



International Journal of Community Currency Research

VOLUME 30 No.1 (2026) 80-98

PROTO-SOCIAL INFRASTRUCTURE AND STEWARDSHIP OF COMMITMENT POOLING

William O. Ruddick¹

1 Founder of Grassroots Economics Foundation (will@grassecon.org)

ABSTRACT:

This paper examines Commitment Pooling as a commons-based resource coordination framework. The Commitment Pooling protocol establishes rules for the exchange of resources, emphasizing reciprocity and mutual support. The infrastructure, blending proto-social systems like rotational labor with modern technologies such as blockchain, enables a transition from extractive to cooperative models. Central to this framework is stewardship, ensuring responsible governance and long-term sustainability of the commons. By integrating protocol, infrastructure, and stewardship, Commitment Pooling provides a flexible, scalable model for fostering cooperative, resilient economies and addressing contemporary challenges in resource management.

KEYWORDS:

Proto-social, infrastructure, resource coordination, stewardship, mycorrhizal, economic commons, blockchain.

To cite this article: Ruddick, W. (2026). 'Proto-Social Infrastructure and Stewardship of Commitment Pooling' INTERNATIONAL JOURNAL OF COMMUNITY CURRENCY RESEARCH - VOLUME 30 No.1 (80-98); www.ijccr.net ; ISSN 3106-0781; DOI - <http://dx.doi.org/10.26034/zh.ijccr.2026.9512>

1. INTRODUCTION

Grassroots Economics Foundation (GrE), a pioneering organization for community currencies now known as Community Asset Vouchers (CAVs), has been at the forefront of developing and supporting collaborative financial approaches to community wellbeing. As of this writing, there are 189 CAVs in and beyond Kenya, being used by individuals, local businesses and community groups.

My journey over the last two decades, leading to GrE's founding, has been shaped by diverse experiences and is still evolving to date. Starting as a physicist, I delved into the intricacies of computer programming, particle physics, econophysics and statistical mechanics, where mathematical constructs provided profound insights into modeling the behavior of complex systems. My love of humanity led me to become a Peace Corps teacher in Kenya, where I taught math, science, computer programming and environmental stewardship on the coast. To fulfill this role, I was exploring ecology through the lenses of permaculture and later syntropic agroforestry. I learned about the intricate and cooperative relationships that sustain ecosystems, like the symbiosis seen between mycorrhizal fungi and plant roots. These ecologies highlighted for me the importance of mutual support in maintaining healthy and resilient systems and hinted at the proto-social protocols I began to recognize later.

I have also been exposed to indigenous non-monetary exchanges commonly known as rotational labor (also known as exchange labor or rotating labor associations), where community members take turns calling on their community for support on various tasks such as farming and house building. Rotational labor is a system that predates monetary economic systems and emphasizes shared responsibility and ensures that the workload is distributed fairly among participants. It goes by many names such as Minga in South America, and in the Mijikenda communities of coastal Kenya, it is locally known as Mweria or Chikola. This system, built on principles of reciprocity, shared responsibility, and collective action, fosters strong social bonds and sustainable resource management has many striking similarities with the aforementioned symbiosis seen in nature.

Community Asset Vouchers (CAVs) have been designed with the ability to interact and pool in a digital format with a blockchain back-end, viewable publicly at www.sarafu.network. The system was built to enable these practices by urban and rural communities as well as various refugee groups in partnership with the Red Cross. I expand on this in Section 4. For example, we built a network visualization to see the connections and loops of rotational labor, where all members issue and send vouchers that represent commitments to deliver goods or services to a rotating assigned host for the week.

Previously, I have defined such vouchers as a form of formalized "commitments" following the Promise Theory (Bergstra and Burgess, 2014) and their aggregation "pooling", thus giving rise to the term "Commitment Pooling" where commitments are made exchangeable (see Ruddick, 2023). We choose to represent the infrastructure that makes this possible as an economic commons because it leverages and allows for an expression that would otherwise be impossible for physical resources alone. This concept emerged from a fundamental question: "what are the minimal viable functions and structures needed for effective resource coordination we see within communities?" As a response, the team at GrE developed social, physical and technological frameworks (like Commitment Pools) and their respective rules and procedures (Commitment Pooling Protocol) that guide resource coordination. This will be revisited in the next section.

1.1. *Money in a Traditional Context*

The rise of hierarchical monetary systems, as exemplified by an ancient Roman tradition where coins were used to execute forced taxation¹, led to centralized and extractive resource coordination by the ruling class. Similarly colonial tax systems imposed on indigenous communities extracted resources without providing equivalent benefits, disrupted ancient cooperative practices.

The influences of the Roman-like monetary traditions combined with the revival and persistence of older cooperative traditions is worth understanding. If ancient Romans were alive today, they would likely recognize remnants or variants of their Juno Moneta traditions still co-opted in our usage of money today. National currencies issued by centralized authorities, imbued with terms like "In God we Trust", still serve the purpose of giving divine-

¹ I acknowledge that this practice goes back even further than the Romans or Greeks and as well could have co-evolved in many locations

like power to the state for imposed tax collection for the protection of wealth. When we carefully consider the roots of money, we will be able to acknowledge its deep-seated role in our own history. Thus, my polemic call is to stop using the term money or monetary as the box we place all economic theory within. Much like cultural appropriation, the overuse of the term "money" as well as "currency" to encompass all economic interactions further obscures the rich heritage of diverse, non-monetary resource coordination practices that have existed and still exist globally.

What I've learned through my work with GrE is that there is no need to teach people in rural villages across Kenya what money or currency is or could be; they know already. Rather than reinventing "money," or "currency" we should learn from, explore and build upon a rich history of resource coordination practices. In academia, you might see terms like mutual aid, gift economy, rotating labor/savings association, or exchange labor. As mentioned earlier, there are many local counterparts for these names in all languages that embed more nuance. As such, the term Commitment Pooling has been used to describe the protocol underlying many of these practices, emphasizing the commitment and reciprocity inherent in them.

I have previously argued for the necessity of moving beyond centralized, extractive models and exploring alternative protocols (Ruddick, 2023). Inspired by ancestral wisdom and ecological principles, Commitment Pooling Protocol offers a pathway towards a more cooperative and sustainable model. It emphasizes the importance of shifting from extractive practices to a synergistic approach that fosters mutual benefit and shared prosperity, ultimately leading to resilient and equitable communities.

This paper builds on Commitment Pooling's underlying "proto-social" infrastructure. I do so by drawing insights from the aforementioned experiences that trace their roots from natural and social sciences (Section 2). Then, it is followed by traditional stewardship systems contrasted with lenses from physical sciences in Section 3. Finally, in Section 4, I provide examples as to how GrE applies both protocol and infrastructure through contemporary digital technologies and Section 5 suggests ways to grow networks of Commitment Pools.

2. COMMITMENT POOLING AS A PROTO-SOCIAL PROTOCOL

The concept of "proto-social" systems offers a lens through which we can examine the fundamental principles underlying early forms of social organization and cooperation. "Proto" in social systems refers to preliminary or experimental forms that precede the emergence of established structures. In group dynamics, the concept of "proto" is applied to reflexive social systems, where group dynamics serves as self-steering social systems, providing a model for understanding and implementing self-organization in various contexts (Schattenhofer, 2019). In organizational contexts, proto-forms are provisional structures that arise when entrepreneurs experiment with new technologies or social novelties using existing organizational forms as a basis (Li & Khessina, 2020).

