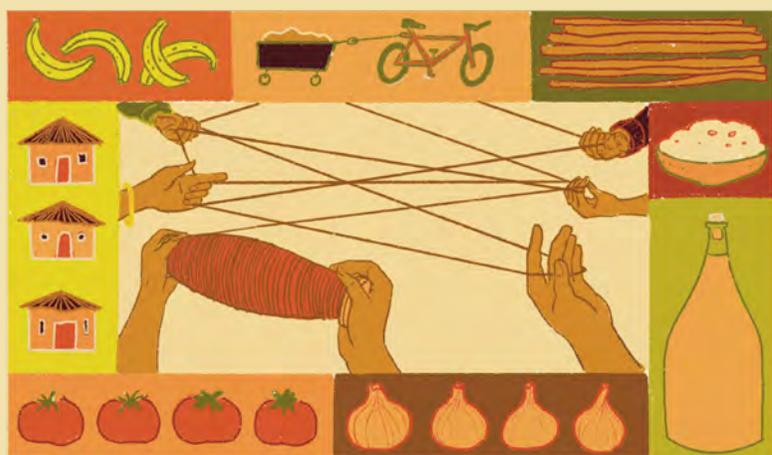


GRASSROOTS ECONOMICS

REFLECTION AND PRACTICE

William O. Ruddick



Grassroots Economics Foundation

Grassroots Economics: Reflection and Practice

—

William O. Ruddick

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Forewords

In 2008, at the end of a social gathering, two friends of mine, one, Aubrey Hornsby, a venture capitalist seeking to support and invest in social impact entrepreneurs, the other Will Ruddick, the future founder of Grassroots Economics and the author of this book, were talking. Aubrey asked Will a number of challenging questions. It got a little heated. Afterward, Aubrey said to me, in a puzzled tone, “Will is not motivated by money.” That’s right. Will is motivated by love, by creating harmonious relationships, and by attempting to solve real problems, regardless of the difficulty.

Will might not be motivated by money, but his understanding of money is profound. He sees money as a type of promise—as a fungible unit of trust. He is exploring old knowledge, of how, over tens of thousands of years, villagers learned to manage promises, to build trust and to take care of each other. He is also exploring how those basic human protocols for sharing, mutual care, and fairness can be adapted to underlie distributed ledger platforms, useful at any scale.

My work parallels Will’s, with my focus on increasing collaboration and self-governance in populations in distress or after a mass trauma. Like him, I am working in sub-Saharan Africa (Liberia) and with generalizable, cross-cultural protocols. There are many of us, working to build the infrastructure of our emerging global society. The world is better for Will and his work. He is a good friend and a good man. I say, learn what he is teaching.

Dr. Eric Wolterstorff, CEO, Sovereignty First

What constitutes value? How is it created, represented, and exchanged?

These questions have driven my 25 years of work across Africa—in countries like the Democratic Republic of Congo, Zimbabwe, and South Sudan—designing projects to build resilience. From my father’s homeland of Abyei along the banks of the Nile, to international agencies, charities, and corporations, I sought ways to apply what I call the STRIVE principle: sustainable technologies reinforcing indigenous values and economics. But it wasn’t until I found myself sitting in a Kaya with Will Ruddick in Kilifi County, Kenya, that I truly understood what this principle could look like in practice.

The Kaya—spiritual institutions housed in sacred groves—are places where elders connect with ancestors, heal communities, and protect forests. These sacred spaces became the setting for countless conversations between Will and me as we explored how ancient traditions could inform modern economics. Through his groundbreaking work with Grassroots Economics, Will skillfully connects practices like rotational labor and collective commitment-setting with a vision of economies rooted in reciprocity and renewal.

Will’s metaphors—such as the interconnected mycorrhizal fungi and the symbiotic dance of the “Three Sisters”—challenge speculative capitalism and offer an alternative grounded in collaboration, resilience, and shared abundance. His work bridges ancient African traditions and the wisdom of nature, presenting a model of grassroots economies that thrive in harmony with cultural and ecological values.

This foreword is not only a testament to Will’s vision but also a deeply personal journey for me. It demonstrates how communities can reclaim their social and economic fabric by aligning with the rhythms of nature and the foundational truths of human connection. With rich examples from the Kaya, African lore, and real-world implementation, this work is both a call to rediscover ancestral wisdom and a roadmap for building more just and sustainable economies.

Daniel J. Deng, Partner, Detcro, LLC

The search for wisdom compels those of us who seek it to search for it wherever it can be found. As a steward of Cooperation Jackson, I searched all over the globe looking for a model of equitable exchange for the distribution of essential goods and services that did not require or enable exploitation and extraction. A model that would serve the material and social needs of the Black working class of Jackson, Mississippi who constitute the overwhelming majority of the city's population, with the objective being the enablement of greater economic autonomy and self-determination. And after searching for nearly a decade, I am more than thrilled to say that I found exactly what I was looking for in Kilifi, Kenya in the living example of the dynamic system of coordinating decentralized commitment pools combined with rotational labor deployment and collective resource allocation that is being revived and reinvigorated by the incorporation of context-appropriate social-digital technologies being facilitated by the Grassroots Economics Foundation.

This excellent work will illustrate to you exactly why we adopted this methodology and model, and why we are working to make it central to our program and practice of cooperative economic development in Jackson, Mississippi to help us further advance our effort to democratize and humanize the US economy. Which is not a small task by any stretch of the imagination. However, we firmly believe that by incorporating the wisdom Will Ruddick has synthesized in this work into the social movements in the United States, we will take some major leaps forward in accomplishing this task.

I strongly encourage you to read this work with an open heart and an open mind. And be willing to embrace the magic that can happen when we reconnect with the traditional practices of deliberative democracy and collective care that existed in all of our ancient cultures and combine them with the best technologies and knowledge systems our modern world has to offer that are premised on decentralization, horizontalism, and distributive resource management and allocation. When read with this view in mind, I firmly believe you will see this work as a critical contribution towards the development of a renewed and better world.

Kali Akuno, Cooperation Jackson

As an ecosystem restoration designer and community leader, I have spent over two decades deeply engaged in structures dedicated to ecological restoration, immersed in the art of cultivating and stewarding landscapes and commons coordination. I have studied on the ground the social, ecological, and economical realities of participatory structures where people build societies of trust and mutual service, in the cycle of giving back to nature and to each other. My exploration has encompassed applied sciences such as ecosystem restoration, water cycles, agroforestry, permaculture, biology, and ecology. From water retention landscapes to aquifer recharge, seed conservation to species identification, soil building, and biomass accumulation. From the functions of plants, the potential of seeds, and the intricacies of handcrafting resilient systems, I came to realise that ecosystem functionality is not just about data points but living values that communities have cared for across generations as part of global commons. To me, ecosystem stewardship is the path to rebuilding socio-economic landscapes, weaving together the interconnected systems we live in. My journey in landscape design and territorial management has been profoundly shaped by studying landscape stewardship traditions and practices in diverse countries. I noticed similar principles across continents and cultures, recognizing their universal relevance.

When I met Will Ruddick in Kilifi, Kenya, I found someone who not only shared this ethos but had developed technological tools to value, share, and elevate the knowledge and wisdom of grassroots initiatives. Using technology as the digital expression of what is curated and valued on the ground, his approach to collective resource coordination is not only visionary but rooted in the lived realities of communities often overlooked in mainstream narratives. I have found deep inspiration in building communities and ecosystems through honoring local stewardship traditions such as Mweria and Dhome in Kenya, reigniting inherited participatory social systems. Growing up in the rural countryside of Normandy in North West France, I witnessed similar ways of organizing and a similar mutual service network in the village I was living in, too. We were all like an extended family, with close relationships, connection to nature and commitment to each other. I now use Grassroots Economics and Sarafu Network tools for ecosystem restoration to connect landscapes and stewards, valuing their capacity and heritage to self organise and commit to collective action. I also create and share certificates for regenerative ecosystem restoration practices, for example, for water systems, soil science, and food production, making accessible adapted regenerative ecosystem restoration design and strategies to local communities, and offering a continuous hands-on learning program led by the people.

The technology helps me coordinate and connect people, track the activities being done and broadcast projects, achievements, impacts, and knowledge sharing.

This book is a call to action, a guide, and a celebration of what is possible when we come together with intention and mutual care. It inspires and equips us to be stewards of both our communities and our ecosystems, knowing that the two are inextricably linked. It supports those already on the ground, and those willing to step into doing the vital work of building a caring society. Its tools are site-specific, designed to honor and grow around local cultures and traditions, while also allowing connections between different people from different contexts, climates, beliefs systems, and socioeconomic realities globally. I envision people as integral parts of nature, with nature seamlessly woven into the fabric of our shared commons. Using decentralized technologies to allow transparent data flows, exchanges, and transactions and co-create thriving collaborative and participatory structures, forging connections between local and global individuals, groups, enterprises willing to transform their households, villages, and regions. Capturing value flows, commitments, agreements, and interactions of living and symbiotic organisms and enabling collaborative and participatory systems.

Aude Péronne, Ecosystem Steward

This economics field guide offers a practical solution to one of humanity's greatest challenges—our struggle to cooperate for mutual benefit.

From traffic jams and overfishing to trade imbalances and climate change, decentralized coordination failures over shared resources are pervasive. The issue lies not in the lack of willingness to cooperate, but in the absence of a mechanism to organize collective action effectively. Economists such as John Maynard Keynes, Elinor Ostrom, and Friedrich von Hayek have proposed solutions ranging from treaties, standards, regulation, privatization, and tokenization. For Will Ruddick the answer is “commitment pooling.”

This guide provides a step-by-step approach to commitment pools, starting with a small group of thoughtful, committed community members. Drawing on inspiration from transgenerational knowledge native to Kenya and evoking the biomimicry of mycorrhizal networks, Ruddick presents a non-monetary economic system for coordinating resources, evolving from his prior grassroots currency initiatives.

As a monetary theorist I have closely followed Ruddick's evolution with great interest. His groundbreaking work in the field of complementary currencies set new standards, with his early adoption of mobile phone and blockchain technologies, and his unparalleled ability to scale community-based systems into polycentric networks of tens of thousands, demonstrates his visionary leadership in this field. His team at Grassroots Economics has empowered marginalised communities in urban slums, refugee camps, and poor rural areas across Kenya and beyond.

The pivot away from community currencies to commitment pools marks an advancement in Ruddick's thinking, if at first surprising. It mirrors the epiphany that struck John Maynard Keynes in the 1930s. In *The Means To Prosperity* Keynes questioned how the global economy, with a shortage of gold (or international reserves), could coordinate in a manner that abundance rather than scarcity would prevail. His solution evolved into his famous 1941 international clearing union, based on trade balance and reciprocity, with no national currency. Keynes argued that a gold, sterling, or dollar international monetary system would propagate persistent trade imbalances, unfair trade, speculative capital, and economic instability. An accounting system with a clearing union would suffice.

The commitment pool, like the clearing union, stands in stark contrast to a market-based system that relies on a national currency and competitive pricing. In such a system financial debts and credits set the stage for persistent trade imbalances, inequality, abuse of market power, and surplus extraction that creates cognitive dissonance and coordination failures.

Ruddick's vision for a network of small decentralized commitment pools, scaling through a network of polycentric governance structures, offers a radical perspective: that commitment and reciprocity, rather than financial exchange, drive effective cooperation and collection action.

Leanne Ussher. Ph.D., Economist

Will Ruddick has written something extraordinary—a guide that bridges ancient wisdom with modern technology to reimagine how communities can coordinate resources and build shared abundance. As someone deeply involved in developing systems for onchain (decentralized technologies) capital allocation through Gitcoin and Allo.capital, I'm struck by how Will's insights about indigenous resource allocation protocols mirror the core principles we're working to encode in blockchain systems.

The protocols Will documents—from the Mweria rotating labor traditions of Kenya to the intricate resource-sharing networks of mycorrhizal fungi—demonstrate that nature and human societies have already solved many of the coordination challenges we grapple with in Web3 (the next generation of internet). His practical framework shows how communities can pool commitments, establish trust, and facilitate exchange without dependence on centralized systems. These are exactly the patterns that many of us aim to enable through onchain mechanisms.

What makes this work particularly valuable is how it grounds abstract concepts about decentralized systems in tangible, human-scale practices that have stood the test of time. Will shows that effective resource coordination isn't just about clever mechanisms—it's about fostering the right relationships, cultural practices, and shared values. His extensive experience implementing these ideas through Grassroots Economics Foundation provides crucial lessons for anyone working to build better economic systems.

As we develop new tools for onchain capital allocation, Will's insights remind us to look beyond pure economic efficiency to consider how we can strengthen the social fabric that makes communities resilient. This book offers both practical guidance and inspiring examples of how to create systems that serve human flourishing. I'm grateful to Will for documenting these vital practices and helping us envision how traditional wisdom can inform the future of economic coordination.

Thank you, Will, for reminding us that any of us, with the right mindset and shared commitments, can seed a more resilient economy. Let these pages spark the open-source revolution that unites our ancestors' wisdom with our networked future.

Kevin Owocki, Founder, Allo.capital & Gitcoin

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This text is rooted in the work of **Grassroots Economics**, a non-profit foundation in Kenya that has collaborated with hundreds of previously marginalized communities to rediscover, harness, and share their collective abundance. Grassroots Economics has developed and implemented the frameworks and software discussed in this guide in partnership with these inspiring communities, ensuring the solutions are grounded in real-world experiences and needs.

Thanks so much to Nia Ruddick and Aude Peronne for living these practices together with me.

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About the Guide

Imagine a community where everyone shares a role in one another's well-being—a place where food, support, and resources flow as freely as nutrients in the roots and fungi beneath a forest floor. In such a community, no one is left to struggle alone, and the strength of one is the strength of all. In many communities glimpses of this spirit appear in times of crisis, when people come together to pool resources, offer help, exchange skills, and build trust. What if this wasn't the exception but the rule—a protocol deeply embedded in our communities?

This book focuses on resource coordination protocols—the shared agreements, practices, and systems that enable fair, sustainable distribution and use of resources—inherent in living systems (both ecological and social systems) and how they can be used to support interconnected, thriving communities.

Drawing from my life among the Mijikenda people of Kenya, I share observations of practices that, while unique to specific clans and families, reflect universal protocols found across the world. These protocols resonate deeply because they connect us to the wisdom of our ancestors and the living systems we emerged from. This book is a guide to speaking about and designing resilient, self-sustaining networks of communities by drawing on natural, ancient wisdom and modern resources.

Part 1 is structured as a reflection and journey, with each reflection offering a “step” toward a system that supports every member of the planetary community. Together, we'll query the fundamental principles of nature's economy, the insights of ancient resource coordination practices, and the underlying protocols that can create trust, sustainability, and shared abundance. We'll also look at where these protocols are inhibited to create centralization of power and decentralized technologies that offer a pathway to rebel.

In Part 2, you will see how these protocols have been implemented in practice by Grassroots Economics Foundation over the last decade—building on ancient tradition and supported by modern technologies. Each reflection builds on the last, providing you with core concepts and tools to bring these practices to life in your own community. You'll also find experiential games—simple, engaging exercises that allow you to embody the principles with your community.

This guide is a call to action: The sustainable, cooperative, and resilient future we seek has already been envisioned. Instead of inventing new systems, we can rediscover the protocols that helped ancient ecosystems and communities thrive. For generations, societies all around the world operated as interwoven communities, relying on abundance created through collaboration rather than competition. These practices—constituting an economics intrinsic to all living systems—coordinated resources, shared responsibilities, and ensured that everyone's needs were met. Today, we have the opportunity to revive and adapt these methods, integrating them with modern tools to create thriving, sustainable communities.

This book is designed to support organizations and individuals in allocating resources in ways that foster long-term connections, resilience, community development, and social cohesion. Grassroots organizations, cooperatives, faith-based institutions, and activists can use it to build social belonging, trust, and economic self-sufficiency. Humanitarian and environmental organizations will find tools to align their programs with principles inspired by living ecosystems and ancient social systems. Blockchain engineers and DAO stewards can apply these protocols to manage shared resources and implement mutual credit systems effectively.

Introduction

Ten years ago, I witnessed a community transforming and healing itself through an ancient practice into something that felt natural and normal, singing again the songs of their grandparents. In a small village in Kitui, Kenya, neighbors faced the challenge of drought. Water was scarce, food supplies were low, and survival looked uncertain. But instead of pulling away from each other, the community came together. They revived an ancient traditional system of rotational labor called **Mweria**,¹ taking turns collectively tending one another's homes and crops, while carefully and fairly pooling their time and other resources. Those with more knowledge shared it with others, those with seeds distributed them, and those with time worked tirelessly, ensuring that no one went hungry or thirsty—while ensuring that there was long-term reciprocity and fairness.

Once reawakened, these Mweria cycles have not stopped. The community is now using the same tradition to help build and repair houses and undertake large-scale water catchment programs—all without money. This experience left a profound impression on me. I saw, firsthand, the immense power of collective action and the momentum built from small but powerful seeds of commitment. This village didn't just survive the drought—they found a way to thrive by relying on one another as their ancestors had done for countless generations.

That's when I realized that much of the wisdom we need already exists—I just hadn't known where to look for it. Practices like rotational labor, shared stewardship, and resource pooling are not only possible but deeply rooted in our shared heritage. These ancient methods, which I saw come to life in those villages in Kitui, are more than practices—they hold deep protocols for resilience. Similar practices seem to be found across Kenya and in all cultures on the planet. They're adaptable, powerful tools that any community or living system can adopt to thrive. This guide represents a journey in reflection, hope, and understanding, with the aim of supporting and expanding these age-old practices across living systems and networks of trust.

¹ Note that many names are used for similar traditions across Kenya. The spelling of Mweria here is from the coast of Kenya, while among the Kamba it might be written as Mwethia.

The spirit of community is not just an abstract concept; it is a living, breathing entity woven into the fabric of our societies. Our strength emanates from this collective identity, a shared heritage that has been passed down through the generations. This heritage has inculcated in us the principles of communal support systems.

These practices are not novel; they are ancient economics, intrinsic to our cultures and ecosystems, forming the core of our relationships with one another.

The beauty of community lies in the support we extend to one another. However, the financial systems we live in today often act as a chasm that widens the gap between us, hindering our ability to work together and offer mutual support. Against this backdrop, ancient social and ecological resource coordination systems—and their role as protocols of trust and reciprocity—are of profound importance.

The experience I've gained from witnessing and taking part in these practices has been transformative. I've seen how these systems resonate with other life-affirming practices and proto-social protocols (foundational customs enabling cooperation and resource sharing) across the globe. Moreover, I have witnessed their versatility and adaptability, fitting seamlessly into a wide range of situations—from refugee camps, farming communities, and faith-based groups to blockchain and wireless mesh networks, urban cities, and business networks.

