, positions it as a promising context for national-scale integration of SoCCs into climate-smart agriculture programs and Payment for Ecosystem Services.

Future research

Longitudinal studies tracking ecological and financial outcomes beyond program implementation periods would strengthen the evidence base. Comparative research across different agroecological and institutional contexts, including dryland farming regions and smallholder systems in other Global South regions, would help assess the generalizability of the SoCCs model. Research on the optimal design of PES-SoCCs linkages and on digital infrastructure requirements for scaling is also a priority.

REFERENCES

Bouman, B. A. M., H. Hengsdijk, B. Hardy, P. S. Bindraban, T. P. Tuong and J. K. Ladha. 2002. Water-wise rice production. International Rice Research Institute and Plant Research International, Wageningen University.

Food and Agriculture Organization (FAO). 2021. Small family farmers produce a third of the world's food. https://www.fao.org/newsroom/detail/small-family-farmers-produce-a-third-of-the-world-s-food/en*https://www.fao.org/newsroom/detail/small-family-farmers-produce-a-third-of-the-world-s-food/en*

Folke, C., S. R. Carpenter, B. Walker, M. Scheffer, T. Chapin and J. Rockström. 2010. Resilience thinking: Integrating resilience, adaptability and transformability. Ecol. Soc. 15(4): 20. https://doi.org/10.5751/ES-03610-150420https://doi.org/10.5751/ES-03610-150420

Lietaer, B. 2001. The future of money: Creating new wealth, work and a wiser world. Century, London.

Ramaprasad, A., V. K. Mehta and G. Ramesh. 2023. A digitalisation roadmap for climate-smart agriculture in India. T20 Policy Brief, Task Force 6: Accelerating SDGs, India G20 Presidency.

Reason, P. and H. Bradbury (Eds.). 2008. The SAGE handbook of action research (2nd ed.). SAGE Publications, London.

Seyfang, G. and N. Longhurst. 2013. Desperately seeking niches: Grassroots innovations and niche development in the community currency field. Global Environ. Change 23(5): 881–891. https://doi.org/10.1016/j.gloenvchange.2013.02.007https://doi.org/10.1016/j.gloenvchange.2013.02.007

Social Capital Initiatives. 2024. Annual report 2024. https://www.soccs.org

Uphoff, N. 2002. System of Rice Intensification (SRI) for enhancing the productivity of land, labor, and water. J. Agric. Resour. Manage. 1(1): 43–60.

World Bank. 2023. *Unfair advantage: Distortive subsidies and their effects on global trade*. World Bank, Washington DC. https://thedocs.worldbank.org/en/doc/0534eca53121c137d3766a02320d0310-0430012022/related/Unfair-Advantage-Distortive-Subsidies-and-Their-Effects-on-Global-Trade-2023.pdf

ACKNOWLEDGEMENTS

The work on Social Capital Credits (SoCCs) in four sites in Hualien Province in Taiwan has been conducted at the invitation of the Taiwan Agricultural Research Institute. We are particularly grateful to Dr. Chi-Ling Chen, a

researcher at TARI in charge of our project, for her guidance and support for the work and field visits kindly organized by her and her staff.

We are also grateful to our local partners in India, including Dilasa Janvikas Pratishthan in Maharashtra, Savera Foundation in Jharkhand and NYDHEE in Odisha. With their deep local knowledge and the trust of the communities they have developed over the years. They continue to be critical in smooth implementation of SoCCs.