Commitment pooling, with its emphasis on reciprocity, mutual support, and equitable exchange, embodies the essence of "proto-social" systems—those early forms of social organization that lay the foundation for more complex societal structures. Just as early human communities relied on shared resources and collective efforts for survival, Commitment Pooling taps into this primal instinct for cooperation. By creating a framework for mutual reliance and shared responsibility, it acts as a bridge between individual needs and collective well-being, mirroring the dynamics of proto-social systems. Since each protocol function has a counterpart enabling infrastructure, they also then inherit and build on the proto-social nature. Thus, proto-social protocols are the rules, standards, and procedures that govern how resources are managed, exchanged, and utilized in social systems. They include the guidelines for mutual aid and resource pooling. Meanwhile, proto-social infrastructures refer to the frameworks, including but not limited to instruments and stewardship systems such as communal land, shared facilities and memory systems that support collective activities and resource management. These infrastructures provide the tangible support necessary for community interactions and resource sharing. Together, proto-social protocols and infrastructures aim to enhance resource coordination and well-being in living systems.

In Figure 1, we combine both aspects of commitment pooling—its protocol (teal blocks) and now with the infrastructures (orange blocks) that support them. Now, we will explore each of these protocol functions and their associated infrastructures in more detail. The first protocol function is curation which involves aggregating individual commitments into a common pool, from which participants can draw reciprocally. Each member contributes curated resources or labor and, in return, gains the right to draw other such curated resources from the pool. More precisely, the pool stores and exchanges authenticated records of commitments (vouchers), not the

underlying goods or labor themselves. This reciprocal arrangement ensures mutual support and collaboration. For example, a farmer might contribute commitments for her surplus crops or labor to the pool and draw commitments for labor for planting or harvesting when needed. The infrastructure that enables this would be something that supports the value storage of what the members have agreed to put in the pool. For the storage of commitments to resources we need collective memory instruments with authentication rather than physical storage.

Figure 1. Conceptual Framework for Commitment Pooling Protocol and Infrastructure

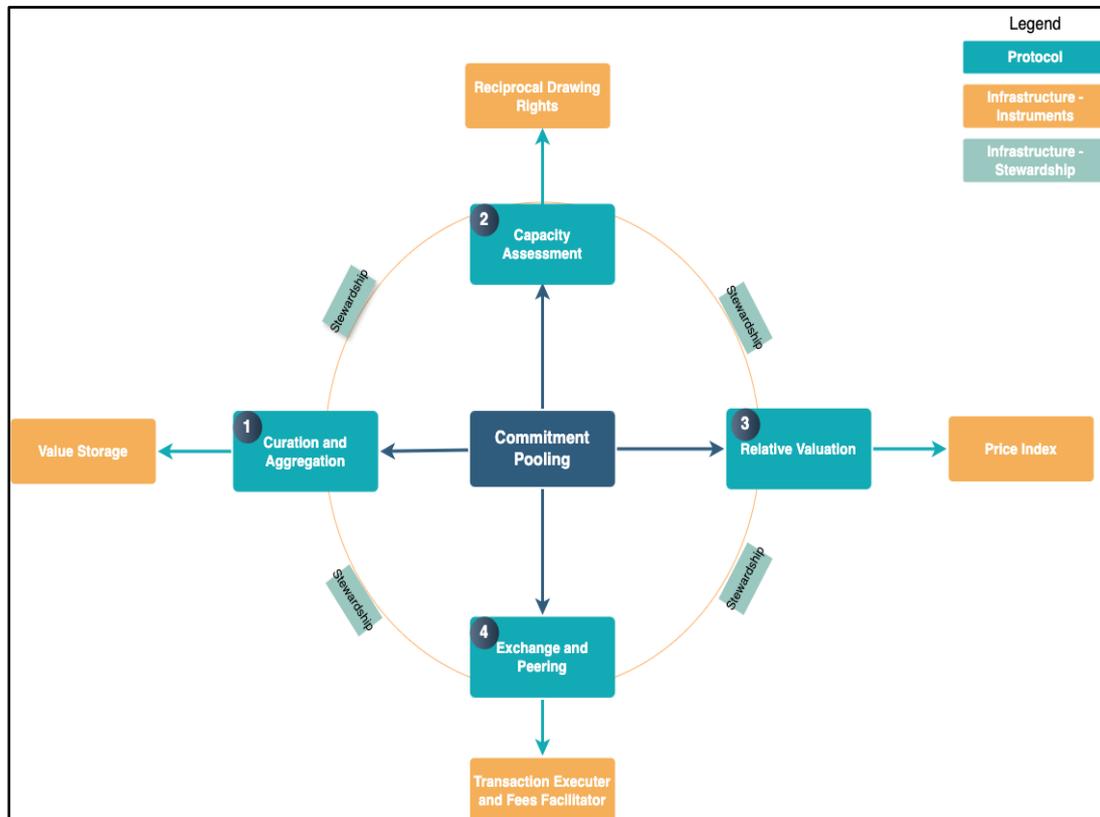


Image Credit: Patricia Marcella Evite

The second function is capacity management. (Throughout this paper, “capacity management” is used interchangeably with “limitation”, meaning the setting of bounded reciprocal drawing rights (credit access) to prevent overexposure and depletion.) To maintain stability and sustainability, it is crucial to assess and limit the capacity of commitments. This involves regulating how much reciprocal drawing rights are available for commitments allowed into the pool. In other words, a limit given to my commitments suggests that I can access resources (drawing rights) from the pool by adding my commitments into the pool (reciprocity) up to my limit. Capacity assessment helps manage risk by ensuring the pool is not overly exposed to particular commitments or depleted.

The third function is relative valuation. This function assigns a relative value to each commitment based on its importance and utility to the community. This ensures fair distribution and recognition of each member’s contributions. By creating a system of relative valuation via a price index, Commitment Pooling balances supply and demand, promoting fair access and preventing the dominance of any single resource or contributor.

Lastly, the exchange or peering function facilitates the flow of commitments within the pool, allowing members to trade commitments to resources and labor as needed. This dynamic exchange is often accompanied by stewardship fees used to maintain, insure, and manage the pool. The chosen fees facilitator infrastructure ensures the pool remains functional and that stewardship costs are shared among members along with the transactions executor, checking whether initial conditions from the first three protocols are valid, supporting the efficient operation of the system. The proto-social protocol and infrastructure are further illustrated through parallelisms between

Commitment Pooling and ecological (mycorrhizal networks) and social systems (reciprocal labor) and those that combine both (e.g., intercropping methods with symbiotic relationships).

2.1. *Mycorrhizal Networks: A Natural Blueprint for Commitment Pooling*

Cooperative organisms, such as mycorrhizal fungi and their plant hosts, demonstrate how mutualistic relationships can optimize resource use. Mycorrhizal fungi extend their hyphae far into the soil, significantly increasing the surface area for absorption (Chagnon, 2013). In return for providing plants with essential nutrients like phosphorus and nitrogen, mycorrhizal fungi receive carbohydrates synthesized by the plants through photosynthesis. This mutually beneficial relationship enhances the growth and survival of both parties, exemplifying a highly efficient form of resource coordination. The key components of mycorrhizal fungi include:

1. Hyphae: Thread-like structures that extend into the soil, absorbing water and nutrients like phosphorus, nitrogen, and potassium.
2. Mycelium: A network of hyphae that connects plant roots, facilitating the exchange of nutrients between plants.
3. Arbuscules: Specialized structures within plant root cells that enable direct nutrient exchange between the fungus and the plant.
4. Vesicles: Storage units within the hyphae that hold nutrients for later use, acting as a reserve for the plants connected to the network.

The mycorrhizal network serves as a compelling natural model, showcasing the interplay between protocol and infrastructure in resource coordination, echoing the dynamics of Commitment Pooling. The fungi's selective connection with compatible host plants mirrors the curation process in Commitment Pooling, where specific resources or skills are chosen for inclusion. The fungi absorb nutrients such as phosphorus and nitrogen from the soil, concentrating them in vesicles and making them available to the plants. This initial provision of resources is akin to seeding, where the fungi invests in creating a supportive environment that responds to signals and promotes the growth and health of their plant partners.