As the founder of Grassroots Economics Foundation, my intention for this book is to share my insights, learnings, language, and protocols to inspire and equip others. I envision a future where grassroots economics is not only propagated and seamlessly integrated into human ecosystems but is also recognized and embraced across the planet—enabling individuals and communities, both local and globally interconnected, to coordinate resources for well-being. This guide is a humble contribution toward that future.

Your Role

“ *Economics without spiritual, human, and ecological values is like sex without love.* ”

—
E.F. Schumacher

This journey isn't just about learning—it's about participating. As we uncover and reflect on the economic protocols which are intrinsic to living systems, it's important to realize that such protocols must already be present in our living culture, our values, our spirituality, our habitat, our families, and our own selves. You are part of this story, and your unique skills, resources, and dreams are essential to building resilient communities. Each reflection encourages you to try out new ideas, experiment with resource coordination practices, and take steps toward collective action. By the end, you'll have the tools, insights, and a roadmap to transform your community into a place where every person's needs are valued, and everyone contributes to a shared future.

I'll use the term community often in this guide. Community is not just the people around us; it is the connection between what we value and share collectively, the space where our shared resources and relationships come alive. I encourage you to be the seed that grows the community around you using and building on the protocols in this guide.

Take a moment to reflect: What experiences have you had with community support and resource sharing? Have there been times when you or someone you know received help without an explicit expectation of repayment? How did it feel? Was there a feeling of indebtedness? Did the relationship continue? What if we could bring the essence of those experiences into a language we could speak and protocols we could follow in our daily lives and structure our communities to support each other as the natural world does?

Here is an invitation to reconnect with our roots and to reimagine how we allocate and coordinate resources in ways that honor both our ancestors and the future we want. By embarking on this journey, you're joining a global movement—a pollination rebellion and a return to the roots of resilience.

So, let's begin.

2 Satish Kumar, editor of *Resurgence* magazine (from the 25th anniversary edition, Hartley & Marks, 1999).

Part 1:



Reflections

Reflection 1: Ecosystems

The word **economics** originates from the Ancient Greek term οἰκονομία (oikonomia). It is a compound word formed from οἶκος (oikos), meaning “society”, “house”, “home”, or “household”, and νόμος (nomos), meaning “law”, “custom”, “protocol”, “management”, or “stewardship”. The original meaning points to the stewardship of society. Today we can understand economies as systems or networks that coordinate (the production, distribution, and consumption of) resources and economics as the study of how these systems operate.

The term **Grassroots** originates as a metaphor for fundamental, foundational movements arising from ordinary people, akin to roots of grass; a single blade of grass is quite weak, but together the roots of grass can hold whole mountainsides together. Historically, it has signified bottom-up efforts driven by local action and participation. **Grassroots Economics** builds on this foundation, referring to the study and practice of resource coordination originating from the ground up, where communities manage and share their resources collectively.

The Ancient Greeks and other cultures that we will reflect on placed humans, and living systems in general, at the center of economics. To begin talking about economics in living systems we should connect with ecosystems as the root of all such economies. The ecosystems of plants and fungi are an amazing example of this. Plants offer nutrients to an underground mycorrhizal fungi network through their roots and surrounding soil. They also pull on the abundance of that network, receiving nutrients that have been transported by the fungi from far and wide. They give to the network when they have surplus, when they drop their leaves, and even when they die.

One way of thinking of these plants and connected root and fungal masses is as a common-pooled resource. This type of commons operates on a broad and long-term sense of reciprocity, where contributions and benefits are distributed over time rather than being immediate or one-to-one exchanges. Yet through a relational lens and an empathy framework we can imagine an intrinsic intention of reciprocity

(debt) of the plant that pulls water and nutrients from the network as well as an intrinsic expectation of reciprocity (credit) waiting to be fulfilled by the rest of the network.

Through this same lens we can imagine plant and fungal networks exhibiting a form of distributed consciousness rooted in evolutionary processes and ecological relationships. Their interactions seem to be guided by an intention to sustain life, expectations of reciprocity, and intrinsic commitments to the future, meaning that water and other nutrients the plant received from the network will eventually return to the greater network. The plant will someday give back all it has gained and more—the nutrients it has processed and produced from photosynthesis or bacterial symbiosis, as beans do to produce usable nitrogen.

That living network has built and continuously participates in an unspoken agreement—giving to the plants, while expecting the plants to give back in return. The network, made up of other plants, fungi, bacteria, and even animals in the ecosystem, can pull on that plant's nutrients (debt) in the future. Crucial to the economic protocols intrinsic to these systems are the resource pooling and coordination systems of fungal networks. The fungal network provides transportation, limited storage of nutrients, and directs the flow of nutrients among connected plants—while maintaining itself by eating from the network to grow and thrive. The key components or organs of mycorrhizal fungi,³ shown in Figure 1, include:

- **Hyphae:**
Thread-like structures that extend into the soil, absorbing water and nutrients like phosphorus, nitrogen, and potassium.
- **Mycelium:**
A network of hyphae that connects plant roots, facilitating and directing the *exchange* of nutrients between plants.
- **Arbuscules:**
Specialized structures within plant root cells that enable direct nutrient exchange between the fungus and the plant.

3 <https://www.sciencedirect.com/topics/biochemistry-genetics-and-molecular-biology/arbuscular-mycorrhiza>

- **Vesicles:**
Storage units within the hyphae that hold limited nutrients for later use, acting as a reserve or *common-pool resource* for the plants connected to the network.
- **Spores:**
Reproductive units that seed new fungal colonies, store genetic material and energy reserves, and germinate based on favorable conditions.

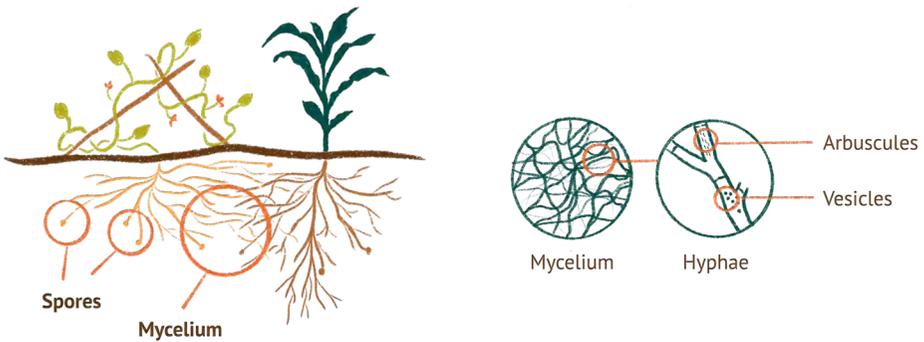


Figure 1. Plants and Fungi

There is a lot we don't know about these fungal networks but we can take the various functions of their organs as a basis set for resource coordination. These functions can be seen in the relationship between the fungi and the Three Sisters.

The Three Sisters and The Fungi

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 achieve optimal resource coordination which 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

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 them 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 human 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 provides and 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 and dispersing 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 nitrogen (N) into a form that can be used 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 coordinators, 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. In response, the beans release their excess nitrogen and the squash their abundant potassium 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. We will reflect on the functionality of ecosystems and compare them to the socioeconomic systems found in ancient human resource coordination practices.

Long-Term Reciprocity

The abundance and patience of natural systems that we can see in natural ecosystems is immense. A plant could pull on the network's nutrients their entire life. It could then be eaten by a deer, and that deer could feed on the abundance of such plants for their entire life, only returning nutrients through defecation and death, and the system continues chugging along just fine. In a healthy ecosystem each organism IS part of the common-pooled resources.

Of course, if that deer were to eat all the nutrients and then defecate them out on pavement or in sewage systems that can't reach back to the forest or soil, eventually over time that particular ecosystem's abundance would be depleted. But the deer is guided by biological limitations: it wants to stay in its forest habitat for companionship and food, so it ends up defecating and dying there, thereby returning the nutrients it has stored, biologically synthesized and processed.

The Pumpkin that Would Not Stop

Imagine a pumpkin that couldn't stop growing and could somehow force all nutrients on the planet to flow through it. Imagine it eventually towering over mountains and growing to the size of the moon. What could it possibly do with those resources? Perhaps it could try to pollinate and sprout pumpkins on another planet? While replication is one goal of many organisms, a healthy ecosystem is one in which everyone is a seed for common-pooled resources, and where the life of the network is greater than the life of any one pumpkin—no matter how big it is!



Even predatory relationships in nature follow this large-scale reciprocity of nutrients going back to the earth to feed the plants, then for the rabbits who eat the plants, and perhaps for the wolves to eat the rabbits—everything comes back eventually. Debts are settled, otherwise the living system breaks and dies. We'll revisit parasitic and predatory relationships later as we discuss monetary systems in Reflection 4.

Shared Reflections:



The topic of economics as it manifests in the natural world is vast and awe-inspiring. Some great places to start reading include Lynn Margulis on the Gaia hypothesis, Paul Stamets on fungal networks, and E.O. Wilson on Eusociality. If you are interested in understanding the intricate relationships between lichens, moss, trees, ants, and so on, I highly recommend that you explore the work of these ecologists and others. Their insights come from decades of observation.

The following section provides some reflections to help you observe ecosystems and how they can inform your approach to economics.

Can you observe ecosystem patterns and functions?

Keep a Record:

Honor and reflect on your insights and observations. Keep a journal! In your journal, jot down what you observe, how it makes you feel, and what you learn about resource coordination from nature. This journal will be useful throughout this guide. Note that ultimately we are all trainers of trainers. Your journal is as important as this guide!

————— “ *Remember, the only difference between screwing
around and science is writing it down.* ” —————

—
Adam Savage

Choose a Place to Observe:

Visit a natural area—a park, a garden,⁴ or even a quiet corner in your neighborhood. Go there as often as possible and observe how it changes. Notice the smells, colors, textures, and interactions between different elements. Where is the water? What are the insects doing? What creatures are eating or sheltering there? What is the effect of the sun? What is different from one year to the next?

Noticing Patterns:

Imagine how each element contributes to the whole. Do you notice patterns or cycles? What would it look like if your community, family or society followed a similar pattern? (Perhaps you can already notice some of these patterns?)

Observe Over Time:

Return to this place in different seasons. Observe the shifting relationships between plants, animals, and the environment. Notice how life adapts to changing conditions.

Nature has perfected the art of resilience through cycles, relationships, and cooperation. By viewing our communities as ecosystems, we can move beyond scarcity and competition, creating systems that allow all members to thrive. What if we designed our economies to be as resilient and interdependent as nature itself? The next reflection will explore how the ancestors did exactly this.

⁴ Gibson-Graham, Cameron, and Healy's book *Take Back the Economy* (2013) reimagines the economy like a garden, as a space of ethical decision-making.

Reflection 2: Ancestral Wisdom

While plant–fungal symbiosis can sound metaphorical, it is far more than a figure of speech. Ecosystems literally coordinate shared resources through feedback loops and reciprocity. Recognizing that human communities mirror these same patterns can be an empowering perspective, rather than mere analogy. We, too, can pool resources when we understand that, in living systems, mutual support is the foundation of resilience.

After learning from the Kamba people of Kitui, Kenya, as mentioned in the introduction, I found similar resilient communities in rural villages where I settled and lived along the coast of Kenya. I found nodes of cultural resilience called Kaya among the Mijikenda people, who have maintained a keen understanding of the abundance in nature as well as their role in reciprocity to nature and each other.

On the following page is a story inspired by tales of Mara the Storyteller⁵ and Mwakalu Chiti, an elder of the Duruma people.

⁵ *Mara the Storyteller is a wellspring of wisdom. You can find more stories here:*
<https://www.marathestoryteller.com/>



The Magic Calabash Story

Long ago, in a village nestled in a forest, a beloved elder held a sacred gourd called a calabash. Anyone in the community could take turns envisioning what they wanted, such as grains or tools, and it would magically appear in the calabash. But for the magic to work properly they also had to put things back in, like their surplus each season. So much had been placed in the calabash over the generations that some people doubted the need to add anything back in.

One day, two men who doubted the tradition crept into the elder's hut and stole the calabash. They fled to a cave and began greedily pulling all kinds of grains, precious herbs, gems, tools, and weapons from the calabash, until it started to crack. The two men were so excited as they pulled more and more from the calabash that they didn't notice the crack and eventually the calabash broke in half, trapping the men under a massive flood of everything that had ever been placed into it.

The next day, the elders and rest of the community found that the calabash was missing. They were upset because it was the basis for how they shared resources and cared for each other. After searching all over for it, they eventually saw the cave. Rotting grains and broken tools spilled from the opening. When they dug through the pile, they found the two men dead and the calabash in two pieces between them.

The community quickly went about repairing the calabash. They tried to sew it back together—but when they reached in, no wealth could be pulled out. The magic was broken. Remembering the tradition, they put in their excess grains, but that wasn't enough to heal the damage. They began to put in their excess building tools, but that wasn't enough either.

The wise elder remembered that the calabash had a creation story told to him by his grandfather. In the beginning it had been empty. Seven generations earlier, the community's great-grandmothers had filled it with their tears and first oaths.

So the adults of each family made solemn oaths under the baobab tree. These oaths were their deepest promises—their commitments to add their services, their tools and even their excess harvests for the benefit of the next seven generations to the calabash. Each person shed a tear as they spoke their oaths into the calabash for all to hear and witness.

Only then was the magic restored and the calabash came back together.

Let's imagine a common resource pool like the calabash. Think of it as a physical seed bank to start with. We can immediately flag some dangerous situations for the long-term survival of that seed bank. We might worry that, like in the calabash story, someone would take too many seeds and not return them. Such dangers often compel us to place limits on access and enclose the commons, while natural ecosystems have evolved and balanced their limits over millions of years in biological networks. The amount plants extract from the mycorrhizal network is limited by their biology—ours is not.

We humans can potentially make rash decisions on time frames that fungal systems might take generations or evolutionary timescales to make. The time in which plants return nutrients to a particular network is limited by their biology—again, ours is not (on the scale of our lifetimes). We could choose to walk away and never give any seeds back to the seed bank. We could even burn the seed bank to the ground.

What this means is that, while millions of years of evolution has created the timings and limits in nature, in human systems we operate in different dimensions of emotions, reputation, memory, cultural norms, and rules. We have social infrastructure that plays the role of the magic calabash and mycorrhizal fungi and biological limiters—but on much faster time scales. This enables us to be dynamic and adaptive, but it also means we can get out of balance and break systems much more quickly.

Returning to the example of the community seed bank:⁶ If everyone in the community is able to keep track of what was put into the bank and enforce a rule that they can pull out a set amount and are then not able to pull out seeds again until they have returned twice that number of seeds to the bank, the system can find balance and continue. These rules may be too rigid and need modification—leeway could be given to those families that have fallen on hard times and so on. When we examine the communities around us, the ancient rules for these systems are not black and white, but leave room for many kinds of situations, forgiveness and other forms of repayment.

We can look at simple social norms, rules, and protocols here. What systems need to be in place for such rules to really work? Let's look next at how fair access to a commons is practiced.

6 See examples from *Nayakrishi Andolon Network* (biodiverse community-centered farming initiative with about 350,000 farmers) in Bangladesh: <https://prabartana.com/ubimigdemo/blog/category/nayakrishi-andolon/>

In Practice

The Duruma are part of a society of nine tribes called the Mijikenda people who live along the coastal region of Kenya.

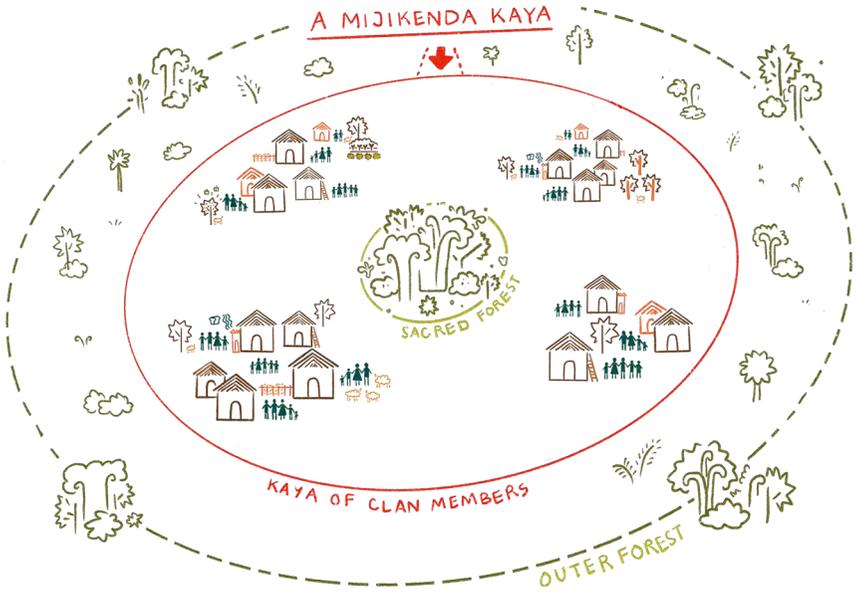


Figure 3. Mijikenda Kaya

All nine of these tribes and many others across Kenya hold to heart a proverb: “Mwache mla, kuwa mtumwa,” which directly translates to: “Those who leave their traditions become slaves.” It can be interpreted to mean: “Those who lose the abundance of their common resources become dependent on those who would exploit them.”

When living among these people on the coast of Kenya, I've been able to witness and take part in ancient practices that go back much farther than written history. These traditions seem to stem from a very long time ago, possibly before we had language to describe them. We can only get an inkling of where they come from based on the creation stories of the Mijikenda—but in some ways they seem to predate even these stories. The Mijikenda origin story is one of fleeing oppression. They migrated to the coastal area of what is today called Kenya from an area near what is today called Somalia. The ancestors of the Mijikenda people fled from a war and found refuge among the Waata (bush people). The Waata are a nomadic people who once lived in the forests among the elephant herds, inhabiting the coastal forests and the Taru Desert.

The Waata, who had themselves migrated to the coastal regions of what is now called Kenya long before the arrival of the Mijikenda, welcomed them to their forests and Kaya. The Waata showed the Mijikenda how to create safe homes or Kaya in the forested hills and how to live among sacred forests.

According to elders, the primary means of self-identification among the Mijikenda is by Kaya. A person is not asked about who they are, but to which Kaya they belong.⁷

Similar to the term *oikos* in Ancient Greek, the term Kaya refers to many things in Bantu languages; it means home, society, village, all their resources, clan, and sacred forest. Figure 4 shows the Kaya with an outer defensible border and sacred forest in the middle where a sacred intention-holding object called a fingo would be buried. Note that each clan group and each home was also considered a Kaya. The Kaya can be seen as a society and a living system.⁸

Mijikenda societies were not kingdoms, or states, but rather inclusive groups based on common descent. This way of living in harmony is remembered among Mijikenda elders—people who, still to this day, have protected these sacred forests and the remnants of this ancient social system.

On the next page is an ancient creation story from the Waata of Tsavo-Galana⁹ that makes it clear that living in reciprocity defined their identity:

7 *The Kaya Complex*, Thomas T. Spear.