Further, the regulation of nutrient holdings and transfer based on plant signals and fungal contributions reflects the capacity assessment function, evaluating the community's ability to contribute to and benefit from the resource pool. For example, a farmer contributing surplus crops must ensure that the pool is not overburdened with the same resource while maintaining enough for others to draw upon when needed.

Finally, the dynamic exchange rates between nutrients and carbohydrates, fluctuating with availability and demand, parallels the relative valuation process in Commitment Pooling which assigns a fair value to each resource based on its utility to the community. For instance, a unit of labor in farming may be considered equal to a unit of materials for house construction, balancing contributions and needs.

These functions are seamlessly integrated with a sophisticated infrastructure comprising the vast network of hyphae as intricate communication pathways that enable rapid feedback and resource allocation adjustments. Hyphae extend into plant root cells to form arbuscules, where they facilitate the efficient exchange of nutrients between the fungus and the plant while feeding the fungi as well. In addition to this, the fungi also exhibit stewardship principles that I categorize under enabling infrastructure. These are manifested through the chemical regulation done through signals, that along with the hyphae, simultaneously facilitate real-time communication and adaptive responses to changing environmental conditions.

2.2. *Human Proto-Social Systems: The Case of Mweria*

The second exploration of Commitment Pooling's proto-social protocol and infrastructure is through the Mweria system, practiced by the Mijikenda communities on the coast of Kenya. By pooling their commitments to labor and resources, community members can undertake large-scale projects that would be hard or impossible to achieve individually, such as building houses, cultivating fields, or managing communal lands. The specific tasks and contributions can also vary depending on the community's needs and skills. Examples include 1) agricultural - farmers may take turns helping each other with planting, harvesting, or other labor-intensive tasks; 2) domestic care - parents may rotate childcare responsibilities, allowing each parent time for other activities while ensuring their children receive adequate care (also common with livestock management); 3) community projects - members of a community may take turns contributing their time and skills to complete projects like building a community

center, maintaining shared spaces, or organizing events. As I have witnessed, the third example can be applied to pursue sustainable use of communal lands and the preservation of local ecosystems. The pooled labor can be utilized for efforts towards ecosystem restoration such as mangrove restoration or flood prevention.

Central to Mweria is the social infrastructure of group gatherings called Dhome by the Mijikenda (to be explained in the next section), which includes the norms and rules that support collective action, and is integral to the success of their indigenous practices. The Mweria system relies on strong social ties and mutual trust among community members. These social bonds are reinforced through regular interactions, shared responsibilities, and collective decision-making. The social infrastructure of the Mweria system enables effective resource coordination and ensures that the benefits of collective labor are distributed fairly, enabling the protocols' effective execution. These gatherings are aided by memory, kinship ties, and other tools such as physical ledgers, which in Section 4, we explain how Commitment Pooling is facilitated in a digital manner through commitments formalized as Community Asset Vouchers (CAVs).

In such traditions, all protocol functions are used – 1) curation: Who will be part of the group and allowed to draw on which goods and services for specific projects?; 2) capacity assessment: What are the capacities of our members so we can prevent oversupply and overburdening of individuals?; 3) relative valuation: How do we ensure that the goods and services we contribute are of fair relative value?; 4) exchange: When and how do we exchange services and perform a Mweria and as well settle debt obligations?

What has been said thus far about Mweria is only a snapshot of what I have observed in the past years since it became an integral part of GrE. My goal here is to show that the Mweria system serves as a cultural analogy to Commitment Pooling, demonstrating how both infrastructure and protocol work together to optimize resource use, ensure balanced exchanges, and maintain sustainability. For nuanced characterization of different rotational labor systems, anthropological studies provide greater insights. In the next section, we will deepen into the social infrastructure that existed with the Mijikenda tribes that govern Mweria.

Table 1: Summary of Parallelisms of Commitment Pooling in Ecological and Social Systems

Commitment Pooling Protocol Key Functions ²	Ecological - Mycorrhizal Networks ³		Social - Rotational Labor	
	Protocol	Infrastructure	Protocol	Infrastructure
Curation and Aggregation	Fungal network formation and selection of host plants	Vesicles for nutrient storage	Selection of specific commitments to support	Neighborhoods, human memory and other memory instruments
Capacity Assessment	Regulation of nutrient transfer based on plant and fungi needs	Fungal communication networks (chemical/electrical signals) enable rapid feedback and resource allocation adjustments.	Assessment of individual labor capacities & community needs	Physical capacity limits (amount of work that can be done in a day)

² For the list of inherited functions (i.e., those that are derived from chosen stewardship systems), see Ruddick (2023). However, some of them are reflected under infrastructure.

³ Adopted from Allen (1991), Agrios (2005), and Chagnon (2013)

Relative Valuation	Exchange rates for nutrients such as phosphorus, nitrogen and carbohydrates	Biochemical signaling pathways and feedback mechanisms	Valuation of labor based on skill, effort, and community needs	Comparison in the work and energy and rarity in different services
Exchange and Peering	Transport of nutrients to plants are exchanged for carbohydrates (fees)	Networks of hyphae and arbuscules	Reciprocal exchange of labor	Market days, communal work events (also called <i>Mweria</i>)

Source: Author

Panel 1. Mycorrhizal fungi (Left) and Serious Game Photo of Mweria (Right).



Sources: Holewinski (n.d.) and Grassroots Economics.

As shown by the two examples summarized in Table 1 and depicted in Panel 1, Commitment Pooling brings two main benefits. First is transparency and accountability. In ecological systems, they create clear paths for nutrient exchange, making the process transparent within the network. In communal systems, they maintain transparent records of allowed exchanges, past transactions and contributions. This transparency builds trust among members and ensures accountability, preventing parasitic behavior and promoting fair participation.

The second is resilience and adaptability. In the example of fungi, pooling allows adaptation to changing environmental conditions by modifying their networks, ensuring long-term resource availability and ecological balance. Meanwhile, by pooling resources and distributing them based on mutual agreements, Commitment Pools in social systems enhance community resilience against economic and environmental shocks. The collective approach encourages sustainable practices, ensuring long-term resource availability and ecological balance. Both systems optimize resource use, ensure balanced exchanges, and maintain sustainability through curated networks and regulated capacities. By understanding these ecological and social systems and their evolution, we can better design and implement infrastructures and protocols that enhance community well-being.

2.3. Symbiotic Agricultural Systems

The ancient agricultural practice of intercropping or mixed cropping of maize, beans, and squash, known as the "Three Sisters," (see Figure 2) is an excellent example of how both nature and mankind work together to reach optimal resource coordination that dates back over 5,000 years. Mixed cropping is primarily an ecological system rooted in the natural interactions and relationships between different plant species, soil microbes, and the environment. However, humans have played a significant role in selecting compatible crops, optimizing planting arrangements, and managing the system for increased productivity and sustainability. The ancestors, aware of the mutual benefits of growing these crops together, were pioneers in understanding the cooperative nature of ecosystems. This practice has proven to be an agricultural jackpot, showcasing the profound interdependence of plant species to promote healthy growth and sustain ecosystems.

Figure 2. Three Sisters Companion Planting Technique

Image Credit: Anna Juchnowicz / CC BY- SA 4.0

Each of the Three Sisters' contributes to the overall health of the group through physical support and resource sharing. Maize serves as the natural trellis for the beans, allowing the beans to climb and access sunlight without sprawling across the ground. This structural support optimizes space and light for all three plants. Squash spreads across the ground, creating a living mulch that suppresses weed growth, reduces soil erosion, and retains soil moisture. Its large leaves provide ground cover, helping maintain the necessary conditions for its sister plants to thrive. Beans, by intertwining among the maize and squash, contribute to the creation of a microclimate. This reduces wind speed, moderates temperature, and preserves moisture levels. Together, the plants create a more stable and resilient environment for growth.

Above-ground, the role of humans in planting and cultivating these crops is crucial, as they manage the spatial and temporal dimensions of this symbiotic relationship. However, the complexity of the Three Sisters goes beyond what is visible to the eye. Below ground, another layer of intricate cooperation unfolds, supported by an underground network of fungi.

Beneath the soil, the roots of maize, beans, and squash interact in ways that are as vital as their above-ground contributions. Each plant has a specialized root system that accesses distinct nutrients, creating a division of labor in nutrient acquisition. Maize develops a deep root system capable of reaching phosphorus (P) from deeper layers of the soil. Phosphorus is essential for root development, flowering, and overall energy production in plants. Squash, with its shallow and extensive root system, excels at absorbing potassium (K), a critical nutrient for cellular function, photosynthesis, and water regulation in plants. Beans engage in a symbiotic relationship with nitrogen-fixing bacteria, converting atmospheric (N) nitrogen into a form that can be utilized by plants. This process enriches the soil with nitrogen, which is essential for protein synthesis, photosynthesis, and overall plant growth. The sharing of these critical resources is facilitated not only by the plants' own abilities but also through an underground network managed by mycorrhizal fungi. These fungi act as resource brokers, enabling the plants to pool and exchange nutrients. The mycorrhizal network connects the roots of maize, beans, and squash, allowing each plant to benefit from the other's nutrient acquisitions.

When maize requires more potassium and nitrogen, it sends signals through the fungal network. The beans, with their excess nitrogen, and the squash, with abundant potassium, release these nutrients into the network, where the maize absorbs them. In return, when maize has surplus phosphorus, it can send it back through the network to the beans and squash. This constant exchange of resources, facilitated by the fungi, forms a grassroots economy that functions continuously below the surface. The fungal network not only acts as a medium for nutrient exchange but also as a storage system. Its vesicles store nutrients that each plant can access as needed, creating a common pool of resources. In return for providing this service, the fungi consume small amounts of sugars produced by the plants

during photosynthesis. This symbiotic relationship benefits all parties involved, with the fungi playing a crucial role in maintaining the balance of nutrient distribution.

The mycorrhizal fungi do more than simply facilitate nutrient exchange; they also regulate the flow of nutrients, prioritizing resources based on the needs of each plant. The fungi respond to signals from the plants, ensuring that nutrients are distributed efficiently and in the right proportions. This dynamic system of resource allocation is not yet fully understood, and ongoing research aims to uncover the mysteries of how these fungi manage such complex interactions. The functions performed by the mycorrhizal fungi—connecting, exchanging, storing, and regulating nutrients—mirror the principles of a healthy ecosystem. By stewarding the flow of resources and responding to the plants' needs, the fungi create a proto-social environment in which life can flourish.

The relationship between maize, beans, squash, and mycorrhizal fungi exemplifies a naturally occurring resource coordination system that mirrors the principles of symbiotic exchange found in both ecological and ancient human economic systems. This underground fungal network not only supports plant growth but also demonstrates the foundational principles of sharing, stewardship, and cooperation that are central to grassroots economies. The Three Sisters, supported by fungi, offer a model for sustainable, interconnected resource management that has been practiced for thousands of years and continues to inspire ecological economics today. These systems mirror human socio-economic practices, particularly in indigenous communities. For example, traditional rotational labor systems like Mweria, practiced by the Mijikenda people in Kenya, offer a similar model for resource sharing and community resilience as we will see in the next example.

3. STEWARDSHIP SYSTEMS

Commitment Pooling hinges on effective stewardship—the responsible management and oversight of shared resources. In this section we will explore traditional stewardship, rooted in cultural practices and communal decision-making, and ergodic stewardship, drawing inspiration from the principles of ergodicity and complex systems theory. We will also highlight how these approaches resonate with Elinor Ostrom's principles for governing the commons, providing a theoretical foundation for understanding the importance of stewardship in Commitment Pooling systems.

3.1. *Traditional Stewardship (Dhome)*

Rotational labor associations like the Mweria of the Mijikenda, as have been repeatedly discussed as a common feature in many ancient societies, involve community members taking turns drawing from commonly held commitments to perform various tasks for the benefit of rotating hosts and the group as a whole. In the context of stewardship, this same method can be applied to the management and planning of these events and other community resources. In such systems, members of the stewardship council rotate their roles and responsibilities, ensuring that stewardship is shared and that diverse perspectives are incorporated into decision-making processes. In this section, we talk about the Dhome practice of the Mijikenda (which may be translated to gathering), and provide insights into how stewardship can be integrated into Commitment Pools. What follows are initial on the ground findings from informal interviews with the communities GrE works with, as they recall the workings of this stewardship system that their grandparents have done and those that came before them while working to revive them today.

In contrast to Mweria, the Dhome may involve many configurations of attendees, from the individual family members to a whole community, to discuss family and community issues, settle debts, tell stories, make commitments and collective decisions, and plan. Elders play a central role in this gathering— they are respected for their wisdom, experience, and knowledge of cultural practices. They also constitute what is called the Kambi, a revolving council, which serves as the primary decision-making body in families and the larger community.

By having these positions as a rotational association, stewardship and planning responsibilities are shared collectively, ensuring that more members have a voice, contribute to and benefit from community resources. The council's responsibilities include managing communal land, overseeing resource distribution, organizing communal labor, and ensuring that traditional laws and customs are upheld. In this sense, the elders provide stable and effective stewardship that benefits the entire community by pooling their knowledge. It also allows for a dynamic and flexible stewardship structure that can adapt to the community's changing needs.

The Dhome cleared the way for the creation and continuation of Mweria. Even if all the community has agreed on a Mweria system, it is often the elders that will chip in their time and labor first, often with a lifetime of such service and clan members backing them. These initial contributions (whether in the form of labor, time, or materials) give the confidence needed for more members to join and a Mweria cycle to begin. This kind of endowment system can also be seen as a form of “seeding” to kickstart a Mweria, where the contributions in the form of labor, time, or materials are seed capital. Elders in the process are crucial, as their endorsement as well as rule keeping can enhance community buy-in and support. Regular family based training and capacity-building sessions help maintain momentum and address any challenges that arise during the early stages. For some communities that are just reviving this process, GrE has helped connect them to other communities and pass lessons from active Dhome/Mweria practicing groups.

In this context, we can see that seeding Commitment Pools within community stewardship structures is a deliberate and structured process. Commitment Pools require intentional seeding and continuous cultivation to ensure their effectiveness and sustainability. The process begins with community mobilization, where members are educated about the concept and benefits of Commitment Pools. This is followed by identifying key resources, contributions, and commitments that members are willing to pool.

3.2. Ergodic to Holonic Stewardship

Now, we explore stewardship from the lens of ergodicity. The principles of ergodicity, a fundamental concept in statistical mechanics, provide a powerful framework for understanding the long-term behavior of complex systems, both physical and social (Boyd, 2023). Ergodicity helps explain how systems explore a wide range of states over time, eventually leading to stable statistical properties that are largely independent of initial conditions. This exploration and stabilization process is evident in both natural ecosystems and social traditions.

In physical systems, ergodicity implies that given sufficient time, a system will explore all accessible states, and time averages will converge to ensemble averages (Boyd, 2023). This behavior underpins many phenomena observed in nature. For example, we can imagine the formation of the primordial soup in early planetary formation, driven by external energy inputs, involving a vast array of chemical interactions. Through continuous exploration of chemical states, these interactions could have led to the emergence of self-replicating molecules and eventually to living organisms. As ergodic systems optimize and stabilize, patterns of recurring states and interactions emerge. These patterns can form the basis for more structured and coordinated entities.