8 This concept parallels Gandhi's interpretation of *swadesh*, which he redefined as the "person-embedded-in-community-and-natural-environment." *Swa-* signified "one's own," while *-desh* referred to the local culture and ecosystem, emphasizing their interconnectedness with history, livelihood, and the people. See Parekh, Bhiku, 1991: *Gandhi's Political Philosophy: A Critical Examination*. Macmillan, Basingstoke, pp. 56–60.

9 Ville, Jean-Luc (1995). "The Waata of Tsavo-Galana: hunting and trading in their semi-arid coastal hinterland". *Kenya Past and Present* (27): 21–27.



*Famine was in the land and a Waata
 hunter always came home empty-handed.
 So his wife decided to take the situation in hand.
 She and her child started eating grass and leaves and
 anointing themselves with red earth.
 They did so every day until they became a mother
 elephant and her calf.
 Thus, elephants were born
 and the Waata, living in reciprocity with them,
 have never experienced famine again.*

The Waata understood that the elephants were not merely a source of food, they were their ancestors and part of their community. What they took from the elephants they were keen to return. They brought this reciprocity into their dealings with all people. The Waata people could, at any time, go to a Mijikenda home and obtain sheep, goats, arrows, and wire with no payment. Sometime later the Waata would infallibly reciprocate by giving the family ivory and meat from the elephants they lived among. This form of long-term reciprocity is similar to the resource coordination systems we see in natural systems.

The Heart of the Kaya

From these beginnings of the Kaya economy, resource coordination appears to have revolved around two core practices that we can term the heart and the mind of the Kaya. We will discuss the heart practice in this section and come back to the mind as an extension of the heart later in the guide.

It is important to note that these practices are not often mentioned as part of the Mijikenda religions or faith-based practices—they seem to predate these by some time. To talk about these practices with people in villages often feels to me like I am asking them how they brush their teeth using tree branches: such a common daily practice that it is second nature. Not only that, but the pursuit of money has far overshadowed these practices so that they are often trivialized.

The heart practice is called Mweria among the Mijikenda. The similarity between this word and the Mwethia used among the Kamba is not a coincidence, but is due to their common heritage from the Bantu language group, which extends from Kenya all the way to South Africa. As our heart pumps blood through our bodies, this practice pumps and distributes resources across and through the Kaya. It feeds the body of the Kaya, bringing goods and services wherever and whenever they need to go.

If we view the Kaya as a body, the Mweria operates like an organ. What is different from both human hearts and mycorrhizal fungal networks is that the Mweria, as a social organ, has no recognizable physical form. It exists in the space of memory, emotion, and reputation. Nobel Prize-winning economist Elinor Ostrom would have called this resource coordination system part of an intangible commons.¹⁰

The most general term for a group doing Mweria-like practices across the planet is a Rotating Labor Association (ROLA). You will find something similar in all human cultures. Each such practice has its own name, although some have been lost. Finding them is a bit like finding a magic calabash. In the Appendix you will find a short list of local names that spans many countries and cultures on the planet. In many cases, these ancient practices came to be banned or replaced during colonization with monetary versions like Rotating Savings and Credit Associations (ROSCA).

¹⁰ <https://www.sciencedirect.com/science/article/abs/pii/S0921800916314215>

How does a Mweria work?

As with the magic calabash story, the Mweria of the Mijikenda people may have started with a promise as a seed of future reciprocity. From my experience in witnessing these Mweria practices come back to life in over 100 communities, the process goes as follows: An elder of the community, often representing a strong family, makes it clear that they are willing to offer some resources or services to others. This offer is the seed of a commons. Another family accepts this commitment and calls a Mweria—which they do by beating a horn with a stick or simply calling out for their neighbors to hear.

Upon hearing the call of the Mweria, those who are inspired by the initial offering and willing to offer their support come to fulfill their commitment and help a family build a new roof, farm, granary, and so on. The family that has received support is then expected to help the others in turn. If the family fails to reciprocate—perhaps because some tragedy befalls it—that is the risk run by those who have participated in the Mweria.

If there is enough abundance in the initial resources—more than enough surplus labor and grains, say—then the community can simply be patient and wait for reciprocity, and in the worst case they can deal with the loss. If the loss is recoverable, the community may start to articulate and impose rules for reciprocity. For example, that family getting help with their new roof should help other families within a certain amount of time before the rains. There is often a clear rotation of whose turn it is to call a Mweria until a full cycle has elapsed and everyone in the community has received help. This can sometimes take a whole season.

Even with no explicit rules, you can imagine a situation naturally forming in which those families that do reciprocate gradually form a thriving living system, and those that don't reciprocate eventually either lose access to the commons (simply put: no one comes to help them anymore) or make amends. I have seen people initially outcast from such groups who were able to make up their debt to the community in many ways, even by asking forgiveness. I have also witnessed people who have been cast out of the commons of the group join or create another Mweria group themselves.

There is a similar process of ecosystem regeneration when a tree falls in the forest.¹¹ Some nutrients are made available—say, the rich soil and minerals in the gap left by the fallen tree—and plants start to sprout up thanks to their new access to those seed resources. Pioneer species begin to establish a habitat that the next generation of plants can thrive in, and the process continues until a whole set of species, at different heights or strata, seals off the canopy again.

From the beginning of a Mweria, there is some initial abundance, a commitment of resources offered, which I will refer to as a seed of the commons. The role of seeding is incredibly important—the more valuable and reliable the seed the better. A strong commitment of ten days of labor made by trusted elders and witnessed by neighbors is stronger than an offer mentioned in passing by a teenager. If that commons is expected to continue, i.e. if there is desire for continuity, then when those initial resource commitments are accepted and used—meaning that some of the seed has been removed—there is an expectation that the resources will be returned to the commons over time. This expectation can be formalized in many ways: as a verbal suggestion, a promise, or an oath. We can think of this expectation in natural systems as unspoken symbiosis.

Let us imagine that the people taking part in the Mweria are holding a magic calabash in their collective memories, which we can call a common pool of commitments—or simply a pool. Once the seed is there in the pool, as an initial commitment to provide resources (labor, support, materials, etc.), chosen community members are given access to those resources and in return they place their own commitments to provide resources into the pool of collective memory. As people receive help, the commitments that seeded the pool are removed: They have been fulfilled and no one holds a debt or obligation anymore.

At some point within a cycle, the people who have received help will return the favor in goods or services to others in the community. For instance, each family may call a Mweria during harvest season to call on the community (commons) for support. The family can get 20–30 people to help them harvest their crops and build a granary in a day (whereas without their support it would take weeks).

¹¹ *In syntropic agroforestry a process of succession starts with a seed resource. See: <https://www.microfarmguide.com/syntropic-farming/>*

Whose turn it is can be determined by who is ready (having prepared themselves to receive support or to offer support), or by lottery (random choice) if there are conflicts. Also note that those in debt to the community due to missing a Mweria can make it up outside of the group's rotation by helping their fellow members. This means that the system can look synchronous, with a group of neighbors going together to support each member's home, or asynchronous, where individuals help each other throughout the cycle.

Shared access to large-scale resources creates a multiplier effect through efficiency, while also providing opportunities for stewardship, belonging, care, skill sharing, collective purpose, infrastructure, credit clearing, and more—all the seeds of a healthy living environment. Before colonization, three days out of four were traditionally spent on Mweria for as long as people can remember, and in most communities we work with, it only truly stopped within the last generation.

Grassroots Economics Foundation has worked with over 100 communities across Kenya, and the communities reviving and practicing Mweria (or Rotating Labor Associations (ROLA) in general) are simply more resilient and happier than those that don't.

On the following pages you will find a step-by-step example with three families (for brevity—traditionally Mweria involves at least seven or eight neighboring families) practicing Mweria together:





Figure 4. Initial Self-Assessment and Seeding

In Figure 4, three families find that they are willing and able to offer four days of labor. These commitments, labeled A, B, and C, each represent a promise for a day's worth of labor. These commitments may be expressed in writing or verbally. The calabash or gourd in the middle will represent their shared agreement or common-pooled resources.

The three families make it known to their two nearest neighbors that they are willing to start with two days of labor for this cycle. This commitment of two days of labor is the initial seed of an intangible common-pooled resource.

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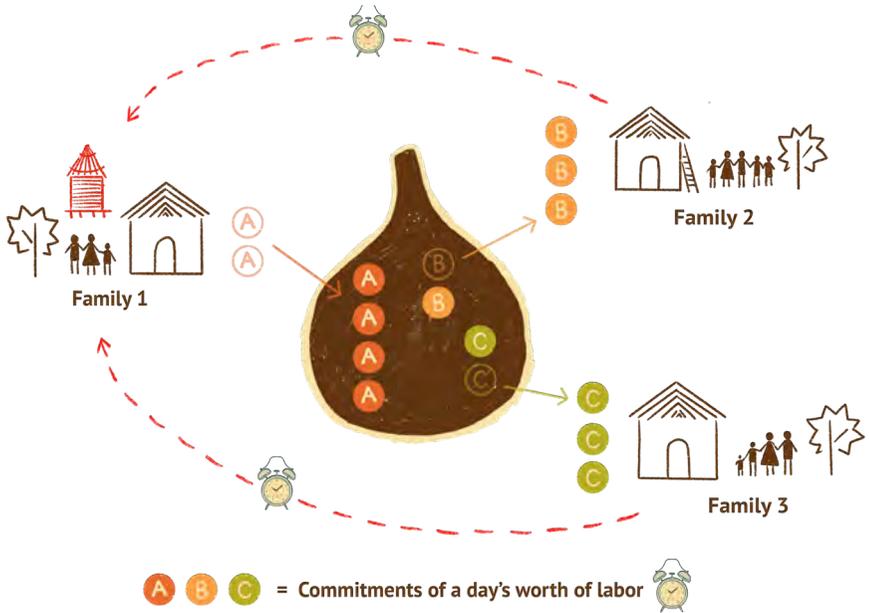


Figure 5. First Exchange and Fulfillment

Here in Figure 5, Family 1 exchanges more of their commitments for the commitments of their neighbors, who help Family 1 build a granary. Family 1 is now in debt to the commons (since the pool is holding the memory of their commitments), while the other two families are in credit—they have fulfilled some of their commitment and can draw upon the commons.

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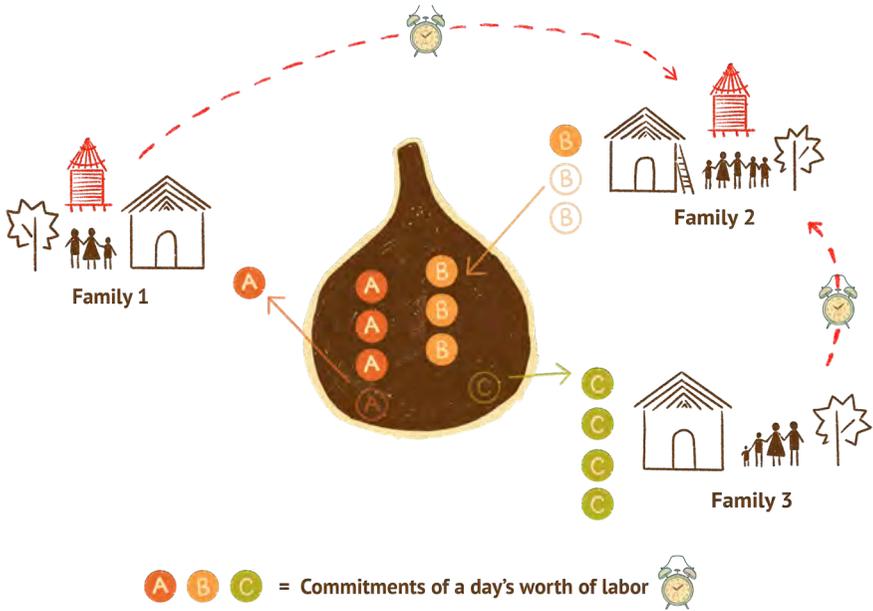


Figure 6. Second Exchange and Fulfillment

Here in Figure 6, Family 2 exchanges more of their commitments for future services to the others and draws on the commitments of the two other neighbors, who help Family 2 build a granary. Family 2 has now used their credit and gone into debt to the others. Family 1 is also still in debt and Family 3 has a lot of credit.

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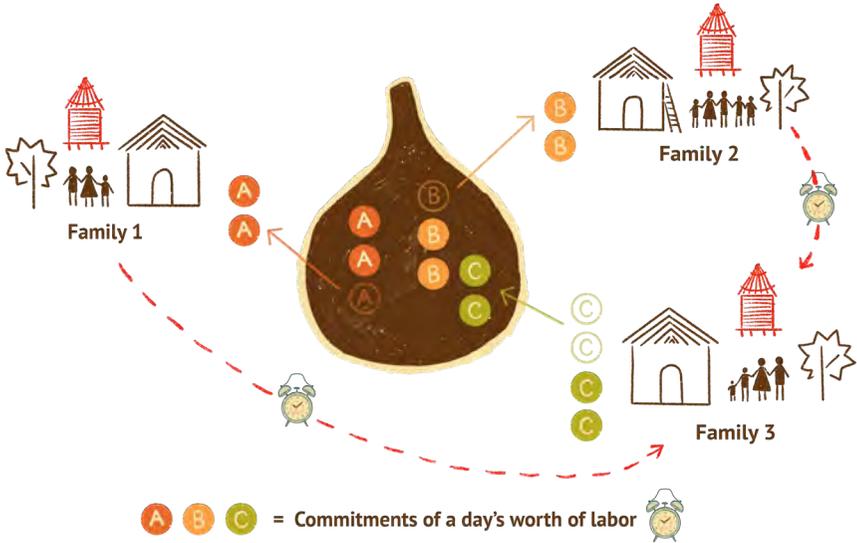


Figure 7. Third Exchange and Fulfillment

Here in Figure 7, Family 3 exchanges more of their commitments to provide future services to the others and draws on the commitments of the two other neighbors, who help Family 3 build a granary. Family 3 has now used their credit and regained a complete balance of trade (no longer holding credit or debt). Family 1 and Family 2 are also no longer in debt or credit and at a complete balance of trade.

Each family has gained in resources: physical infrastructure, social belonging, skills, purpose, voice, and supporting nature. While no money changed hands, they were able to coordinate and exchange resources out of a common-pool of commitments. This is not direct barter or what we would think of as a market economy—it's based on a protocol that is much, much older and some variation can be seen in all living systems.

Shared Reflections:



Identify Resources:

Start by identifying the resources in your own community. Think about the skills, materials, knowledge, spaces, and natural resources available to you. Think of these resources as valuable services and draw a map that visualizes these resources and how they interact. We will revisit this in Part 2, in the exercise on Resource Mapping.

Observe Existing Interactions:

Take note of how these resources are already connected. Who in your community already shares skills, tools, or knowledge? Where do you see natural groupings, synergies and alignments between resources? Think of resources as the ingredients of recipes that produce something you love.

Reflection 3: Base Protocols

Protocols are the foundational frameworks for governing interactions. They form the processes that enable harmonious coordination in systems, while languages are the expressive tools that communicate or implement these protocols. Protocols ensure fair and meaningful exchanges, while languages provide the content.

In this reflection, we explore economic protocols intrinsic to living systems,¹² examining how they are used to create trust, sustain relationships, and ensure balance. We will also look at how these protocols have been misused and disrupted, and what it takes to return to symbiotic relationships. Just as the DNA of plants and fungi encode rules for interaction, and the laws of physics shape physical reality, protocols express economic rules that can maintain shared well-being.

What is seeded? What belongs in the network? What is valuable? Each individual person, family, or group knows what is valuable to them. These things may be recognized as moral, beautiful, secure, trustworthy, and so on. They may be goods and services found offered, wanting, and/or needed. This selection of valuable things is what we might call a curation. There are many types of curation. Ecosystems and even families can be seen as curations. Your favorite restaurants can be considered curated. Whenever we formalize a group of valuable things, we are curating. Both organic and human social curations are expressions of life organizing itself to sustain and thrive. Just as ecosystems curate relationships between plants, fungi, and animals in order to share resources and balance ecosystems, human societies curate communities.

¹² A note on protocols in living systems: When we speak of “protocols” such as curation, valuation, limitation, and exchange in ecosystems (e.g., plant–fungal interactions), we refer to emergent biological processes, not literal rules or contracts. These processes evolve over millennia, shaped by feedback loops and natural selection, rather than by conscious negotiation. In drawing parallels to human socioeconomic practices, our intention is inspirational—to show how living systems balance resources for overall resilience. We fully acknowledge that nature’s ways are neither moral prescriptions nor exact templates for human laws. Rather, they’re a reminder that cooperation and synergy can arise organically and can guide how we design and steward our own community “protocols.”

If you are offering someone something valuable like your time and services—since giving someone your time is not something you will ever get back—you may want to be explicit as to what kinds of goods or services you expect in return, over what time period, and so on. Should you want continued exchange over time, this curation of your valuable goods or services—and those you desire—is the beginning of an economic commons and can be seen as a fledgling intangible living system.

If you make an agreement that you will exchange your apples for carrots, we can imagine this as a simple bilateral pool or a commons of two types of offerings. Within this agreement space, commitments to provide apples could be seeded in, and can be removed with, commitments to provide carrots on a one-to-one basis.

This type of agreement can break easily. What happens if no one wants the apples? What happens if there are not enough carrots or apples for the next time? Bilateral pools can continue to thrive when there is a huge abundance of both items, but they can also stagnate if those two items are not being exchanged for each other. It would be a coincidence if someone with excess carrots wanted to exchange them for apples.

The curation of valuable things need not be so brittle. Increasing the diversity of what is on offer and what is needed is important. If the bilateral commons above were to grow to accept bananas, then bananas and carrots could be exchanged in the pool without touching apples. This cross exchange within a commons builds abundance (through efficiency and possibilities for creations and synergies), and decentralizes any particular resource—while reducing the need for people's wants to coincide.

Remember the Magic Calabash

Physical goods and services were not enough to restore the magic calabash. What happens if this physical store is destroyed or comes under restrictive centralized control? The answer in the magic calabash story was that the store or pool was made up of records or memories of commitments to future resources, rather than purely the resources themselves.

Economic protocols are sets of agreements that establish a space for agents (people, plants, fungi, etc.) to pool and exchange valuable things (services, nutrients, seeds, or commitments). Our ancient ancestors were not storing huge amounts of food or tools in one space. Instead they were able to call upon those tools, resources, and services when they needed them, by exchanging commitments. Imagine an Amazon warehouse where the products are stored in the small homes and shops of those who make them. They may not even have been created yet. Instead of storing the actual products to ship, the warehouse is just a ledger of trusted commitments to provide those products. This is more like the way networks of families and clans operated, as well as networks of plants and fungi and trees.

————— “ *I store my meat in the belly of my brother*¹³ ” —————

—

A hunter from the Pirahã people in
the Brazilian rainforest.