In nature, the transition from random genetic mutations to stable species with specialized roles illustrates this evolution. Over time, stable patterns within ergodic systems can give rise to holons —autonomous units that function independently while contributing to the larger system (Koestler, 1967). These stable holons emerge from the repetitive and optimized interactions of the system’s components. In a social context, individuals and their roles within a community can be seen as holons that have emerged from the broader social interactions and optimizations. Holonic systems can be seen as polycentric stewardship mechanisms, where each holon operates autonomously but adheres to overarching principles and goals. This integration ensures that local actions contribute to larger community objectives. Holons can be seen to organize into stewardship models where smaller holons (e.g., individual commitments) form part of larger holons (e.g., commitment pools), which are in turn stewarded by higher-level holons (e.g., economic commons).

The organization of cells into tissues, tissues into organs, and organs into organisms in biological systems exemplifies holonic integration. Holonic systems are highly adaptable due to their decentralized nature. In a stable system each holon can respond to changes in its environment while maintaining coherence with the larger system. The redundancy and flexibility inherent in holonic systems contribute to their resilience. If one holon fails, others can adapt to compensate, ensuring the overall system's stability.

Ergodic systems evolve into holonic ones through processes of exploration, optimization, structure formation, coordination, and adaptability. This evolution is driven by the need for stability and efficiency, reflecting principles seen in natural and social systems, and is underpinned by fundamental physics principles like localized entropy reduction and self-organization. Holonic systems thus represent an advanced stage of ergodic systems, characterized by polycentric control and protocol-based stewardship.

The Dhome system also demonstrates holonic characteristics by operating at multiple levels – from the family unit to villages and the larger community, with each level exhibiting a degree of autonomy and contributing to the overall system. This is because the Dhome system is deeply rooted in the stewardship of the Kaya which simultaneously means home, village, clan, sacred forest and society with the Mijikenda people, thus inherently having a holonic nature. Both models encourage participation, while establishing transparent rules and fostering individual responsibility within each holonic unit.

Figure 3. Commitment Pooling as Holonic Systems

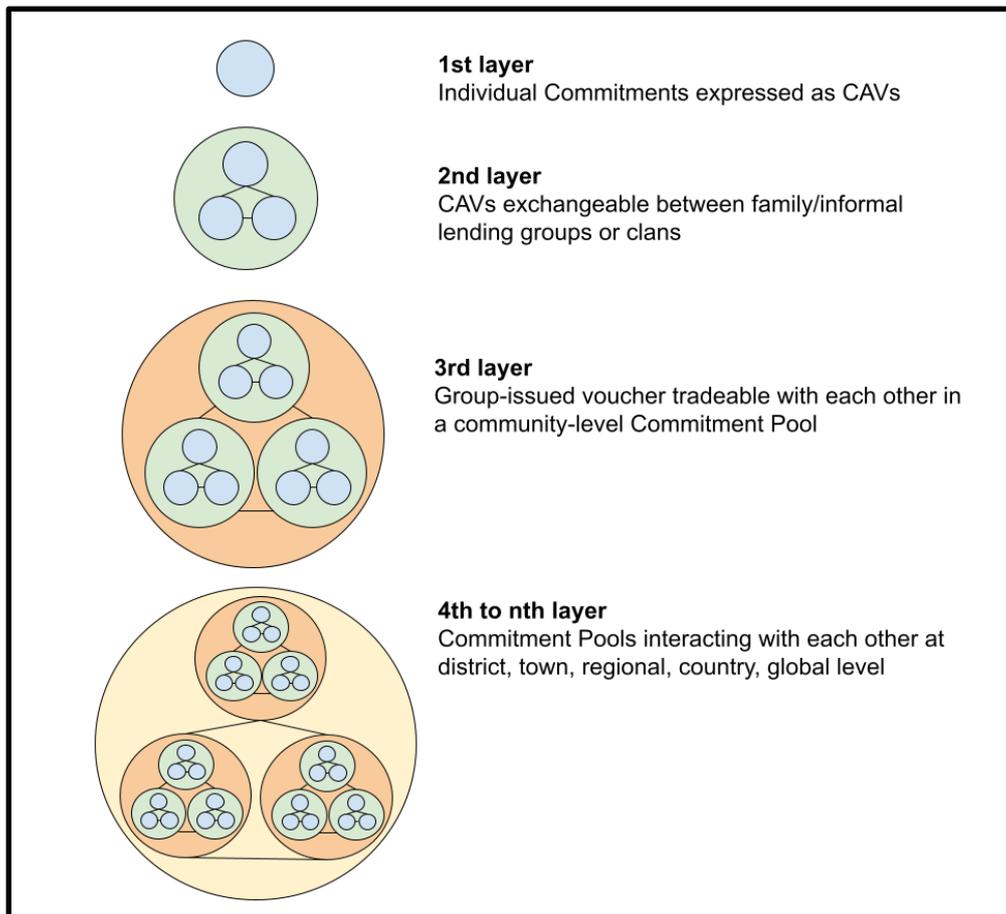


Image Credit: Patricia Marcella Evite ada *pted from Kirke (2024)*

To transition towards a more holonic stewardship model, it is crucial to cultivate a balance between individual autonomy and collective responsibility within nested structures. This involves establishing clear communication channels, transparent decision-making processes, and mechanisms for feedback and adaptation at each level of the holarchy. The current application of commitment pooling by GrE reflects the ergodic approach of holonic systems as shown in Figure 3. Starting from the foundational layer of individual commitments, represented by CAVs (Community Asset Vouchers), the system allows for the gradual expansion and integration of economic activity. CAVs function as an autonomous unit of value (individual holons), representing a specific commitment issued by a business, or group member. These CAVs, together with the practice of Mweria, are exchangeable among members of informal lending groups or clans (2nd layer of holons).

Previous analyses (Ruddick, 2023) have revealed that these CAVs have a connection, made possible because some members had multiple vouchers owned and acted as informal brokers or basic pools. Following this observation of demand for a multiplicity of CAV ownership, through smart contracts executed on the blockchain, we implemented Commitment Pooling (3rd level holons), making group-issued CAVs exchangeable from one to another. This higher-level interconnectedness allows members to deposit their CAVs for another, expanding their capacity to trade in other communities.

Finally, the final 4th and nth layer illustrates the potential for these Commitment Pools to interact and exchange resources at even higher levels, from districts and towns to regional, national, and even global networks. At present, GrE has Commitment Pools that allow exchange of group-issued CAVs in Nairobi and various reciprocal labor associations in Kenya. This scalability highlights the transformative potential of commitment pooling, demonstrating how it can facilitate resource coordination and economic cooperation across diverse communities and geographies.

3.3. Commons Stewardship

Commitment Pooling mirrors the dynamics of commons stewardship, as it relies on mutual trust and cooperation rather than hierarchical control, making it a natural fit for managing intangible resources such as commitments. Elinor Ostrom (1990), renowned for her work on commons stewardship, developed eight principles for managing shared resources, which can offer valuable insights for Commitment Pooling Protocol. Ostrom's research, based on historical and contemporary examples of resource management, emphasized how communities can organize to manage common resources without centralized control. As will be illustrated shortly, these principles—ranging from clearly defined boundaries to collective decision-making and conflict resolution. Below we will mention the eight principles and how they relate to Commitment Pooling.

1. **Clearly Defined Boundaries:** Ostrom emphasized the need for well-defined boundaries around the resource system and its users. In the context of Commitment Pooling, these boundaries delineate who can participate in the pool and what commitments are being pooled. The definition of who belongs to the commons and what their roles are helps to manage expectations and resources, ensuring that only those who contribute to the pool can benefit from it. This prevents free-riding and enhances collective responsibility.
2. **Congruence Between Rules and Local Conditions:** The rules governing the usage of resources in a Commitment Pool must be adapted to fit the specific cultural, social, and economic conditions of the community. This flexibility ensures that local practices, such as rotational labor systems like Mweria in the Mijikenda communities, are respected and incorporated. By aligning the protocol with local traditions, such as Dhome gatherings where decisions on resource management are made, Commitment Pooling reflects the unique needs and capacities of each group. This approach ensures that the infrastructure for pooling is responsive to the available labor, cultural practices, and types of resources within a community, fostering deeper engagement and sustainability.
3. **Collective-Choice Arrangements:** In line with Ostrom's principle of collective decision-making, Commitment Pooling preserves the autonomy of participants by enabling them to have a say in the rules that govern their pooled resources. This is exemplified in Dhome gatherings, where the community comes together to make decisions about shared labor and commitments. By decentralizing stewardship and allowing members to co-create the rules, Commitment Pooling ensures that each participant feels invested in the system, strengthening their commitment to the collective. With Community Asset Vouchers (CAVs) and other pooled resources, decisions about allocation and distribution can be made collectively, reflecting the interests and priorities of the group.
4. **Monitoring:** Effective monitoring is crucial in Commitment Pooling to ensure that commitments are met and rules are followed. This aligns with traditional systems like the Dhome, where elders and community members monitor and enforce the rules of stewardship. In the digital context, Commitment Pooling leverages tools like Sarafu.Network with a blockchain-based ledger to transparently track the exchange of commitments. These systems provide real-time accountability, allowing members to monitor contributions and withdrawals, thereby building trust and ensuring that the commons are managed responsibly.
5. **Graduated Sanctions:** In Commitment Pooling, participants who fail to meet their commitments can face graduated sanctions, a system where penalties increase based on the severity or repetition of the violation. Such sanctions can include a lower valuation or reduced limits. This mirrors traditional practices in systems like Mweria, where failure to participate in communal labor could lead to escalating consequences, but always with an opportunity for correction. By using a system of graduated sanctions, Commitment Pooling ensures that individuals are given the chance to rectify their behavior before being excluded, maintaining the long-term functionality and fairness of the commons.
6. **Conflict Resolution Mechanisms:** Accessible conflict resolution mechanisms are essential for maintaining harmony and trust in Commitment Pooling. In traditional systems like the Dhome, conflicts are often resolved through community gatherings where mediation and consensus-building take place. Similarly, Commitment

Pooling integrates conflict resolution through regular meetings, third-party mediation, or digital platforms, ensuring that disputes over the value of contributions or fulfillment of commitments can be addressed efficiently and at a low cost. This helps maintain the cohesion and functionality of the commons.

7. **Minimal Recognition of Rights to Organize:** Commitment Pooling emphasizes the autonomy of communities to manage their own economic systems without interference from external authorities, reflecting Ostrom's principle of recognizing local stewardship responsibilities and rights. Like the Dhome practice, where local elders manage resources without external oversight, Commitment Pooling empowers communities to govern their commitments and resources on their own terms. This autonomy is critical for resilience, as it allows communities to develop systems that reflect their own cultural values and needs, independent of centralized monetary systems.
8. **Nested Enterprises:** Commitment Pooling operates at multiple levels, aligning with Ostrom's principle of nested enterprises. This holonic structure begins with individual commitments, which are pooled within groups and then connected to larger networks of groups, forming a multi-layered system of resource coordination. Just as the Dhome system functions within families, clans, and larger communities, Commitment Pools are nested within broader regional or global networks, allowing for both local autonomy and wider cooperation. This scalability ensures that Commitment Pooling can expand while preserving the independence and self-organization of smaller units, making the system both resilient and adaptable across different contexts.

The integration of these principles and practices within Commitment Pools paves the way for a more holistic and scalable approach to resource management - the Economic Commons framework, which we will explore in the next section.

4. ECONOMIC COMMONS

The agreements around the management of CAVs and Commitment Pools as implemented and facilitated by GrE are cataloged inline with Ostrom's intangible commons in what we call an Economic Commons. The primary purpose of Economic Commons is to enable resource cooperation for the collective well-being of its members. This is achieved through mutually accepted instruments (such as CAVs and Commitment Pools) that share surplus value, costs, and risks fairly among members. Much of this framework is based on Chris Cook's non-dominum framework (see Bhandal, 2013) and has been customized by communities working with GrE since 2020. Currently, all communities issuing Community Asset Vouchers and utilizing Commitment Pools use some form of Economic Commons as a template for their collective agreements. The Economic Commons comprises key principles (Box 1), statutes (Box 2), and instruments implementing them (Box 3).

Box 1. Key Organizing Principles of the Economic Commons

1. **Care for People:** The principle of Care for People emphasizes collaboration and vision-driven care for the well-being and happiness of all community members. It ensures that the needs and aspirations of individuals are addressed collectively, fostering a supportive and inclusive environment.
2. **Care for the Environment:** This principle supports environmental protection and regeneration, minimizing the use of finite resources for economic activities. It advocates for an ecosystem management approach to farming and business development, ensuring sustainable practices that benefit both the community and the environment.
3. **Fairness:** Fairness ensures secure and equitable access to instruments, land, resources, knowledge, and care for members from diverse backgrounds, ages, genders, and religions. It promotes justice and equality within the community, preventing dominance and exploitation.
4. **Reciprocity:** Reciprocity involves the mutual sharing of risks, costs, and surplus among community members. It ensures that all contributions and benefits are balanced, fostering a sense of mutual responsibility and interdependence.

5. **Non-Dominance:** The principle of Non-Dominance ensures that no person or association has dominant rights over another's resources, such as data, finances, intellect, materials, or freedom. It promotes equal power dynamics and respects the autonomy of all members.
6. **Resilience:** Resilience refers to the community's capacity to prepare for, address, and adapt to economic, political, climate, and other events. It ensures sustainable community-based systems and the ability to withstand and recover from adverse situations.

These principles were a template developed by community groups across Kenya as well as with advisors from the fields of permaculture and community action planning. Their job is to guide any stewardship actions performed using the instruments of the commons. People implementing such a framework should be keen to adjust and change them to reflect their own values.

Box 2. Statutes of Economic Commons

1. **Membership Agreements and Admissions:** Members of an Economic Commons include individuals, organizations, or associations with a common purpose. There are three classes of members: General Members, Core Service Providers, and Guardians. Members must mutually agree to standards, rights, and obligations. Non-performing members must issue certificates attesting to their situation and comply with review recommendations.
 - **General Members:** Utilize all instruments, vote on usage, and report non-compliance.
 - **Core Service Providers:** Provide essential services, manage ledgers, and ensure data security and transparency.
 - **Guardians:** Develop, design, implement the Commons, and hold veto rights over incompatible amendments and decisions.
2. **Jurisdiction:** The Economic Commons transcends national and religious law, sharing data globally among members independently of jurisdiction.
3. **Amendments:** Amendments to the agreement require a majority vote and can be vetoed by guardians if incompatible with the aims and principles of the Commons.
4. **Entirety & Notices:** This agreement represents the mutual consent of members to the common purpose. Notices and votes to change the agreement must be delivered via guardian contact information.
5. **Official Signatories:** The agreement is signed by duly authorized guardians, general members, and core service providers, who agree to abide by its terms.

These are based on a non-dominium framework for agreements with a mixture of elements from standard memoranda of understanding.

Box 3. Instruments in the Economic Commons

1. **Ledgers:** Ledgers are shared memory systems which can as well be implemented as digital accounting databases that enumerate and qualify instruments subject to mutual agreements or organizational rules. They ensure transparency, accountability, and efficient management of community resources.

2. **Community Asset Vouchers (CAVs):** These instruments represent formal commitments and are used within an Economic Commons to facilitate economic transactions and foster community development. CAVs promote local trade, social cohesion, and sustainable practices. They are initiated and managed by local communities, addressing specific economic needs and priorities.
3. **Commitment Pools:** They are treasury-like value storage objects that hold CAVs and enable reciprocal exchange between them. They facilitate the management and distribution of CAVs within the community, ensuring equitable access and efficient resource allocation.