It's not that these people were extremely generous, nor that physical storage wasn't available. They were following some core, probably ancient protocols. They were part of a long-term, reciprocal network in which individuals could store on behalf of the group (pool), and also in their social infrastructure—their willingness to offer goods and services in the future. The choice of what is stored in this space of emotion, memory, and reputation we will again call a **curation**. So here we enter more fully into the intangible commons of a pool of commitments.

¹³ When questioned by linguist Daniel Everett about why he didn't preserve surplus meat for future use. Quoted in *Don't Sleep, There Are Snakes*.

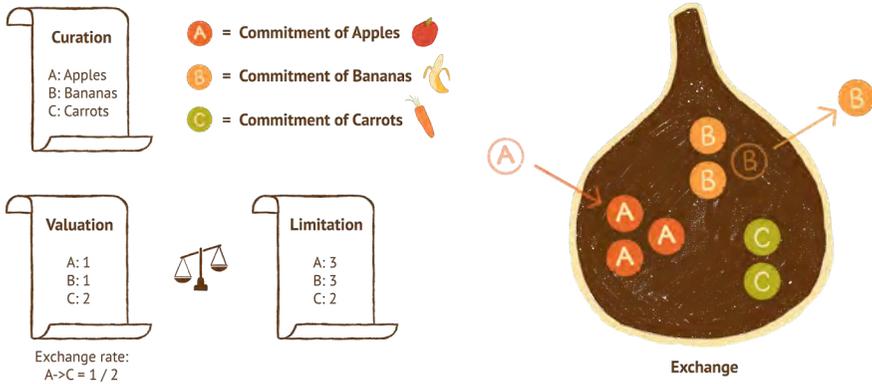


Figure 8. Minimal Protocol Functions for Pooling Commitments

In Figure 8, we have an example curation of three commitments to provide resources (Apples, Bananas, and Carrots) that have been allowed into and have been seeded into a pool (shown as a calabash or gourd) along with a valuation (price list) and limitation (maximum capacity). Below I'll describe each protocol function one by one.

Curation: This is the process of selecting, organizing, and managing the various commitments to provide resources that are included in the pool. These could be commitments to days of labor in a village, commitments to specific products like a quantity of roofing materials, apples, mud, and so on. The languages or schemas in which commitments are expressed and evaluated are important and we will return to these later.

Beyond curating what is allowed into the common-pool, the pool stewards perform a **valuation** of the relative value of each item in the curation. This may look like a price. When one neighbor comes to your Mweria bringing one cup of water while another neighbor works the entire day, are these two things of equal value? How would you know how to reciprocate? There are many ways to value things relative to each other, and in cases where there is no corresponding valuation, those things may not belong in the same pool.

Valuation: Expressing the value of each item in the curation establishes their relative exchange value (a.k.a. price). This set of relative values also provides an intrinsic unit of account. In the above example, the community holding the pool (in their memory, accountability, or rules) has said that two carrots need to be exchanged to receive one apple or one banana from the pool. One apple can also be exchanged for one banana. This may be changed as needed by the pool stewards, taking into account factors such as seasonality, for example.

This is where **limitation** is important. Valuation is often not enough to ensure balance. A pool with no limits, using only valuation to promote flow in a pool, often turns into a speculative, market-driven system. If apples are being added to the pool for the purpose of pulling out carrots, we may want to limit the number of apples that can be added, so we are not overwhelmed by them. We could do this by changing the relative value of apples, as there are more apples and fewer carrots (this is often called a bonding curve). Or we could simply specify the maximum number of apples we want at the current valuation.

Limitation: Specifies the maximum quantity of each commitment that can go in the pool. This is one way for the community to ensure that there isn't an overabundance of any one resource. Let's say someone has many carrots. As the pool is defined, they can never put in more than 20 carrots—unless the pool stewards, i.e. the community of people holding the pool, change the agreement.

There is one final protocol function: exchange. The exchange function establishes how, when, and with what caveats the commitments can be exchanged for each other based on their relative value and up to their defined limits. The specifics of how exchange works can be very simple or nuanced.

Let's imagine two ways in which a commitment can be added to a pool.

1. **Seeding:**

A commitment can be formally expressed (like a written contract or a witnessed oath) and held by the pool (in a file, database, or collective memory). This is what we have been referring to as seeding.

2. **Swapping:**

Alternatively, it can be added to pull something already in the pool out at fair value. We can call this a swap—for example, if an apple commitment comes into the pool it could swap out a carrot commitment that was already there (through seeding or swapping).

There could also be a requirement that, for each of these seeds or swaps, a small amount of apple or carrot commitments must go to support the pool stewards. One could think of this as feeding the mycorrhizal fungi (or the magic calabash), or as a simple form of taxation for using the communal services.

This simple example covers a basic set of rules or functions with economic protocols. These protocol functions could be implemented or expressed in many ways and languages, depending on the implementing technology, capacity of the community, its cultural context, and their legal or rule-based environment.

Protocol Supporting Environment:

These core protocol functions are merely doing what happens intrinsically within biological living systems. For them to function properly in a human social environment, that environment or habitat must also support them. If we think of these protocol functions (curation, valuation, limitation, and exchange) as creating a space or organ within the body of a society, then to sustain these functions consistently, we must consider the enabling environments that nurture their operation:

- **Historical accounting or memory:**

The ability to recall previous states for accountability is necessary. In biological systems, this memory is stored in systems like DNA and in memory systems across fungal networks. In human societies, memory is stored across multiple dimensions: in our emotions and subconscious associations, in our brains through neural connections, in the stories and oral traditions passed down through generations, and in external records such as ledgers, written documents, artworks, monuments, and digital archives. This layered storage allows for collective accountability and the continuity of knowledge.

- **Proof of identity, authentication, and permissions:**

Who is liable to fulfill or able to exchange which formalized commitments? In biological systems, proteins are encoded to interact very specifically with each other. In human systems, pools are defined by boundaries shaped by history, trust, and utility, deciding what is included or excluded.

- **Stewardship:**

How are decisions made for curation and pool usage? How are pools seeded and the operations of the system enacted or executed? In biological systems, these rules are also written into DNA. With human systems, we take on roles of stewardship.

We will look later at how different mediums enable the protocols to be expressed in different ways. Digital operating systems, virtual machines, and digital decentralized ledger environments can enable pooling to happen across agents, space and time in ways that differ from both biological and ancient human networks.

Overlapping of Pools

What if I value my apples and commit to providing them when given carrots and, as well, you value your carrots and will allow people to exchange them for bananas? In Figure 9, we have two simple separate pools that connect to each other through a common resource commitment (carrots).¹⁴

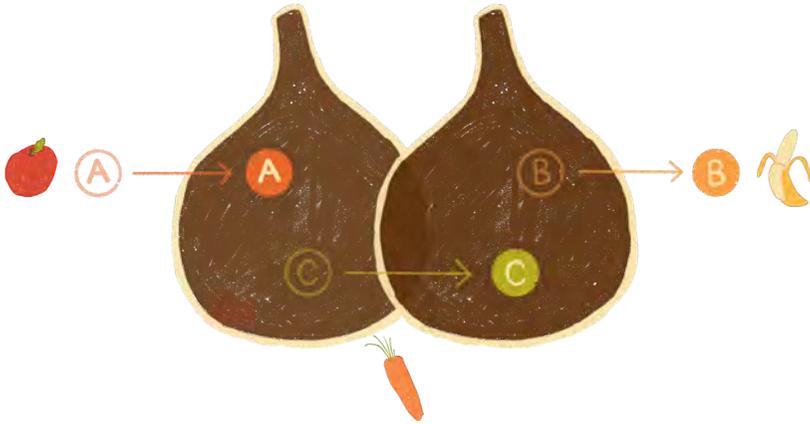


Figure 9. Overlapping Pools

If one were to exchange some apple commitments (A) for carrot commitments (C) in the first pool, those carrot commitments (C) could again be used to exchange for banana commitments (B) in the second pool, which could then be redeemed for bananas. These overlapping curations with a resource in common have the potential to span across a network and can define common mutual services.

In the communities I live among, each family is part of many Mweria-like groups. This means that one family may have commitments as well as a reputation that transcends many different groups of neighbors. These commitments connect across families and clans for many purposes: childcare, education, farming, house construction,

¹⁴ Blockchain enthusiasts may recognize that most decentralized exchanges (like Uniswap or Bancor) have this architecture: networks of bilateral agreements (pools with two tokens) connected by common “network” tokens—with valuation determined by algorithms such as bonding curves and near infinite limits.

emotional support, weddings, funerals, and so on. In order for commitments to be shared across clans, a single pool isn't enough. Apart from anything else, it would create many types of centralization problems.

This kind of interconnectivity is, of course, what we see among root and fungal systems as well: a situation in which mutual offers and debts can continuously balance or clear each other out. A network of overlapping curations can also form something resembling a neural network, in which the most common offerings (in this case carrots) that connect each pool form network hubs, like the strongest neurons. Note that exchange (of carrots for apples) could occur simultaneously, or be delayed for some weeks until the apples are ready, or could even be a gift—all depending on how the curation, valuation, limitation, and exchange functions are implemented or expressed.

Overlapping pools connect resources, commitments, and relationships across diverse spaces. In closed bioregional spaces, they enable sustainable exchanges of natural resources like water or food; in emotional and cultural spaces, they build trust and support shared traditions; in project-based spaces, they drive sustainable collaborative endeavors like housing or cooperative businesses. Pools also encompass intangible resources such as skills and knowledge, creating decentralized learning and work networks.

Rather than forming massive centralized networks, in healthy systems, these protocols thrive on many smaller circles connecting over shared commitments. Each pool steward (as an individual or group) curates its own offerings, and overlap emerges naturally—just as neighboring forests might share fungal connections at the boundary. This “horizontal” approach means no single pool grows too big or powerful, while still allowing inter-pool exchange. When this is unrestricted, participants can simply start a fresh pool and link to existing ones if and when they choose.

Overlapping pools gain their power from the simple fact that people can connect through whatever they both value—no single entity or formal organization is required. In the example above there are two separate pools, one exchanging commitments A for C, the other exchanging C for B. Different individuals or groups may steward each pool, but they become linked via the shared resource C (carrots). That shared value—much like a friendship—creates a non-zero-sum connection, a “big win-win” that benefits both sides without forcing them under one ownership structure. This logic also applies to “community”: it's not a single entity that can be “owned” but rather an overlapping network of mutual values. In such a network

there's no need for corporations—steward what you are responsible for, and link up where others value the same resource. So long as everyone sees value in the link, all parties gain.

Together, overlapping pools create resilient, multi-layered systems in which trust and reciprocity flow like nutrients in an interconnected ecosystem. We can imagine the space of connected pools spanning across many different types of value and forming into a larger living system. As we zoom out, we can look at the overlap between Mweria across neighbors, villages, and clans, and we can also zoom in to see the overlap between all the pools of commitments of each individual family which form a Mweria. The same can be seen in nature, where each plant and each fungus has its own individual curation and exchange network—which overlap to form an ecosystem.

Expressions of Commitment

We've talked about curating and exchanging valuable things. In the case of human society our ability to make commitments to or about valuable things helps us create common-pools of commitments that can build trust and adaptability in resource coordination—like a magic calabash.

Let's look at the many forms commitments can take and apply them to a wide range of goods and services, as well as certificates, which we will talk about below. **A commitment is a strong promise: an expressed intention that requires an investment of resources or reputation by the promiser.** Trust is built through the interdependence, fulfillment, and flow of commitments.

Commitments to Future Delivery: Promises of Action

These are forward-looking promises to deliver a specific good or service at a later time. They create binding intentions that obligate the issuer to deliver in the future. Formalizations can include vouchers, contracts, tokens, bus tickets, subscriptions, IOUs, and many more. They align planning, coordination, and shared efforts within a community or network. A group can pool commitments to future deliveries, such as pledges of labor, resources, or goods, to create a shared resource that participants can draw from as needed.

A subscription can also be thought of as a formalized commitment; it is a proof of right that you (the authenticated holder) can use to access some specific resources over time (like a gym membership). A bus ticket or even airline reward points can similarly be regarded as formalized commitments. My mother holds at least five (or more) forms of store loyalty points—all of which are commitments of various businesses.

We can also think about credit and debt in relation to commitments.

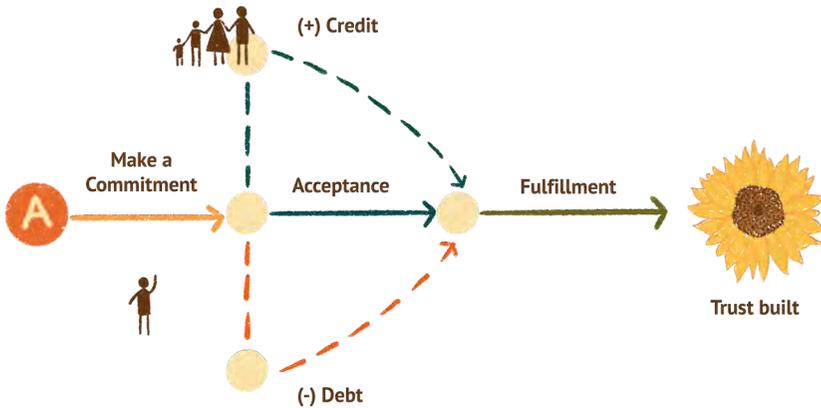


Figure 10. Credit and Debt Space

In Figure 10, we can see that a commitment created by someone can be accepted and held by someone else, or in this case a group or family. This is akin to giving your word, or a promise, while also holding someone to their promise. In effect those who hold the commitment (who have accepted the promise) can be said to be in credit (or have credit) and the one who made the commitment is in debt (or has debt). Put another way, those in credit are expecting a commitment to be fulfilled and the person making the commitment has an obligation to fulfill it. The commitment itself can be seen to have the intrinsic potential to pull apart into credit and debt. This tension between credit and debt is like the tension of a rubber band that is being stretched, pulling the commitment into two parts. The tension that seeks a resolution is a space formed by an agreement—which is in effect the overlapping of the two parties' commitments and corresponding expectations. In the next figure we will examine what the acceptance of a commitment could entail.

Mutual Credit as a Lens

Two people (A) and (B) express commitments for future resources



The commitments are to deliver Apples & Bananas respectively



They develop an agreement/pool for exchanging

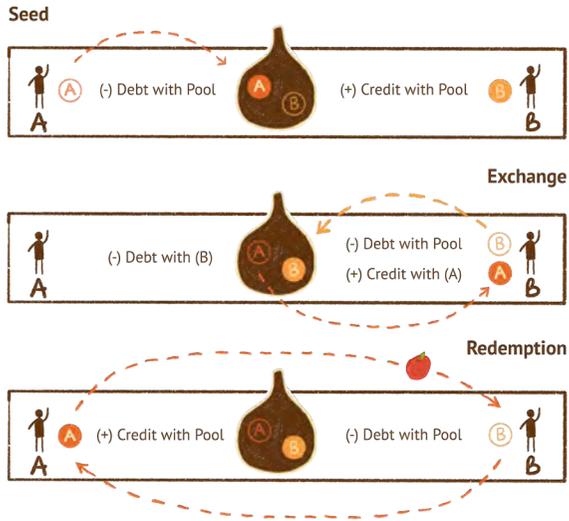


Figure 11. Mutual Credit as seen through Pools

In Figure 11, we unravel the relationship between credit, debt and commitment further.

Person A seeds the pool by expressing their commitment to provide resources and making Person B aware that they can exchange their commitment. Person B has been offered “credit.” Person A, by agreeing to back someone else’s credit, has put themselves in debt; through Person A’s offer Person A has agreed to take on “debt.” Person A has seeded the pool by committing to deliver apples and specified the condition that they will exchange their commitments for a commitment from Person B to deliver bananas.

Person B can swap their commitment for A’s commitment and redeem this for apples (in other words, use them to get apples from A). At which point Person A, who lost some apples, now holds a credit in the pool, because Person A has fulfilled their commitment to provide apples by actually giving the apples.

Now A and B’s debt and credit relationships have reversed. Person B has committed to give bananas to someone through the pool; B now holds an obligation to the pool; B is now “indebted” to the pool.

Person A can exchange their commitment for Person B’s commitment, which is now in the pool—and then finally get bananas.

Seen through one lens, the relationships have now returned to where they began. Person A's seed (commitment) remains in the pool; so Person A is once again indebted to the pool, which other members of the pool (Person B) can draw on; Person B has credit.

Seen through a second lens, everything has changed. Person A has gained reputation, by seeding the pool with a commitment (and taking on debt), then fulfilling their commitment by giving apples when Person B used their credit to take the apples. Person B has gained reputation, by giving bananas when Person A used their credit to ask for the bananas. This particular magic calabash (this common pool) has gained reputation as a vehicle for exchange.

This mutual credit relationship can stop here with Person A ending the agreement, since both parties have exchanged a fair amount of goods. Or the agreement could go on and on, allowing for larger limits and more types of commitments with many more parties. This mutual credit system can also extend across an entire network of similar overlapping pools with common commitments.

—

National currency (commonly referred to as money or simply currency) functions as a formalized commitment, primarily redeemable by the state for tribute or tax obligations and, in some cases, for state services. When the state and banking systems issue increasing supplies of money without clear or adequate commitments to corresponding goods, services, or value in the economy, the system is at risk of over-issuance. This imbalance can lead to inflation—a decline in the purchasing power of money—where the public bears the cost through higher prices for goods and services. While inflation can arise from multiple factors, including supply chain disruptions, speculative behaviors, or external shocks, excessive money issuance without a foundation of tangible value exacerbates this erosion of trust and utility in the currency.

Note that the state is not alone here: The risk of over-issuance (over-commitment) can happen with individuals, groups, and businesses as well. It is important to note that when money, tokens, or vouchers are used as a general medium of exchange, there is a risk of glossing over their true backing or commitment.

One would not want a telecom top-up credit to become the only medium of exchange for everyone, as the simple failure of that company (a single point of failure) would be at risk of crashing the entire system.

While any individual formalized commitment (like telecom airtime) could theoretically act as a general *medium of exchange given enough general demand, a polycentric, interconnected network of pooled commitments can provide more robustness and resilience*. Rotating labor traditions like Mweria teach us that commitments can be pooled in order to be exchangeable for one another. These systems of exchangeable commitments are fundamentally different in many ways from monetary systems.

Commitments can also be commitments of reputation, which represent the proof of past actions. We can think of commitments as existing along a continuum of time. This continuum ties together both forward-looking commitments and past-looking commitments (a.k.a. validations of completed actions) under the same concept of trust and obligation. Both future and past commitments can also be pooled, creating shared resources of promises for the future and valuing proofs of past fulfillment.