4.1. *Digital Systems*

Grassroots Economics has taken a significant step towards realizing the vision of commitment pooling through the development of free and open-source software (FOSS) that empowers communities to establish and manage their own Economic Commons. This software ecosystem, exemplified by the Sarafu.Network, provides the digital infrastructure and tools to operationalize the key instruments of the Economic Commons framework (Box 3). The first one is a ledger. In GrE, we use a specific type called a Distributed Ledger or blockchain. This plays a crucial role in mimicking and enhancing traditional and ecological resource coordination systems (Catalini and Gans, 2016) . Here are several ways in which blockchain contributes to these systems:

Blockchain's decentralized ledger ensures that all transactions are recorded transparently and immutably. This transparency builds trust among community members, as they can verify transactions and track the flow of resources. In traditional systems like Mweria, trust is built through face-to-face interactions and communal oversight. Blockchain replicates this by providing a transparent record of all commitments and exchanges.

The cryptographic nature of blockchain technology secures authentication, transactions and prevents many kinds of fraud. Each transaction is validated by a network of nodes, ensuring that only legitimate transactions are recorded. This security is essential for maintaining the integrity of the resource pool and protecting against malicious activities, much like the social norms and enforcement mechanisms in traditional systems.

Blockchain enables efficient and scalable resource coordination by automating processes through smart contracts. Smart contracts are self-executing agreements with terms directly written into code, which can automatically enforce the rules of the Commitment Pooling protocol. This automation reduces the administrative burden and allows the system to scale beyond local communities to larger, more dispersed networks.

Blockchain can integrate various forms of digital assets and traditional practices, allowing different communities to interoperate. For example, Sarafu.Network can facilitate exchanges between different community currencies and other digital tokens, creating a broader network of resource coordination. This interoperability is akin to the ecological networks of mycorrhizal fungi, which connect multiple plant species to share resources efficiently.

The decentralized nature of blockchain ensures that the system is resilient to failures and adaptable to changes. Unlike centralized systems, where a single point of failure can disrupt the entire network, blockchain's distributed ledger ensures continuity and robustness. This resilience mirrors the adaptive strategies found in ecological systems, where diversity and decentralization enhance stability and sustainability.

Overall, the blockchain provides what can be called a consensus layer which includes a memory system, authentication and verifiable execution of agreements. Building on this, implementing the four functions of Commitment Pooling protocol has been fairly straightforward as a suite of smart contracts that can be published and interacted with by permissioned stewards.

The curation process starts by each commitment allowed in the pool being represented as a unique digital Community Asset Voucher (CAV). This digitization provides a transparent and immutable record of each commitment, making them easily trackable and verifiable. Specifically, the CAV is a smart contract (computer program) that a person or any entity can publish that keeps track of whoever holds a portion of its supply and also can automatically deal with demurrage or expiration rates. A Commitment Pool is similarly a suite of smart

contracts that include implementations of the four protocol functions. The smart contract can define the rules for adding commitments to the pool, including eligibility criteria and any necessary approvals. Blockchain's distributed ledger technology ensures that the record of commitments is stored across multiple nodes, acting as a consensus layer and enhancing security and transparency. It is important to note that the view of credit and debt on a commitment pool network allows someone to look at the assets they hold and see how much credit they have across the network with any other user.

Relative valuation is done through a price index that can enable stewards to determine the relative value of different commitments. External data sources and oracles can provide real-time price information for certain commodities or services that are connected to certain markets like stable coins, helping to establish a reference point for valuing related commitments within the pool. Smart contracts can as well be designed to adjust the relative value of commitments based on supply and demand within the pool.

Capacity management is done via a real-time view of the total commitments within the pool. This allows for continuous monitoring of the pool's capacity and helps prevent over-commitment or depletion of specific resources. Smart contracts can be programmed to dynamically adjust the limits on reciprocal drawing rights based on previous performance, current capacity and demand within the pool. This helps ensure a balance between the needs of the community and the sustainability of the pool. In more advanced implementations, algorithms could be used to analyze historical data and market trends to predict future demand and adjust capacity limits accordingly.

The last function of peer-to-peer exchange is enabled by blockchain smart contracts - eliminating the need for intermediaries and reducing transaction costs. Smart contracts can facilitate atomic swaps, where two parties exchange commitments simultaneously, ensuring a secure transaction. Further, they can automate the collection of stewardship fees, helping to ensure investment, transparency and accountability in the management of the pool. The blockchain's immutable ledger provides a clear record of all transactions and fee collections. Members (anyone holding allowed commitments) can then draw reciprocally from this pool as needed, while ensuring that resources are distributed equitably and efficiently and that credit (access rights) and debts (outstanding commitments) can be mutually cleared.

5. TOWARDS A SYNERGISTIC SYSTEM

This paper has explored the concept of Commitment Pools as an economic infrastructure inspired by ancestral wisdom, focusing on proto-social infrastructures and protocols derived from physics, nature, history, and digital technologies. By examining the interactions seen by Grassroots Economics between traditional practices like the Mijikenda community's Dhome tradition and modern digital systems, we have pointed in the direction of how infrastructures and stewardship enable Commitment Pooling to effectively manage and distribute resources, fostering collaboration, equity, and resilience within communities. The transition to synergistic relationships in ecological systems provides a compelling case for the transformation needed in economic systems. In nature, relationships between species can evolve from predatory or parasitic to mutualistic, where both parties benefit from the interaction. Drawing parallels to economic systems, the capitalist model often prioritizes short-term profits and resource extraction without sufficient regard for long-term sustainability and community well-being. The capitalist approach tends to exploit resources, akin to a parasitic relationship.

To transition to symbiosis, it is crucial to introduce a system where people holding wealth and power and communities can collaboratively build and protect shared resources, much like the evolved relationship between mycorrhizal fungi and their host plants. This involves creating incentives for investment in the long-term health and sustainability of ecosystems and communities, thereby transforming their role from exploitation to stewardship. I believe that the implementation of Commitment Pooling does so by aligning individual incentives with collective well-being, thus transforming competitive interactions into cooperative ones.

To encourage adoption of this synergistic model, it is essential to offer them tangible benefits and roles within the system. By allowing those with monetary wealth to protect and grow their wealth, through seed investment in sustainable and community-driven projects, they can see the long-term value of their contributions. For instance, investment in zero-interest loans, regenerative agriculture, community infrastructure, or ecosystem restoration projects can offer both financial returns via pool stewardship fees and social/environmental benefits. The concept of seeding Commitment Pools with initial capital or resources acts as an endowment or catalyst, much like planting

seeds in a garden. These initial investments can grow and multiply, fostering a thriving ecosystem that benefits all participants. The core competencies required to execute the necessary stewardship system for such a vision include:

1. The steward should have mastery of the Core Pool Functions.
 - a. Curation: The individual must be capable of assessing and selecting participants, ensuring that the goods or services curated align with the pool's objectives and the needs of the community it serves. This involves active engagement with local networks to ensure inclusivity and sustainability.
 - b. Valuation: The steward must demonstrate proficiency in evaluating the contributions of participants in a fair and transparent manner. This includes setting relative values of different goods, services, and commitments using methods that respect both local economies and broader ecosystems.
 - c. Limitation: The individual should be skilled in setting limits on the resources within the pool to avoid over-commitment and depletion. This includes managing the allocation of community asset vouchers and ensuring that contributions match capacity.
2. Exchange: The steward must facilitate smooth exchanges within and across the pool, ensuring that commitments can be fairly and easily traded among participants. They should also enable cross-pollination across different pools and networks, ensuring that exchanges benefit the broader ecosystem. The individual must have the capacity to bring in seed funds either from their own resources or by securing external support. This could involve engaging with endowments or donors, managing investments into the pool, or leveraging community assets for initial funding. Beyond securing the seed resources, the steward must ensure these resources are allocated wisely to enhance the pool's ability to generate further value, creating a revolving mechanism where resources continuously support the ecosystem.
3. Stewards should exhibit strong community leadership skills, fostering trust among pool participants. This involves active participation in local traditions, respecting indigenous knowledge, and building on ancestral systems like ROLA (Rotating Labor Associations) to drive collective benefit. They must act as service providers to both curated participants and clients, ensuring that all stakeholders see value in their involvement with the pool. As is said, "You move at the speed of trust."
4. The steward must encourage cross-pollination of ideas, services, and goods, both within the pool and between different pools. This means creating opportunities for participants to exchange commitments not just within their local pool but also across different communities, amplifying the overall value and utility.
5. The steward should be adept at setting and managing appropriate fees for the pool's operations. This includes ensuring that fees do not deter participation but contribute to the sustainability of the pool while providing fair compensation for services.
6. The steward should be comfortable with the use of decentralized technologies and tools, such as digital vouchers or blockchain systems. This ensures transparent management and exchange of commitments; and that the pool can scale appropriately while maintaining trust and accessibility.