Commitments of Reputation: Acknowledging Completed Actions

Commitments of reputation are validations that a valuable action has already been performed, serving as proof that a past obligation was fulfilled. Examples include certificates, attestations, receipts, badges, testimonials, and acknowledgments. They serve as records or verification demonstrating the fulfillment of a promise. They establish accountability and trust by providing evidence of contribution or value created.

One could choose to give access to a commons based on reputation via certifications. Basic Income programs often want to certify that the person is a living human before they get access to a basic income pool. Groups can also pool certificates or attestations, such as proofs of completed work or environmental actions (e.g., tree-planting certificates), creating shared accountability and recognition.

Certificates, like carbon credits, are sometimes used as a medium of exchange—similar to people trading signed baseball cards.¹⁵ It is important to remember that a

¹⁵ *Certificates can be formalized in many ways, such as paper diplomas, witnessed praise or NFTs (non-fungible tokens).*

pool full of these has little impetus for future action and is likely to stagnate. Balancing past and future commitment is something we will discuss in the next reflection. *An economy built only on proofs of past action says little about the future.*

For example, a labor-sharing network might pool future commitments to work (vouchers for hours pledged) alongside attestations for past work done (certificates of hours fulfilled). These pools can be drawn upon as needed, creating a commons of commitments that sustains ongoing cooperation.

By treating commitments—both future and past—as resources that can be pooled, communities and networks can build stronger, more adaptive systems of trust and reciprocity. This aligns with both ancient traditions and modern technologies, such as decentralized ledgers, which can formalize these processes for broader applications.

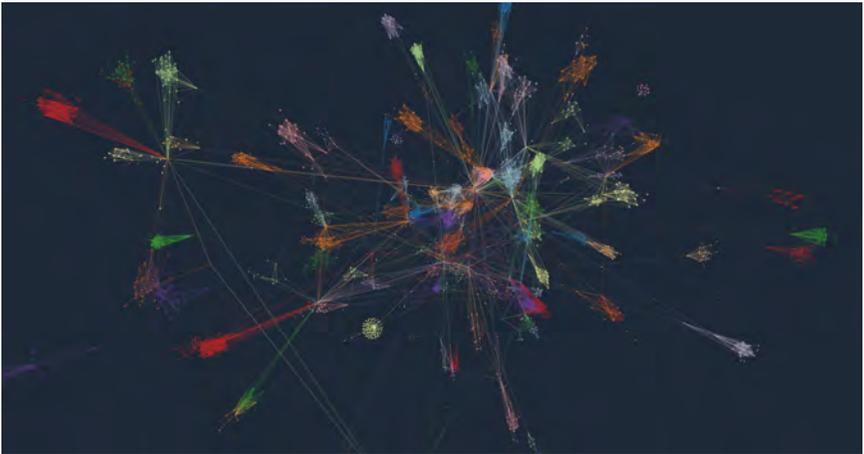


Figure 12. Sarafu Network Visualization

Figure 12 shows a network visualization¹⁶ of vouchers being exchanged (as differently colored lines) through pools among thousands of individual people and businesses (as the dots). Clusters show commitments moving around tight-knit communities, while longer lines show more distant connections.

16 <https://sarafu.network> is an open source registry of commitments (in the form of vouchers) and pools running on open source software built by Grassroots Economics Foundation. The network visualization can be found at <https://viz.sarafu.network>.

Shared Reflections:



Mapping Commitments:

Using your journal, consider commitments you have made, whether formal or informal. Think of your consulting or job contract. What are the terms and conditions? Are those commitments transferable and, if so, to whom and when?

List commitments you have made in the past week (e.g., services, goods, or promises). Divide them into “commitments to future delivery” (e.g., I agreed to tutor someone next week) and “certificates for completed actions” (e.g., I helped organize a community event).

Vouchers vs. Certificates:

Think about a tree-planting project in your area.

1. Create a mock “voucher” for future tree planting. What does the voucher promise? (An example might be to plant a number of trees.) Over what time period is this promise valid? Could you give such a voucher to someone as a gift? Could you sell it?
2. Create a mock “certificate” for trees already planted. What would be written on such a certificate? Number of trees planted, location, types of trees? Would you sign it as proof that you verified someone planted a tree? Could you award this certificate to someone? Could this certificate give someone access to other resources or prizes?

Pool-Building Role-Play:

Consider the four protocol functions of curation, valuation, limitation, and exchange and how they relate to your life and resources. Think about under what conditions you or others have access to various resources (like a gym or school). Think as well about the conditions under which you give other people access to your resources (time, services, attention).

Think of two separate pools created by different stewards. For example, imagine two pools, one for gift cards of vegetarian restaurants and yoga achievement certificates, and one for environmental volunteer hours and children's activities. Draw these two pools as circles on paper and place into it (seed) a mix of what you think are appropriate vouchers and certificates. Role-play as members of a community, drawing lines on the paper to indicate trading commitments to provide goods/services or certificates of past actions to access the resources in the pool. Reflect on how these systems build trust and sustain relationships and how the pools could connect.

Reflection 4: Protocol Expressions: The Language of Coordination

The protocols we've gone over ensure that interactions follow agreements, maintaining the fairness, efficiency, and integrity of the living system. The protocols maintain the space for interaction. The expression of these protocols can take many forms, which we might call languages. Language enables participants to interact meaningfully within the larger system. In this reflection, we are going to practice looking at how the protocols are expressed in different resource coordination environments.

Ecosystems

In Reflection 1, we looked at mycorrhizal networks as a compelling natural model, showcasing the interplay between protocol and network infrastructure in resource coordination. The fungi's selective connection with compatible host plants exhibits what can be seen as a curation process in which 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 invest in creating a supportive environment that responds to signals and promotes the growth and health of their plant partners. Seeding in this light is the provision of initial resources.

Furthermore, the regulation of nutrient holdings and transfer based on plant signals and fungal contributions reflects the limitation or capacity assessment function in common pooled resources, 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, fluctuating with availability and demand, parallel the relative valuation protocol function 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 also feeding the fungi. In addition to this, the fungi also exhibit what we might call stewardship principles that could be categorized as enabling infrastructure. These are manifested through the chemical regulation via signals which, along with the hyphae, simultaneously facilitate real-time communication and adaptive responses to changing environmental conditions.

Ecosystem Parasites

Ecosystems have evolved intricate ways of managing parasites, integrating them into the broader web of life. Parasites often begin by exploiting resources, taking advantage of opportunities in a system. While their impact may seem purely harmful, they play critical roles in maintaining ecosystem balance. By controlling host populations, parasites prevent overgrowth and allow resources to be distributed more equitably among other species. This selective pressure drives coevolution, spurring both parasites and hosts to adapt and become more resilient over time.

In many cases, parasites indirectly contribute to nutrient recycling, breaking down and redistributing resources that might otherwise remain locked within their hosts. Over time, some parasites transition into symbiotic roles, integrating so deeply with the system that they contribute to its overall stability. For example, certain parasites defend the resources they exploit from other invaders, ensuring the survival of their host—and, by extension, their own survival. This mutual cultivation and defense of the system can transform what was once a purely exploitative relationship into one of cooperation.

Parasites also play key roles in food webs, acting as prey for predators or even as predators themselves, linking the food web¹⁷ and contributing to ecosystem complexity and resilience. In some cases, their influence can shape habitats, earning them the label of ecosystem engineers. Far from being mere disruptors, parasites are integral to the intricate dance of life, highlighting the adaptability and interdependence of living systems.

————— “ *Nature doesn’t charge us any money.
Nature gives us everything for free.
All nature asks of us is that we protect it.*¹⁸ ” —————

—
Attributed to Davi Kobenawä Yanomamö, a leader
of the Yanomami communities in Brazil.

Parasites teach us that even the most exploitative relationships can evolve into symbiotic partnerships, where mutual benefit emerges from what was once conflict. This transformation, however, requires a shift in perspective—from seeing resources as something to extract to recognizing ourselves as integral parts of the systems on which we depend. As Davi Kobenawä Yanomamö eloquently reminds us, nature gives freely but asks us to protect and nurture it in return.

The story told above, of the Waata and their relationship with elephants, illustrates this evolution. What may have begun as a parasitic dynamic—taking from the elephants—matured into a deep interdependence, where the Waata saw themselves as part of the elephants’ world. By contrast, the ancient Roman elite may have failed to recognize their connection to the people (whom they called peasants and slaves) on whom their society depended, creating a system of exploitation rather than stewardship.

Today, those who control the majority of global capital have fallen into the same trap. Instead of fostering relationships of care and reciprocity with workers and communities, many see them as resources to exploit, replace, or discard. This centralization of power and control enables extraction and undermines the protocol

¹⁷ *Trophic interactions refer to the feeding relationships between organisms in an ecosystem—essentially, who eats whom. These interactions create a food web, linking plants, herbivores, predators, and decomposers. For example, grass is eaten by rabbits, which are then hunted by foxes. Each step in this chain, or “trophic level,” shows how energy and nutrients flow through the ecosystem.*

¹⁸ *From the film, Video in the Villages, Indians in Brazil: Children of the Land (Mother Earth) (2000), written and directed by Vincent Carelli, produced by Beth Formaggini.*

functions inherent in living systems—stopping our ability to connect directly with each other and create common-pooled resources. It also erodes the health and resilience of our ecosystems and society.

Modern examples, like the criminalization of seed exchange in Kenya partly as a result of corporate lobbying, highlight how these centralized powers restrict the natural human capacity to exchange directly, pool resources, and build commons. Just as nature's protocols offer inspiration for pathways to balance and sustainability, reclaiming these practices from dominating extractive centralized systems is essential to the creation of equitable, thriving systems.

Stewardship is not about domination, but about recognizing ourselves as part of the whole and nurturing the systems that sustain us all.

Social Systems

Our second exploration of proto-social protocols and infrastructure in Reflection 2 centered on 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 in short time periods 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) agriculture—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 that 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 used for efforts aimed at ecosystem restoration such as mangrove restoration or flood prevention.

Built into these traditions are all four protocol functions:

1. **Curation:**

Who and what services will be part of the group pool and allowed to draw on those resources, in exchange for what?

2. **Relative valuation:**

How do we ensure that the goods and services we contribute are of fair relative value?

3. **Limitation and capacity assessment:**

What are the capacities of our members so we can prevent oversupply and overburdening of individuals?

4. **Exchange:**

When and how do we exchange services as part of a Mweria as well as settling debt obligations?

The Mind of the Kaya

We've discussed the basic protocols for resource pooling in ecosystems and social systems. While understanding these protocols makes it easier to replicate them and connect them across larger communities, how do we make sure it's done well and avoids the pitfalls we see in dominating and extractive systems? We've focused on the heart of the Kaya, and now it's time to focus on the mind.

With Mweria as the heart, reciprocally pumping resources through the Kaya (Mijikenda society) over generations, stewardship is brought through the mind of the Kaya in a practice called Dhome by the Mijikenda. Dhome¹⁹ is a tradition of fireside gatherings, by which the agreements, rituals, and norms of the culture are enacted. This is where we find deliberations, settlement of debts, stories, celebrations, histories, and morals taught to children.

¹⁹ Dhome can be spelled and pronounced differently across the Mijikenda as Rome or Thome. According to Njmabi Njoroge <https://grassecon.org/rome>

The full day agenda of a Dhome looks something like:

1. **Call to attend and introductions**
2. **Singing and dancing**
3. **A visit to a sacred forest**
4. **Start cooking**
5. **Storytelling, learning songs and skills, weaving and drinking**
6. **Eating and sending children off to sleep**
7. **Serious discussion, settlement of disputes and debts and Mweria Planning**
8. **Singing, dancing and drumming**
9. **Continued discussions can go on till morning**

As with a Mweria, a Dhome can be called for many reasons. The role of stewardship is there not only to review curation (membership in the commons), but also to value mutual contributions and limit the risk of imbalances between them. Dhome may involve many configurations of attendees, from individual family members through groups of elders to a whole community, coming together to discuss family and community issues, settle debts, tell stories, make commitments and collective decisions, and plan.

Elders play a central role in these gatherings, since they are respected for their wisdom, experience, and knowledge of cultural practices. They constitute a revolving council, which serves as the primary decision-making body across a clan. Council membership rotates by age, as well as Kaya members calling on a particular elder. A Dhome can be called for many reasons (like dealing with a drought or a domestic problem) and the elders that form the council will shift based on many factors including familiarity with the issues, history of fairness and wisdom and so on.

We can see the Dhome itself as an expression of the same protocols as the Mweria. In some ways it seems that the Dhome has grown out of the Mweria itself. Rotating stewardship roles means that 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 and collective resources. It also allows for a dynamic and flexible stewardship structure that can adapt to the community's changing needs.

Together the Mweria and Dhome—like the heart and mind—support the Kaya as a viable or living system²⁰ through the following functions:

1. **Operations:**

Mweria organizes core communal labor and resource sharing, delivering the community's essential outputs (e.g., farming, construction).

2. **Coordination:**

Mweria ensures harmony among participants by scheduling and distributing labor equitably to avoid conflicts or redundancy.

3. **Control:**

The Dhome provides stewardship for resource use, resolves disputes, and audits commitments, ensuring that the Mweria operates effectively within shared rules.

4. **Collective Intelligence:**

The Dhome adapts strategies by considering external factors (e.g., droughts, conflicts) and aligning community actions with future needs.

5. **Planning and Policy:**

The Dhome upholds the community's core values, cultural identity, and long-term well-being, integrating the operational and strategic aspects of Mweria into a unified vision.

Social Parasites

The ability for a person or a family to be parasitic by extracting large amounts of resources from the commons of a village or clan setting is limited to a single Mweria cycle. If you were helped by the community and didn't support anyone else over a whole season, you would not be helped in the next cycle. As with the biological limitations of ecosystems, it is very hard in such an environment to continually pull from the commons, just as it would be very hard for a pumpkin to keep growing forever.

Sadly we must acknowledge that anything resembling natural limits on parasitic behavior has been breached again and again. The ancient Mijikenda were able

20 See Stafford Beer's *Viable System Model*: https://en.wikipedia.org/wiki/Viable_system_model.

to escape the warring Galana tribes in the north and find refuge in the forests for centuries, but eventually most of the social systems of the Mweria were again dismantled by extractive colonial powers. What if our very ability to form new connections and commons is thwarted and all our exchanges are channeled to feed a particular extractive system—like a giant pumpkin?

Where can we all escape to today?

Centralization and Extraction

Imagine you're an architect designing a house. To build something sturdy, you rely on foundational protocols, like understanding how forces interact (physics) and how shapes distribute weight (geometry). These protocols are at work whether the house stands strong or collapses. A well-built house shows how these protocols are applied effectively, while a collapsing house reveals what happens when they're not. The rules themselves remain constant—the difference lies in how the protocols are followed.

While we can identify healthy systems with protocols at work in them, we can also look at systems that have collapsed, continue to fall apart, or exhibit cancerous growth and see the same protocols at work. Let us take a snapshot of where the usage of these protocols broke down. There are many moments to choose from but let's start with the resource coordination tradition of the Romans that brought us the word *money*.

The rise of monetary systems, as exemplified by, but not unique to, the ancient Roman tradition in which coins were used to execute forced taxation, has in many cases led to centralized and extractive resource coordination by the ruling class. The legacy of these traditions continued in colonial tax systems which were imposed on communities, extracting resources without providing equivalent benefits and violently disrupting ancient cooperative practices like Mweria and Dhome.

If ancient Romans were alive today, they would likely recognize remnants or variants of their traditions still co-opted in our usage of money in modern times. National currencies issued by centralized authorities, imbued with terms like "In God we Trust";²¹ still serve the purpose of giving divine-like power to the state to collect

21 *Written on the American Dollar.*

taxes. When we carefully consider the roots of money, we must acknowledge its deep-seated role in our own history.

Growing up surrounded by a monetary system and dependence on state money, we often take money as the only form of resource coordination. Because we are so fixated on money (specifically state money or national currency) it is worth looking at the classically ascribed (but also misleading and narrow) functions of money, namely *store of value, unit of account, and medium of exchange*,²² and how they can be seen in common pooled resource networks.

The **store of value** in monetary systems involves restricting access to valuable resources through the issuance of tokens, granting holders rights to those goods. These tokens are assumed, often without much evidence, to have intrinsic value or provide security for future needs. In a common-pool, this function is mirrored by the ability to store and remember valuable resources including commitments to them. Instead of physical or digital currency, a pool of commitments maintains a curation that represents the group's collective intentions and resources.

Let's now look at what is called the **unit of account**. When we say, "a dollar is worth a dollar," we are pointing to something economists often gloss over: money as a tautology. In other words, a dollar is commonly taken to be worth one dollar simply because the issuing authority declares it so and everyone else abides by that convention. Money issued by a central government (like the U.S. dollar) does have real purchasing power—people accept it for goods and services—but this acceptance, at its core, relies on two forms of enforcement:

1. **Legal enforcement:**

Governments levy taxes in their own currency. If you owe taxes in U.S. dollars, you have a built-in reason to accept (and seek) dollars.

2. **Social convention:**

Because everyone around you also uses dollars, the simplest way to exchange value—buy groceries, get paid—is to do the same.

From a purely logical standpoint, though, saying "a dollar is worth a dollar" doesn't shed much light on why it has that worth—beyond "that's just how we do things." This is what we mean by "tautological." It's a circular explanation: A dollar is worth

²² Jens Martignoni expertly dismantles these narrow and misleading functions of money: <https://ijccr.net/ijccr-27-2023/vol-27-pp-80-83/>

one dollar because we treat it as such, and we treat it as such because a dollar is worth one dollar.

When an entire economy uses one currency (like the dollar) as its main unit of account, all prices get expressed in dollar terms. This simplifies transactions across many goods and services, but it can also mask the underlying reality of where the dollar's value comes from (enforcement and convention). It also means that the relative prices of goods and services are forced into alignment with how the dollar is issued and managed, regardless of local or community-specific needs.

In a pool of commitments, the unit of account isn't automatically "one dollar"; instead, value is determined by the particular resources in the pool and the relationships among them. Imagine a shared basket with different kinds of commitments—e.g., hours of carpentry work, bundles of firewood, baskets of produce, tutoring sessions. The pool's community (or the pool's smart contract, in a digital setting) decides how many "units" of carpentry equals so many "units" of firewood, produce, or tutoring, directly in terms of one another. That is:

- 1 hour of carpentry = 2 bundles of firewood
- 1 basket of produce = 30 minutes of tutoring
- ...and so on

Each item's relative price can shift over time as new resources enter or as seasonal needs change. These relative values can be based on many things, like the energy and time or scarcity required to produce or deliver those resources, or the seasonal needs of the community. There's no single yardstick (like the dollar) overriding every exchange; instead, the pool creates a flexible relative-value (a.k.a. price) index based on supply, demand, and consensus among participants.

Crucially, this frees communities from the one-size-fits-all logic of "everything must be converted into dollars." Instead, the pool's internal exchange rates (or "prices") arise from the actual resources and needs on the ground. If desired, a community can still tie those relative values back to external currency (e.g., so many "units" is roughly equal to \$5), but they are not obligated to anchor themselves exclusively to one currency.

In short:

- **Conventional money:**

A single currency is used as the universal measure, and “a dollar is worth a dollar” by enforcement and convention.

- **Pools of commitments:**

A more direct, dynamic measure of value emerges from the actual goods and services in circulation, letting exchange rates evolve over time and in response to the real conditions of the community.

Finally, a **medium of exchange** in traditional monetary systems is a tangible or digital bearer instrument, such as a coin or token, used as a stand-in for goods and services. In contrast, a pool facilitates exchange through a cultivated space of mutual agreements and relationships. Commitments are exchanged directly within the pool, bypassing the need for a singular intermediary object.

Let’s look at how centralization in monetary systems can become deeply entrenched, and lead to the loss of local autonomy. Global monetary dominance has happened in many ways, but a significant factor was global trade—particularly the reliance on just a few major currencies, the foremost among them being the U.S. dollar, to purchase key commodities like oil. Anyone wanting to buy from international markets is effectively forced to use that currency or convert their own. Because nearly every nation needs these reserve currencies, the institutions that issue and support them—such as the U.S. Federal Reserve, the IMF, and the World Bank—can set terms that include interest rates and structural adjustment programs; countries that do not comply risk being cut off from global markets. Access becomes restricted, and dependence is enforced. A small group of banks and financial actors decides who can open accounts, secure loans, or tap into credit in the dominant currency. Those who do not comply with the system may face sanctions or be denied crucial funds, leaving local alternatives underdeveloped or illegal.

Once nations and businesses worldwide rely on a single currency, the issuing country can freely produce that currency and collect fees, interest, or seigniorage²³ at a level that would be unsustainable for smaller economies. This setup funnels steady wealth back to the center. Over time, large corporations and financial institutions exploit this advantage to buy out competitors, merge into powerful conglomerates, or engage

23 *Seigniorage*: When a government makes money (like printing bills or minting coins) and it costs less to create than the value written on it, the difference is called seigniorage.

in “horizontal shareholding,”²⁴ enabling them to profit across multiple industries. A few massive players then control vast pools of resources, while community-based resource coordination methods, such as seed saving, rotating labor, and communal grazing, are marginalized or deemed illegal since they do not operate within sanctioned monetary channels.

From this perspective, monetary centralization should not be seen as random misbehavior but as an expected outcome of a system that rewards power concentration and penalizes those who seek independence. Techniques that maintain this dynamic often appear to be unethical or isolated instances, yet they arise naturally from a design that enforces top-down control. Throughout history, we see various tactics that are aptly called **colonial methods**—such as outlawing indigenous practices, enforcing exclusive currency use for taxation, burdening communities with high-interest loans, privatizing common resources, imposing expensive licensing requirements, inflating costs through currency manipulation, favoring monopolies by shaping regulations, patenting life forms to monetize genetic resources, over-regulating communities in the name of safety or consumer protection, extracting fees through mandatory channels, promoting dependence by undermining local markets, and criminalizing resistance whenever communities attempt their own resource coordination systems.

It becomes clear that these tactics are not simply the work of a handful of bad actors exploiting an otherwise fair setup. Instead, they emerge from a centralized monetary structure designed to channel resources toward a few power brokers. Even ordinary officials or businesses often carry out these tactics because the system itself rewards and normalizes such behavior. Corruption or exploitation does not merely stem from a small group of evildoers. Normal people can enact this same extraction pattern if they operate within a centralized framework that remains profitable for the powerful. In turn, the same structural outcomes repeat on a global scale: Major nodes in the form of banks, corporations, and states continue to siphon resources from smaller communities that lack the leverage to resist.

Today, in looking at the underlying protocols for resource coordination, we can see them expressed in the global monetary systems and used along with tactics for the centralization of power. The network of money and control across the planet looks like a spider web feeding very few massive central nodes, in which each agreement or pool connects those who would sell their goods or services for money from those

24 *The Myth of Capitalism* by Jonathan Tepper and Denise Hearn.

who have most of it. This concentration of power is similar to massive overlapping pools forming one massive network of pools, controlled by very few companies and their shareholders—much like the cancerous pumpkin that didn't know when to stop growing in Reflection 1.

We carry within us and our communities the enduring heritage of our ancestors and ecosystems—systems rooted in cooperation, reciprocity, and shared abundance. Yet the legacy of centralized monetary traditions, steeped in fear and domination since the Roman Empire, continues to shape our world. Colonial methods and modern shareholder systems have mastered the art of curating vast pools of resources, assigning value, restricting access, and profiting from exchanges—all while **enclosing the commons in exclusive, controlled domains**. Under this system, we are funneled into using national currencies and specific markets as the only means of exchange, concentrating resources and power. Understanding that these colonial methods are embedded features of how modern finance works clarifies why local practices like rotating labor associations hold more than mere cultural or historical significance: They are genuine lifelines that help communities preserve autonomy, foster reciprocity, and cultivate shared abundance.

Shared Reflections:



Are you a parasite?

We are all parasitic from some vantage point. In what relationships and ecosystems do you take more than you give? Consider the role of parasites in ecosystems and their potential to evolve into symbiotic partners. What lessons can human economic systems learn from this transformation about managing exploitative relationships and fostering mutual benefit?

When is some centralization healthy and when is it unhealthy?

How do your individual decisions reflect the intentions of your entire body made up of living cells and organisms? How do your individual decisions reflect the intentions of your other people like your family? Reflect on how systems may restrict access to resources and limit the creation of alternative pools. When can our ability to pool commitments in a decentralized way provide a more equitable and resilient alternative and when can it lead to problems?

What is the difference between a healthy steward and a parasite?

Stewardship in ecosystems and social systems often involves maintaining balance and ensuring sustainable resource distribution. How do you see the protocols of Mweria and Dhome embodying these responsibilities, and how could they be applied in your own life?

Reflection 5: Digital Ecosystems

We've seen that the same protocol functions in ecosystems and ancient social systems can be seen in today's centralized resource coordination networks, the main difference being that much of humanity has lost²⁵ their ability to pool common resources and is forced to depend on extractive centralized pools and access tokens (money). Decentralized technologies have and are continuing to rebel against this.

The digital dimension of cross pollination and value exchange is at the forefront of a rebellion from centralized control. In this reflection, we will dive into these digital realms and discuss the hopes and strategies that grassroots economics offers us for ending the current massive centralization peacefully.

Let's stop for a moment to define the *knowledge commons*. This term refers to an intangible commons: a network of pools of curated valuable information, commitments, stories, and science. Today, it also refers to software that people can access, learn from, and add to. This commons is stored in our memory, our written memory extensions and, more and more often, in digital devices.

Cultivating the knowledge commons, a space of overlapping pools of information, and preventing centralization and corruption is incredibly important and challenging. As soon as we have dependency on centralized digital systems, we can start to lose our freedom to create and access these commons without going through some controlled and often extractive access point (also known as bottlenecks or choke points).

In the digital realm, choke points emerge in ways that mirror the same centralized control found in colonial methods. Proprietary platforms, dominated by a few corporations, function like heavily guarded ports where only certain ships may dock.

²⁵ *The various methods of removing a population's ability to exchange and pool common resources are in fact the methods of colonialism: imperial monetary systems, forced centralization, and extraction—along with education systems that no longer teach children how their ancestors co-operated.*

Search engine algorithms control what appears on our screens, relegating some content to obscurity. Government censorship, meanwhile, can ban or filter entire websites, reminiscent of colonial powers restricting speech and movement. Licensing requirements impose costly barriers to entry, excluding those who cannot afford to comply—much like historical edicts that granted only certain traders the right to do business. Mandates on data localization, content moderation, and platform liability can all serve as modern enclosures, shaping information channels in ways that favor larger powers and limit local or independent voices. Collectively, these tactics reinforce dependency on a small number of digital gatekeepers and echo the same patterns of control and resource extraction that have long underpinned centralized power.

While many of these practices could be considered normal and not harmful at small scale, we can already see a situation emerging in which the majority of the world's information and communication systems are stored with restricted access, in a few big companies' databases. Even the digital hardware of phones and computers comes from factories owned by a few big companies. We can also see those companies (combined together through horizontal shareholding) lobbying governments to allow and favor their monopolies.

While at present we are extremely dependent on centralized digital technologies, there is an opportunity to co-opt or hack the system by expressing pooling protocol functions through the development of open-source systems that empower communities to establish and manage their own pools with their own sovereign hardware and software. This software and hardware ecosystem can provide the digital infrastructure and tools to give access to, operationalize, and re-normalize the key instruments for pooling commitments.

Ledgers or databases that act as memory and accounting systems form a core element of this software ecosystem. Distributed Ledger Technology (DLT) is like a shared ledger or digital notebook distributed across many computers called nodes, where everyone holds a copy. At Grassroots Economics, we currently use and develop DLTs that allow for the freedom to develop and connect community devices together to form sovereign, distributed ledger systems. These decentralized technologies play a crucial role in mimicking and enhancing traditional memory systems of human brains in communities.²⁶

26 Catalini, C. (2018). *Blockchain technology and cryptocurrencies: Implications for the digital economy, cybersecurity, and government*. *Georgetown Journal of International Affairs*, 19, 36-42.

————— “ *Blockchain is not about removing trust;
it’s about distributing trust.* ” —————

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Vitalik Buterin

Here are several ways in which Grassroots Economics has utilized blockchain and, more generally, decentralized ledgers:

A decentralized ledger can ensure that all interactions are recorded transparently and immutably. This transparency builds trust among community members, as they can verify historic flows of resources. In traditional systems like Mweria, trust is built through face-to-face interactions and communal oversight. A decentralized ledger replicates this by providing a transparent record of all commitments and exchanges. This means that anyone can see the agreements in pools as well as commitments.

The nature of decentralized ledgers secures authentication, transactions, and prevents many kinds of fraud. Each transaction is validated by a network of nodes, ensuring that only legitimate interactions are recorded. This security is essential for maintaining the integrity of the network of resource pools and protecting against malicious activities, much like the social norms and enforcement mechanisms in traditional systems. In practice, we’ve enabled community members to easily validate who they are and which commitments and pools they steward via a mobile phone and a secret PIN. Note that not all stewardship protocols and social norms need to be or should be digitized, as some are deeply rooted in cultural contexts and thrive best within face-to-face or analog environments.

Smart contracts are agreements with terms directly written into code read by the network, which can automatically enforce the protocols of pooling commitments without intermediaries. This automation reduces the administrative burden and allows the system to scale to more dispersed networks. This is essentially giving people the ability to bake rules like accountability into their agreements. In this environment, the contract is a bit like a living organism with programmed code forming its DNA or instructions. Given easy-to-use open source interfaces, anyone can write and interact with contracts—simply expressing what their commitments are and pooling those together for common access.

Decentralized ledgers can integrate various forms of digital resources and traditional practices, allowing different communities to connect their pools together. For example,

such digital networks of pools can facilitate exchanges between different types of commitments, certifications, and other digital tokens like stable coins (vouchers representing national currency), creating a broad and diverse network of resource coordination. This interoperability is akin to the ecological networks of mycorrhizal fungi, which connect multiple plant species to share resources efficiently. In practice, Grassroots Economics has enabled people to pool all kinds of digital assets, which means they can also link the commitments in the pool to national currencies.

Distributed ledgers help the system to be resilient to failures and adaptable to changes. Unlike centralized ledgers, in which a single point of failure can disrupt the entire network, a distributed ledger ensures continuity and robustness since any one computer can shut down without the system collapsing. This resilience mirrors the adaptive strategies found in ecological systems, where diversity and decentralization enhance stability and sustainability. In practice, Grassroots Economics is responsible for a node of the Celo Blockchain—meaning that we can continue the system without the rest of the Celo Blockchain, while the rest of the network can also continue without Grassroots Economics.

Overall, decentralized ledgers have provided us with what can be called an agreement space, or *consensus layer*, which includes a memory system, authentication, and verifiable execution of agreements. Building on this, implementing the four functions inherent to pooling commitments has been fairly straightforward as a collection of smart contracts that can be published and interacted with by their creators. Let's get more into how the protocols for pooling have been expressed in this digital environment:

The **curation** process begins by turning each commitment into a unique digital record. This digitization creates a clear and unchangeable way to track and verify each commitment. The commitment is formalized as a “smart contract”—a computer program stored on a shared digital system (a decentralized ledger). This smart contract tracks who holds portions of the commitment and it can manage features like expiration dates automatically. The pool of commitments is also managed digitally, using software that enforces the agreed-upon rules for adding commitments, such as who is eligible to add or pull out commitments, and what approvals are needed.

Valuation in a digital pool of commitments is done through a price index that can enable pool stewards to determine the relative value of different commitments.

External data sources²⁷ can provide real-time price information for certain commitments like stable coins that track national currency value, helping to establish a reference point for valuing related commitments within the pool. Smart contracts can also be designed to adjust the relative value of commitments based on many parameters like seasonality, supply, and demand within the pool.

Limitation or 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. Limits on reciprocal drawing rights can be based on previous performance history, current capacity, and demand within the community. This helps to ensure a balance between the needs of the community and the sustainability of the pool.

The state of a pool of commitments can be described in a simple way, as in Figure 9, which showed a pool allowing for commitment of apples (A), bananas (B), and carrots (C), with their relative values, limits, and current holdings of 2 apple, 2 banana, and 2 carrot commitments.

The last function of **exchange** is also enabled by the contractual design, eliminating the need for intermediaries and reducing transaction costs. Smart contracts can facilitate swaps, where two parties exchange commitments simultaneously, ensuring a secure interaction. Further, pool stewards can automate the collection of contributions, helping to ensure investment, transparency, and accountability in the management of the pool.

This shared distributed ledger system ensures transparency and security by allowing all participants to verify and match their copies, making it nearly impossible to fake or lose information. Commitments, or promises to deliver goods or services (e.g., "I'll fix your car" or "I'll trade eggs for milk"), are recorded in this digital notebook for everyone to see and trust. A digital agreement space ensures that all participants agree before new commitments are added, maintaining the integrity of the shared record. In essence a distributed ledger system is a transparent and secure way to manage commitments and exchanges within a group.

27 *Published price indexes and expert stewards can be used to establish pricing.*

Navigating Vast Networks

We can envision an economy in which individuals, businesses, and groups can issue commitments and have them accepted within pools of commitments, giving them credit that they can spend widely, because a large network of overlapping trusted pools helps to convert an individual's promise into something backed by a much wider community. The more we want to connect across and traverse these larger systems, the more help we will need to navigate a vast network of pools. The challenge is akin to organizing a vast, dynamic trade fair where participants have specific "want" and "offer" lists. Here, the objective is to enable as many satisfactory exchanges across the network as possible, while ensuring that values and principles are cared for. AI and various algorithms in this scenario could function as advanced matchmakers, pairing offers with wants and utilizing the network of pools to fulfill these desires. They can employ iterative methods to continuously refine the trade matches, aiming to optimize the number of successful trades while prioritizing local transactions and caring for community and environment.²⁸

For such assistance and optimizations to happen without coercion, and without extraction through centralization, the underlying AI or algorithms must be decentralized, adaptable, and capable of responding to the fluid nature of pool liquidity and valuation. Transparency and trustworthiness of such service providers is paramount, ensuring that every participant can rely on the fairness and security of the system. Grassroots economic principles and decentralized technology converge in these advanced applications to create more efficient and inclusive systems. Through these approaches, large-scale economies can maintain balance and maximize trade opportunities and ecosystem and community health, within a vast, globally interconnected network of local pools, referred to as cosmo-localism.²⁹

While digital decentralized technologies are hacking into the global financial system and enabling us to create our own pathways for connection while bypassing centralized and extractive structures, they too can become centralized and extractive—especially when the people using them are not actively engaged with their design, evolution, and maintenance. Moving such software and hardware into the hands of their users is the realm often called *tech sovereignty*, and this should be a core topic in any discussion of grassroots economics. While developing open

28 Commercial solutions like this already exist, such as those mentioned by Fleischman (2020): <https://www.mdpi.com/1911-8074/13/12/295>.

29 Read the work of Michel Bauwens on Cosmo-Localism: <https://wiki.p2pfoundation.net/Cosmo-Localism>.

source software is important, when you are the only one developing, maintaining, and running that software, you become a systemic risk to the system. So, while Grassroots Economics is a steward of Sarafu.Network, it is important that this single network is only one of many nodes across the planet. This is why we must continue to train trainers to work on, run, and develop their own technologies and maintain backup options using analog systems and paper ledgers.

While blockchain and smartphone apps can supercharge our ability to record, pool, and exchange commitments, not everyone can—nor needs to—run their own infrastructure. Simple, paper-based ledgers and communal record-keeping can work just as effectively for smaller pools (as you will see in the case study in Part 2). The key is clarity and trust, not technological complexity. Communities can choose the tools that suit them best without fearing that “low tech” is somehow inferior. In fact, many groups often find that analog approaches feel more tangible, approachable, and secure.

The Opportunity in Use Cases

Given the warnings above on the dependency on technologies, it is important to recognize that most of us are extremely dependent on existing digital technologies (like visa cards or mobile money) and the global monetary system. The following sections outline several examples of ways in which people have applied the principles of grassroots economics to co-opt today’s digital financial systems in order to provide a peaceful transition back into symbiosis.

Vending Machines

I will begin with a common situation today, in which someone offers a service and simply wants national currency in return. This is akin to a vending machine, except that instead of putting money in and taking something out, the owner puts something in the machine and asks for money in return. It may seem counterintuitive or mundane but if we are to transition from a centralized national currency economic system into a more polycentric mutual service system, we will have to tackle the current need for/addiction to money.

In this example, Joan runs a small school and wants to sell subscriptions for her teaching services. She creates a voucher (A) worth one US dollar (\$1 USD) of tuition fees, and also publishes a pool and seeds it as follows

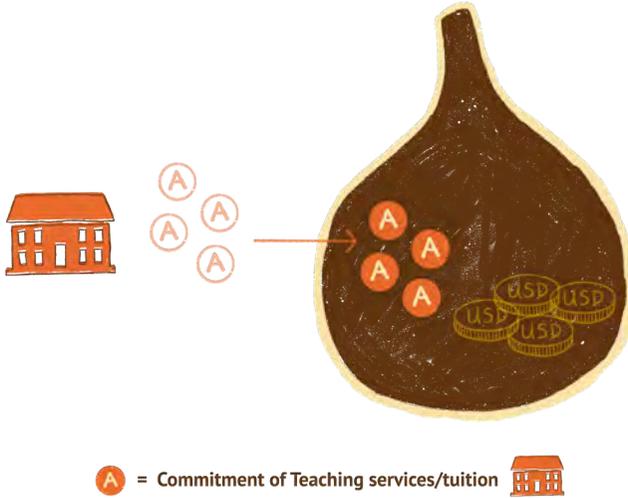


Figure 13a. Vending Machine Stocking with Vouchers

In Figure 13a, she places four of her (A) vouchers into the pool, inviting anyone to exchange them each for a dollar (USD). In other words, anyone can place \$4 USD into the pool and pull out her vouchers at a 1:1 value. Once this is done, the pool would then contain \$4 USD and zero (A) vouchers. Note that the total value of the pool remains constant (\$4 USD of value).