The ancient Roman tradition of forced taxation with centralized monetary systems seems to have laid the groundwork for modern capitalism, characterized by hierarchical structures and resource extraction. To transform from these traditions to a more cooperative and sustainable model and at larger scales, we propose the following steps:

1. Raise awareness regarding the benefits of commitment pooling. Use workshops, training sessions, and digital platforms to disseminate knowledge and best practices.
2. Advocate for policies that support cooperative models and the implementation of Commitment Pools. This includes creating formal legal frameworks and providing financial incentives for sustainable practices.
3. Foster active participation from all community members in the stewardship of Commitment Pools through Economic Commons. Ensure these systems are inclusive, transparent, and responsive to community needs.
4. Develop digital tools and infrastructure that support Commitment Pools. This includes user-friendly platforms for tracking and exchanging commitments and ensuring technology access for all community members.

In conclusion, this paper has explored Commitment Pooling as a multi-faceted approach to resource coordination, emphasizing the infrastructure, and stewardship for effective utilization of the protocol. The Commitment Pooling protocol acts as the foundational set of rules and procedures that govern how resources are managed and exchanged within a community, drawing on principles of reciprocity and mutual support. The infrastructure, encompassing both social systems like rotational labor (Mweria) and technological frameworks like blockchain,

provides the physical and digital structures needed to facilitate the pooling, tracking, and exchange of commitments. Finally, the role of stewardship is central to ensuring that these systems are managed responsibly, with designated community members overseeing the protocols for fair distribution of resources and maintaining the long-term sustainability of the pool. By combining these elements—protocol, infrastructure, and stewardship—Commitment Pooling offers a powerful model for fostering decentralized, cooperative economies that strengthen community resilience and equity. Looking forward, this system has the potential to not only address the economic challenges of today but also to pave the way for regenerative, community-centered resource management in the future.

NOTES

REFERENCES

- Allen, M. F. (1991). *The ecology of mycorrhizae*. Cambridge University Press.
- Agrios, G. N. (2005). *Plant pathology* (5th ed.). Elsevier Academic Press.
- Bergstra, J. A., & Burgess, M. (2014). Promise Theory: Principles and Applications. <https://arxiv.org/abs/1405.2628>
- P2P Foundation. (n.d.). *Non-dominium*. P2P Foundation Wiki. <https://wiki.p2pfoundation.net/Nondominium>
- Bhandal, M. K. (2013, January 16). Submission by Chris Cook to the Land Reform Review Group. <https://blogs.ucl.ac.uk/resilience/2013/01/16/submission-by-chris-cook-to-the-land-reform-review-group/>
- Boyd, G. (2023). The Ergodic Investor and Entrepreneur. Evolutesix.
- Catalini, C., & Gans, J. S. (2016). Some Simple Economics of the Blockchain. *NBER Working Paper No. 22952*. National Bureau of Economic Research.
- Chagnon, P. L., Bradley, R. L., Maherali, H., & Klironomos, J. N. (2013). A trait-based framework to understand life history of mycorrhizal fungi. *Trends in Plant Science*, 18(9), 484-491.
- Holewinski, B. (n.d.). Underground Networking: The Amazing Connections Beneath Your Feet. National Foundation Forest. Retrieved from <https://www.nationalforests.org/blog/underground-mycorrhizal-network>
- Koestler, A. (1967). *The Ghost in the Machine*. Arkana.
- Krikke, J. (2024). The Tao, Holons, and the Theory of Everything. Retrieved from <https://jankrikke2020.medium.com/the-tao-holons-and-the-theory-of-everything-47b0fcc934d3>
- Li, Y., & Khessina, O. (2020). *Academy of Management Proceedings*, 2020(1), 10146. doi:10.5465/ambpp.2020.10146abstract
- Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge University Press.
- Ruddick, W. O. (2023). *Commitment Pooling - An Economic Protocol Inspired by Ancestral Wisdom*. *International Journal of Community Currency Research*, 27, 54-79. DOI: <http://dx.doi.org/10.15133/j.ijccr.2023-004>.
- Schattenhofer, K. (2019). Was bedeutet eigentlich Selbststeuerung in sozialen Systemen? Oder: Das gruppensdynamische Training als Prototyp eines reflexiven Sozialsystems. *Der Mensch in der Selbstorganisation*.

ACKNOWLEDGEMENTS

The author wishes to acknowledge the significant contributions of Patricia Marcella Evite to this paper. Their insightful comments and meticulous editing improved the clarity and precision of the paper. Furthermore, the conceptual framework illustrations, skillfully crafted by them also have greatly enhanced the reader's

understanding of the key principles presented herein. This work and much more went into the publication of *Grassroots Economics: Reflection and Practice* <https://willruddick.substack.com/p/grassroots-economics-the-book-is> Many more acknowledgements can be found here.

FUNDING

The author received no financial support for the research, authorship, and/or publication of this article.

ABOUT THE AUTHOR

Will Ruddick, a grassroots economist, combines traditional practices and economic innovation. After graduate school in high-energy physics at Stanford Linear Accelerator Center and Economics at the University of Cape Town, his passion shifted to grassroots economics. Based in East Africa since 2008, he's implemented programs in resource coordination with local groups spanning the globe, connecting communities with their abundance. Founder of Grassroots Economics Foundation, he's a pioneer on commitment pooling, an economic protocol inspired by ancestral wisdom.

GLOSSARY

Blockchain: A decentralized and distributed digital ledger technology that records transactions in a secure and transparent manner while providing authentication and execution of programmable smart contracts.

Commitment Pooling: The aggregation of individual or group commitments into a collective pool, enabling communities to manage and exchange resources equitably.

Community Asset Vouchers (CAVs): Digital or physical tokens representing commitments to provide goods, services, or labor within a community.

Dhome: A traditional gathering in Mijikenda communities where members discuss community issues, make collective decisions, and plan for the future.

Economic Commons: A framework that facilitates joint stewardship of common instruments for resource cooperation and mutual support within communities.

Ergodicity: A concept from statistical mechanics that describes how systems explore a wide range of states over time, leading to stable statistical properties.

Holons: Autonomous units within a system that function independently while also contributing to the larger whole.

Mweria/Chikola: Mijikenda terms for traditional practices of rotational labor or exchange labor, where community members take turns performing tasks for the collective benefit.

Proto-social: Refers to preliminary or experimental forms of social organization that precede the emergence of established structures, emphasizing cooperation and resource sharing.

Smart Contracts: Executable contracts with the terms of the agreement directly written into lines of code and executed by a blockchain.

Stewardship: The responsible management and oversight of shared resources, ensuring their sustainability and equitable distribution.



This content is licensed under a Creative Commons Attribution-NonCommercial Share Alike 4.0 International License (CC BY-NC-SA-4.0). To view a copy of this license, <https://creativecommons.org/licenses/by-nc-sa/4.0/>

This is an open access article, permissioned by the authors and by IJCCR as part of RAMICS (independent association)