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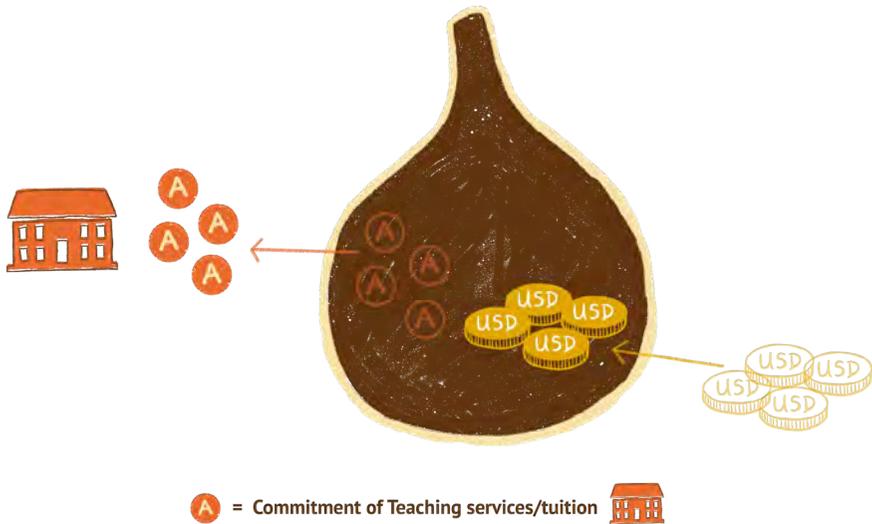


Figure 13b. Swapping USD for Vouchers

This is akin to a simple vending machine, but instead of a physical product, there is a commitment/voucher, making the machine a sort of production financing facilitator. Joan places what she deems as \$4 USD worth of her resources (e.g., teaching services/tuition vouchers) in the pool and allows anyone to exchange it with \$4 USD (paying in advance), effectively giving her money up front.

While this example is for teaching services/school tuition, a myriad of other types of commitments could follow the same model, such as a subscription for local veggies, or community-supported agriculture, a gym membership subscription, bus tickets, gift cards, phone credit, and so on. This is comparable to a simple business contract, where a consultant sells a commitment to provide services to a client who can buy or exchange them with USD and redeem them over time for services, subject to terms and conditions specified in the commitment's formalization.

What makes this example different from someone going to the school and paying for next semester's tuition is that the vending machine is digital and can be accessed online, and anyone holding USD could swap them for tuition vouchers and vice versa. If they have (A)s they are not using, they could swap their remaining voucher (A)s for USD, if there is still some in the pool, or give them to someone else. Since this pool exists on a decentralized ledger, anyone with these two commitments can swap USD and (A)s. This pool then begins to act as a general conduit or market connecting

USD and (A) vouchers and can be used by a network of other pools that contain USD or (A) vouchers. Note that one could also specify exactly who can hold their vouchers and their transferability via an access list.

It is also important to note that whenever anyone buys a voucher in advance, they are in effect providing a form of production financing. The voucher issuer who is selling their voucher is receiving some value (money or in-kind) up front, and is obligated to pay back the “loan” in product (goods or services). In other words, they must redeem the voucher as specified by the terms of the voucher.

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Collateralized Resources

The above case might seem risky. What if Joan does not accept back the vouchers, or her teaching (the product or services) is not at the quality promised? While this can be handled under contract law and a state or community legal system, those processes are cumbersome and expensive. Seeing that her clients want some form of collateral, Joan adds more resources to her pool as follows.

In the next example, let us assume that Joan holds some of these other (B) and (C) resources, which are subscriptions to teaching services/ tuition at other local schools in the area. Joan seeds two (B)s and two (C)s into the pool, along with the existing four of her own (A) vouchers.



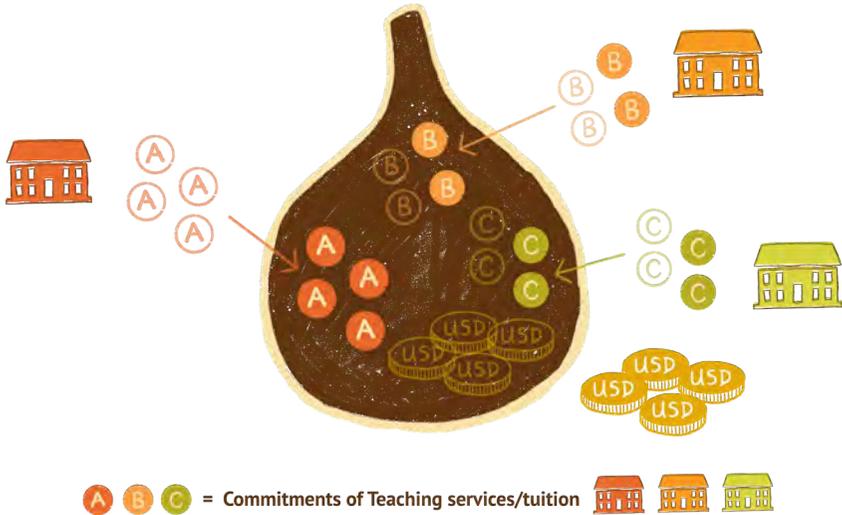


Figure 14a. Adding More Vouchers to Joan's Pool

In this pool diagram, Figure 14a, Joan has allowed vouchers A, B and C into the pool. Say these represent commitments from other schools/teachers, which can now be exchanged for her (A)s or USD. Note that because of the Resource Limits she imposed (four each), anyone holding (B)s wanting to take any other resource out of the pool would be limited to being able to swapping their (B)s only if there are less than four in the pool—this is a method of giving credit access while limiting risk and overexposure.

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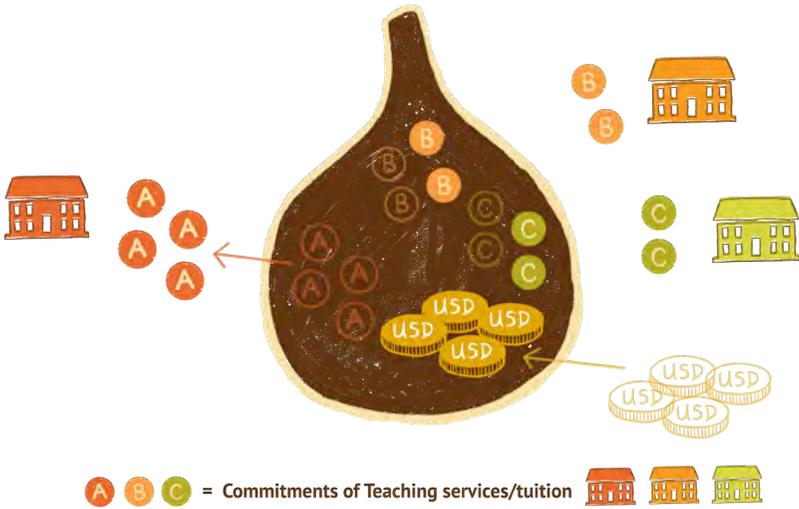


Figure 14b. Swapping USD for Vouchers

In Figure 14b, as before, a buyer can place USD in the pool and pull out four (A)s.

If for some reason the buyer does not want Joan’s teaching services or they are unavailable, they could swap the four (A)s for two (B)s and two (C)s, which act as a form of collateral and increased utility. This might be useful when moving to a new area and changing schools.

—

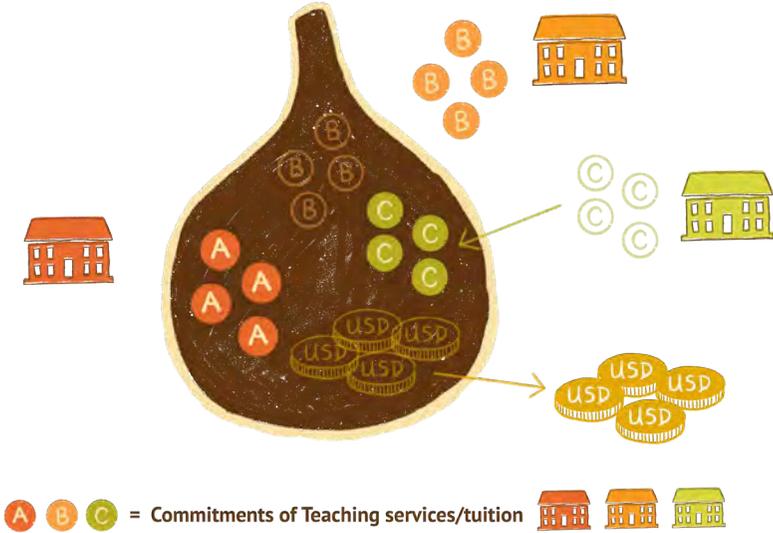


Figure 14c. Swapping Vouchers

In Figure 14c, the buyer who bought (A)s and no longer wants them has put them back and is now holding two (B)s and two (C)s. Now anyone holding (B), or (C) could pull out (A)s or USD from the pool.

-

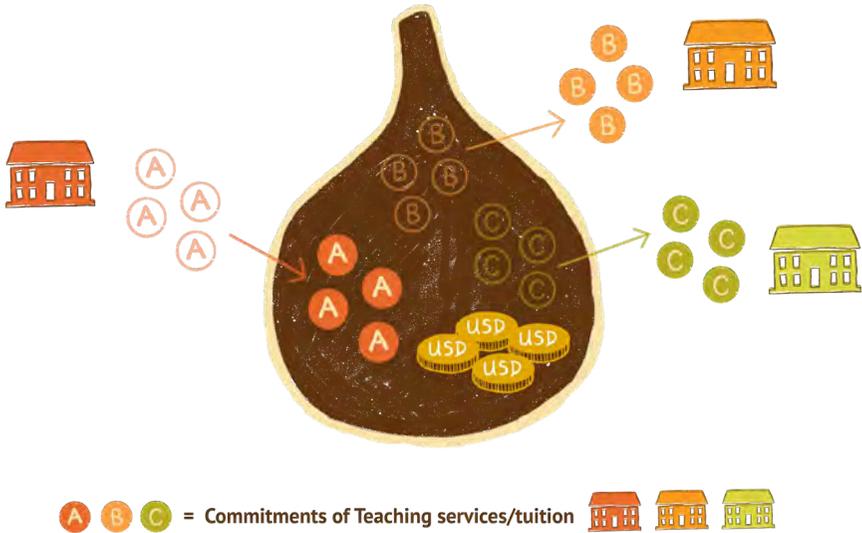


Figure 14d. Swapping Vouchers for USD

In Figure 14d, if Jane, who is the issuer of (C)s (running another small school), decided to exchange four (C)s for four USD, she would effectively be tapping into a line of credit (her access to the common-pool).

This example addresses our addiction to money while also giving anyone holding A, B, or C commitments the ability to exchange them without needing any USD—effectively opening a door to bypassing national currencies.

Note that pool transaction fees in the commitments themselves (a percentage of A, B, C, or USD as they are exchanged) could constitute an insurance fund that is available to people who hold defunct vouchers from a pool. So while having multiple resources in the pool does give more options to holders, ultimately, if the pool is managed by a larger group of people, this helps to mitigate the risk of defaults (non-redeemable vouchers).

—

Cooperative Ownership

One disadvantage of the vending machine model is that it relies solely on people curating their own vouchers in pools. Now, let us imagine a case where the pool creator has none of their own commitments in the pool and simply wants to create a pool and seed it with various commitments and digital resources they hold, while charging fees on exchanging them. This would be akin to creating an exchange out of a portfolio of resources which allows anyone holding those specific, allowed resources to exchange them for other resources in the pool. The creator of such a pool could, for example, be a family foundation wanting to encourage collaborations between organizations it has invested in.

Joan could share pool stewardship rights with other schools (represented by Jane and Bob), who would be able to vote on the parameters of the pool. The simplest version of this might be a multi-signature wallet, where the signatories must all sign to make any changes, or two out of three signatories might be able to make changes. (This would act as a safeguard in case someone loses their signing key.) Note that it will always be possible for forms of centralization to arise from these kinds of networks—which is why networks of smaller pools and clear commitments are so crucial in preventing extractive centralization.

If there were exchange fees on using the pool, these could also be divided among all three owners. Indeed, fees could be split among anyone who seeded resources in the pool as well as an insurance fund in case of default of any vouchers in the pool and to help with the maintenance and balancing of the pool. One of the best ways to develop an insurance fund that I have seen is to have a tax on usage of the pools as well as a hoarding tax. This is sometimes called demurrage or a Gesell tax: The commitments (whether held by an individual or in a pool) can have an expiry date. These pool fees and expired commitments or vouchers can be utilized by a community fund that supports emergencies and defaults.

Mutual Service Exchanges

Since the concept of pooling at Grassroots Economics formed around learning from mutual service practices, i.e., ROLA traditions such as Mweria, it is important to come back to these and consider them in the digital context. One person could call upon the commitments of the community and in return give their own over time. Based on the formalization of pooling protocols, each person would express their commitment

to services (possibly as a voucher) and place these in the pool. A committee (made up of village elders or group leaders) acting as stewards could manage permitted resources, limits, and relative values. Unlike in the previous examples, labor is not necessarily swappable with USD, since ROLAs don't generally use money. However, there might be instances where hired labor or support from neighboring groups is mixed with ROLA commitments.

Reflection 2 outlined the exchange of commitments across three families in this same digital fashion as a record keeper. This system satisfies the traditional mutual service example while also giving several opportunities for the group to transparently choose to create overlapping pools like those of a neighboring village. Each person can have commitments in several overlapping pools, acting as a bridge between them. This network of pools connected by shared commitments can act as a polycentric economic system.

Pooled Islamic Endowments

Resource coordination practices predate formal religions, arising from our earliest instincts for survival and cooperation. It is no accident that faith communities worldwide find that these practices align beautifully with core values of stewardship and compassion. This guide is meant for all traditions—and none—reminding us that collaboration is part of our universal human heritage.

Dr. AbdulHakim Maina has been applying his studies of Islamic Finance using digital pools of commitments on Sarafu.Network to build a network of Resilient Community Waqfs³⁰ in Kenya. AbdulHakim explained to me that an Islamic endowment (Waqf) can be a seed of money or any valuable resources that are intended to help a community and are maintained over time. I visited him, curious to learn more. After giving us tea and the proper attire to attend prayers at his mosque he explained his system as follows:

An endowment of national currency in the form of a stable coin resource (digital commitments for USD) is seeded (endowed) in the pool by AbdulHakim, who then extends access to the endowment to trusted shopkeepers in the area via zero interest loans. The shopkeepers can exchange their own commitments to their store goods

30 *Resilient Community Waqfs—Digital Pool:*

<https://sarafu.network/pools/0x1e40951d7a28147D8B4A554C60c42766C92e2Fc6>

(as digital vouchers they have created) to pull out endowed funds from the pool. There is also an agreement that the shopkeepers will exchange back funds for their commitments over time.

AbdulHakim explained that he believes in *patient capital*, meaning that the borrower can exceed their time limit without harassment—while also encouraging repayment within the time limit by awarding them a higher credit limit in the pool and a boost to their reputation.

These shopkeepers (who are the main community lenders in Kenya) then use the funds to stock their shops and give out the same kind of loans to their clients (cascading/overlapping pools). This means people have resources when they need them—and solves a serious problem in cash-starved communities.

A Waqf or seed endowment is intended as a reciprocal instrument that helps the community. In combination with zero-interest lending, the Waqf can be seen as an Islamic formalization of ancient reciprocal practices like the Mweria tradition of the Mijikenda. Simply put, a community can use the endowment for their collective good and must replenish what they use to maintain it over time—much as someone receiving communal support in a Mweria must return that support to others over time.

Islamic finance, endowments, and zero interest loans offer additional examples of ways to utilize scarce, but still needed, national currencies in a way that is more sustainable while also building the resilience of rural, urban, and refugee communities. This **resilience building** aspect is potentially the most impactful aspect of the common-pool structure since, once a community has created a Waqf with an endowment and is using it for zero-interest lending, they also have the ability to exchange directly among themselves—bypassing the need for national currency.

For example, if Katana's Shop has credit in a pool and Amina's Shop has debt in the same pool, Katana can use his credits to swap his commitments for Amina's in the pool and then use them to purchase goods with Amina—completely bypassing the need for national currency. In other words, Amina can pay back her debt (removing her vouchers in the pool) simply by accepting her vouchers as payment from Katana. Katana, with his vouchers now in the pool, has replaced Amina's debt. In this way the total value of the pool doesn't diminish (since something must come in, as something goes out) and continues to help the community. This creates a dynamic equilibrium

in which the tension between credit and debts enables those community members with credit in the pool to clear each other's debts (Obligation Clearing or Offsetting).³¹

With an endowment, we are creating a **clear expectation** that the total value of the pool must be maintained over time while also supporting a community of service providers—instead of treating seeded funds in a pool as a gift or donation. This expectation sends a clear signal toward sustainability that is simply not there in many charitable models.³²

Overall new technologies like shared digital records (distributed ledgers) and agreement systems give us modern tools to work together in ways that build on ancient traditions of cooperation. These tools make it easier to see clearly what everyone has agreed to (transparency), stay accountable, ensure people follow through on their promises, and work together seamlessly, even across different systems (interoperability).

They're like bridges connecting the wisdom of how we've always lived and worked together with exciting possibilities for the future. These technologies aren't the final answer but an important step forward in creating systems that support thriving, fair, and connected communities.

31 See the great work of Mutual Credit Services for more on how this is being done in the UK.

32 For more on this, see this article on seeding: <https://willruddick.substack.com/p/seeding-gardens>

Shared Reflections:



Come up with some more examples of how digital systems offer an opportunity for people to connect to national currency and each other in a way that allows for resilience without national currency.

What are the dangers and pitfalls of dependency on digital systems and how can they be overcome?

How can the same protocols be used and connected without digital systems?

Reflection 6: A Path Forward



The Magic Coin Soup Story

Once upon a time, a stranger stumbled into a war-torn village on the brink of famine. People were hoarding what little food they had left—nobody shared so much as a crumb. When the stranger knocked at door after door, each villager grumbled, “We have no food left to spare. We won’t survive the winter if we give anything away!”

*“Not to worry,” the stranger said with a broad smile,
“I can prepare the most delicious Coin Soup.
All I need is a kettle and a fire.”*

Curious but skeptical, the villagers lit a small fire in the center of the square and placed a battered pot over it. The stranger reached into his pocket and pulled out a handful of glittering coins.

A woman scowled. “We’ve barely got enough onions left for ourselves, we’re not going to sell you anything—we can’t eat money,” she snapped.

"That's easy to fix," said the stranger. "Here, take these coins. In exchange, I need some onions to begin my soup. When the soup's ready, bring these coins back, and you'll get a whole bowl of delicious soup."

Intrigued by the prospect of a hot meal, the woman traded her onions for the stranger's coins. In they went, sizzling and caramelizing to perfection. Soon, a second villager ambled over, drawn by the rich aroma wafting through the air.

"Got anything to add?" the stranger asked, holding out more coins. "Carrots, maybe? Celery? A dash of salt?"

The second villager took a coin and sprinted off and returned with carrots. Another neighbor, seeing the others, came bearing celery. Someone else even had a bit of chicken hidden away. One by one, they exchanged their goods for coins, tossing vegetables and scraps of meat into the pot. The soup began bubbling into a heavenly broth as the villagers lined up, eagerly clutching their coins like precious tickets to a secret feast.

At last, the soup was finished—overflowing with flavor, warmth, and sustenance. Families approached the stranger, coins in hand, and in return, he ladled out hearty portions of the soup. Bowls were filled, children grinned from ear to ear, and the village echoed with laughter for the first time in ages. The stranger ate his fill, too, then collected his coins and prepared to leave.

"Wait!" cried one villager. "If you take those coins away, how can we make Coin Soup again?"

The stranger gave a wink. "You don't need my coins." Before anyone could press him for more details, the stranger tipped his hat, stepped onto the road, and vanished beyond the horizon.

I often find myself in situations where people say, “That all sounds nice and good, but that’s all for people who trust each other, not us.” When gardening in a desert, the seed resources you bring with you make all the difference. The Magic Coin Soup Story you might recognize as a deeper dive into the agreements that might have been there in the old Stone Soup fable, in which hungry strangers convince the people of a town or village to share small amounts of their food in order to make a meal. Notice how the stranger in the story created a common-pool by first giving his word that he would make and distribute soup. The magic coins were a token of that commitment; their only purpose was to keep a record of commitments in a publicly accountable way. Again, the stranger curated his own commitment in his common-pool as the first seed, then specified the commitments he wanted in return. As people took his coin, they accepted his commitment and also added their own. They created a mutual credit between them. When they returned with items for the soup, they retained a credit (symbolized by the coin), which they later redeemed for soup—relieving the stranger of his debt. This beautiful ability for us as individuals to seed common-pools is an important part of our heritage.

Imagine a world in which communities no longer depend on distant, extractive economic systems but instead thrive through networks of shared resources and commitments. This vision isn’t just a dream—it’s happening today. I have witnessed it firsthand in Uganda and Kenya: networks of refugee camps, business in cities, and rural farmers who managed to coordinate the equivalent of billions of dollars’ worth of goods and services without a single currency transaction, relying instead on the pools of mutual commitments their ancestors used.

Pooling commitments, grounded in the ancient wisdom of systems that link the heart and mind of society, are powerful tools for modern economies. We have also looked at the way modern digital technologies are helping to bring these ancient protocols back to the world, expanding their reach, and allowing people to exchange commitments and pool resources without money and across vast regions and diverse needs. All over the world, similar networks are emerging and flourishing on every continent, connecting farmers, builders, educators, and others in ways that grow not just their resources, but their relationships, skills, healthy ecosystems, and their sense of belonging and purpose. We are in a transitory phase, and today’s digital technologies present an opportunity to step (back) into forms of symbiosis.

This great opportunity brings many challenges.

Challenges and Opportunities

“ *We are called to be architects of
the future, not its victims.* ”

— Buckminster Fuller

One of the first hurdles in creating and regrowing resilient networks of pools is stewardship. To transform a parking lot or any degraded soil back into a garden takes a dedicated gardener. Every pool needs stewards—people who plant their seed in the commons and ensure that operations run smoothly, decisions are transparent, and those affected have a voice. As we’ve seen from the mind of the Kaya, these stewards act as caretakers of a common-pool, adapting its rules and processes as the needs of the community evolve. Without this kind of leadership, even the best-designed digital or analog system can falter.

Another challenge is management of risk. What happens if someone doesn’t fulfill their commitment? Pool stewards must have clear mechanisms in place to handle risks, like adjusting the value of unfulfilled commitments and creating enough abundance to absorb temporary losses. These systems ensure that a single failure doesn’t destabilize the entire pool.

Access to expressing commitments and pooling plays a critical role, but the process must be as self-sovereign as possible, user-friendly and accessible. Imagine a wallet assistant—an app, or even a community member—helping you navigate your commitments, find the best exchanges, and simplify complex trade routes. Behind the scenes, decentralized technologies can provide the infrastructure for transparent and secure transactions, but the user experience must remain intuitive. Any digital ledger system should be able to revert if necessary to analog paper ledgers and other record systems. Manual and analog systems should not be diminished or forgotten—they represent important technical sovereignty.

Legal frameworks also need to catch up. While there’s precedent for traditional practices as well as commitment-based instruments like vouchers and loyalty points, scaling pools of these instruments globally means navigating a labyrinth of regulations—many of which were created specifically for the purposes of colonial rule and monetary centralization. Communities must work together to formalize traditional practices like Rotating Labor Associations in modern legal and technological frameworks, ensuring they remain culturally authentic while gaining wider acceptance.

In 2012, five friends and I were jailed for implementing these very practices in Kenya. Our experience there in jail and eventually in court, where we were prosecuted for having restarted these social resource coordination systems in urban informal settlements, showed us that we were not alone. Everyone saw it as unacceptable for the government to forbid a mother from trading her commitments to provide tomatoes to pay for her daughter's school fees. The Director of Public Prosecution ordered the government to drop the case, setting a precedent for hundreds of communities to start reviving these practices.

This guide does not offer legal advice, and we recognize that regulations differ widely, often lagging behind community innovation or stifling it altogether. While some regions have restrictive laws around seed exchanges, mutual credit, and alternative currencies, we encourage communities to advocate for the right to freely pool and trade their ancestral knowledge, labor, and resources. Changes to laws often begin with local acts of rebellion and conscious policy engagement. We share these practices with the hope that legal frameworks will evolve to honor and protect them, rather than suppress them.

Reconnecting outside the artificial and imposed scarcity of money, as our ancestors always did, should never be illegal. As more and more of us regrow our connections to one another, we are both witnessing and part of a pollination rebellion. A pollination rebellion is a movement of shared abundance, where communities exchange resources, ideas, and care to regenerate ecosystems and relationships, resisting systems that prioritize control and extraction over connection and mutual support.

A Synergistic Future

————— “ *Be the change that you wish to see in the world.* ” —————

-

Mahatma Gandhi

So, what does a future built on our heritage of grassroots economics look like? *We are the gardeners and the stewards we are looking for.* All of us hold some wealth and abundance, some part of which needs to be used as seed for the interconnected pools of the future.

—————

If, like the stranger with the magic coins, you have an abundance of national currency, this means you have an opportunity to invest or seed endowments that end up connecting people and projects together to the point that they will, over time, no longer need the initial funding in national currency. This form of liquidity investing in regenerative projects will grow abundance in stewardship, social belonging, skills, purpose, commitments, natural ecosystems, and infrastructures. If, like most people in the world, you do not have an abundance of national currency, such seeding or investment can take the form of families pooling resources with their neighbors to build and repair homes, farmers using their labor to support one another, and bioregional networks coordinating to protect and share water, food, and skills sustainably.

The work of Grassroots Economics is one shining example of these kinds of approaches. It connects over 100 Rotating Labor Associations across five bioregions in East Africa, where communities practice syntropic agroforestry, build homes, and exchange skills—all without relying on national currency—as their ancestors did for countless generations. These overlapping pools of commitments create a web of resilience, much like the mycorrhizal networks in a healthy forest, where resources flow freely and strengthen the whole system. These same tools are now available online as open source software that anyone can reuse and build on.

The key to this transformation lies in stewardship. Stewards act as grassroots economists, guiding the four core functions of a pool—curation, valuation, limitation, and exchange—and ensuring that the system remains fair and sustainable. Importantly, they seed the initial resources, whether through labor, materials, or external funding, and foster trust among participants. A good steward is a bridge, using local traditions and modern tools to connect their own resources with individual needs and community goals, and past wisdom with future potential.

Moving Forward

Positioning grassroots economics as a public good empowers communities, particularly marginalized ones, to reclaim and adapt traditional resource allocation and coordination practices to modern challenges. By making resource pooling accessible, communities can create fair systems for resource management, mutual aid, and credit clearing.

This enhances resilience, fosters social cohesion, and ensures that even in cash-scarce³³ environments, communities can thrive.

It is important to note that, while the act of pooling (the right and ability to establish cooperative systems) is a public good, the specific pools (the commitments, resources, and relationships formed by groups) remain private or semi-private commons governed by the participating group. Recognizing pooling as a public good supports sovereignty, fairness, sustainability, and cultural preservation while ensuring that diverse communities have the tools to build their own resilient systems.

The transition from extractive capitalism to cooperative, regenerative economies won't happen overnight. But every overlapping pool connected by common commitments exchanged is part of a pollination rebellion—a step toward a future where collective well-being outweighs the dominance of the few. It starts with small actions: identifying what we can offer, pooling it fairly with others, and building trust. Workshops, policies, and tools can help scale these practices, but the heart of this transformation is human connection, and that starts with you.

————— “ *We move at the speed of trust.* ” —————
-
adrienne maree brown

Our networks of common-pools are more than economic systems—they are ecosystems of relationships, in which every promise made and kept strengthens the bonds that hold us together.

The future isn't just something we passively wait for. It's something we can build together. As we close these reflections, consider this: What commitments are you ready to make and pool together with others for mutual well-being?

Let's start.

33 The terms “poor” and “poverty” were popularized during colonial rule as part of a strategic narrative to justify the imposition of monetary systems and taxation, such as hut taxes, on indigenous populations. These terms framed traditional, self-sustaining economies as inadequate, promoting the idea that life without money was dire and dependent on colonial intervention for improvement. This narrative was instrumental in dismantling indigenous resource-sharing systems and integrating communities into exploitative wage economies.

Part 2:



Practice

Becoming a Grassroots Economist

A significant part of this work is training trainers of trainers to spread good stewardship practices. Stewards (whom we also like to call Grassroots Economists) play a vital role in seeding, utilizing, and developing common resource pools to enhance cultural economic activities and foster sustainable community well-being. I have found that people who understand that *people*—themselves—are the key to their own development, over time, become adept at guiding communities to recognize and utilize their shared abundance across all resources—whether social, human/spiritual, political, natural, physical, and economic.

When using the term *group* or *community*, I like to imagine that a community is the sum of each person's overlapping pools. Similarly, each of us (as conscious collections of resources, organisms, and cells) has (and is) a curation of what we find valuable in ourselves and the world around us. As stewards, we find ourselves inside this value system, with our own values connecting out to those around us. From this perspective we become better gardeners, able to see and cultivate where valuable and healthy overlap can occur.

Visionary Approach to Community Action Planning

A wonderful core skill for a steward is the **visionary approach to community action planning**, encompassing systems thinking and sustainable development. My experience with it is based on the extensive and beautiful work of Mwalimu Musheshe and Alida Bakema-Boon, elders and co-founders of Uganda Rural Development and Training (URDT) program and African Rural University (ARU) in Uganda. Their approach involves working with people to develop a common vision, map their abundance, and establish clear action steps for reaching their vision. I've found it to be a natural space that allows for the emergence of pooled commitments toward a collective vision.

The visionary approach to development uses the creative-tension resolution system to achieve individual and community goals. It melds individual visions into a unified vision for community well-being. It promotes inclusivity and collective goal setting rooted in the community's desire for a good life. The assessment of "what is", and of current resources relative to the vision, determines actions and usage, allocation, and coordination of resources as a roadmap from the present to a desired future. This collective tension between current resources and vision brings about active participation and results in community development by choice rather than by co-option or force.

Everyone in the community should have a clear picture of what a desired life looks like and develop the strategies to get there. In the following pages, we will look at each phase of the visionary approach and how it can be integrated with commitment pooling.

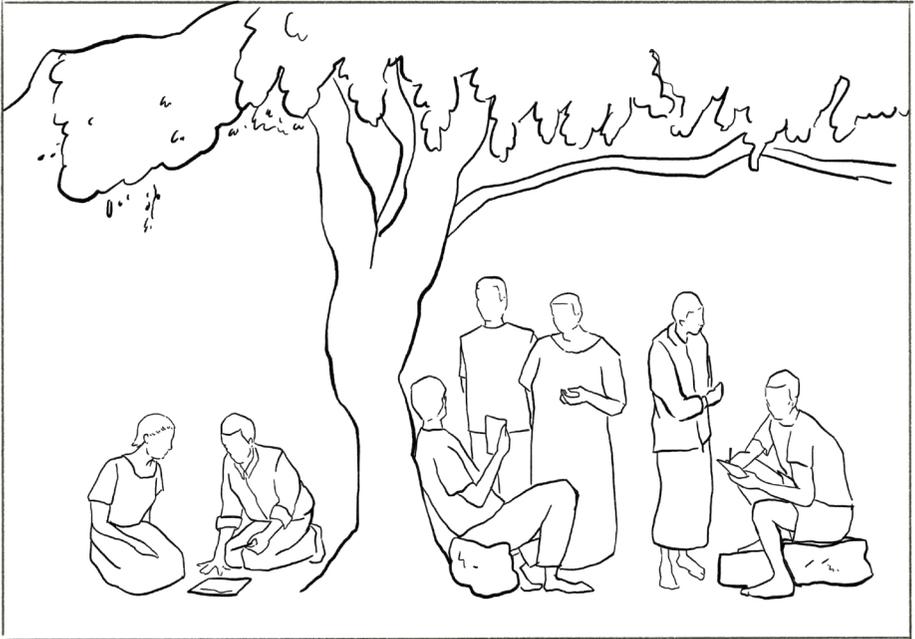


Figure 15. Working on Vision

Phase A: Developing a Common Vision

Developing a Common Vision is the foundation of any successful endeavor, where the group unites around a shared purpose and direction. This phase begins by identifying core values, aspirations, and guiding principles that resonate with everyone involved. Individuals are encouraged to reflect and breathe life into their personal visions, which are then shared to create fertile ground for collaboration and resource pooling. By finding common elements among these visions, the group can craft a compelling and inspiring shared vision that motivates and aligns their collective efforts.

Beyond motivation, a common vision acts as a compass for decision-making, guiding the group when faced with challenges. It also plays a crucial role in resolving conflicts, offering a shared framework to assess which course of action best aligns with the group's purpose, values, and principles to accomplish the desired goal. Additionally, the vision provides a benchmark for measuring progress, helping the group evaluate whether they are moving in the right direction and achieving their goals.

The process of creating a shared vision requires introspection, open communication, and collaborative decision-making. By dedicating time and effort to this process, a group can lay the foundation for cohesion, purpose, and long-term success. Note that all these steps are something you should do individually, as well. But for the group vision, composing a team is the key to participation and inclusivity by recognizing that people have innate power, wisdom, and authority that they can tap on to achieve what matters in their lives and as a whole. It also engenders a strategy of empowering weak members in the group by recognizing that they also have a role to play.



Figure 16. Imagining what's Possible with Your Community

Exercise: Envision Your Future

Here are some best practices and steps to help a group³⁴ to come up with a shared vision:

1. **Begin by explaining the importance and purpose of a shared vision. Ensure that everyone understands that this vision is where their individual visions overlap with others' visions, and that the shared vision will guide the group's decisions and actions.**
—

2. **Ask: "What could you create as a group in one year?"**
 - a. Individual reflection: Encourage each group member to spend some quiet time reflecting on their personal vision for the group. Ask them to close their eyes and really imagine what achieving the vision looks like. Encourage them to consider all six forms of resources: social, human/spiritual, political/governance, physical/infrastructure, natural, and financial. (For more on these, see the definitions in Phase B, below.)
 - b. Pair or small-group discussions: Once individuals have reflected on their own, ask them to pair up or form small groups. These smaller settings allow people to share their individual visions, perhaps drawing them or using other creative ways to express their ideas.
 - c. Combining visions: After the pair or small-group discussions, bring these smaller groups together to share their visions with the larger group. Encourage them to identify common themes, ideas, or goals that emerge from their discussions.
 - i. This format can be done in many ways such as: 1 minute for solo contemplation, 2 minutes for discussion in pairs, 4 minutes for discussion in groups of four, and 5 minutes for discussion in groups of 8, and so on until you have the entire group working together. A group of 20 people should take roughly two hours for such a session.

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³⁴ A group could simply be two people or it could be as many as 200. We use a divide and merge format that can scale to many people depending on how many stewards there are. A single steward can handle a group of 20 in a two-hour session.

3. **Creating a draft vision:** Based on the common elements identified, create a draft vision statement. This statement should be concise, clear, and inspiring, encapsulating the collective aspirations of the group. Note that visual depictions such as art or diagrams help us all really see and feel more clearly what it is we are creating.
—
 4. **Feedback and revision:** Share the draft vision with the entire group and solicit feedback. Be open to suggestions and ensure that everyone's voice is heard. Revise the vision based on the feedback received.
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 5. **Finalizing the vision:** Once the group is satisfied with the revised vision statement, finalize it. This shared vision should be something that all group members feel connected to and motivated by.
—
 6. **Communicating the vision:** Ensure that the vision is communicated clearly and regularly to all group members. It should be a living document that guides the group's actions and decisions.
—
 7. **Remember, creating and holding a shared vision is not a one-time activity but a continuous process that may need to be revisited and revised as the group evolves and circumstances change. The important thing is that the vision remains a true reflection of the group's collective aspirations and provides a clear direction for their journey.**
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Case Study: Phase A



This case study is based on the work of Emma Onyango, an amazing community steward and grassroots economist whom I've had the pleasure of knowing for over a decade. We even spent time in jail together and won a precedent-setting court case to honor the rights of people to practice their traditions, as discussed earlier. I will continue this case study at the end of each phase as a way of providing practical ideas to bridge the theory in the above sections.

Emma owned a small hair salon in a coastal town, where she keenly felt the seasonal ebb and flow of cash. Whenever off-peak months arrived, people delayed visits, pushing her into her own cash crunch. Inspired by an example she heard about in another community, she decided to try a new approach. She resolved to become a steward of a local economic network rooted in mutual support and the traditions of rotating labor.

To begin, she reached out to five of her most trusted neighbors: Yusuf, a **grocery shop owner**; Jane, a **tailor**; Grace, an **at-home baker**; Kevin, a versatile **carpenter and handyman**; and Beatrice, a **teacher who tutored children** in the afternoons. They all met one evening in Emma's salon, where she served tea and bread, spending just a few dollars on refreshments. Each neighbor spoke of cash shortages during the tourist off-season, when incomes dropped and debt piled up. Emma then proposed an idea: What if they could rely less on scarce money by exchanging goods and services without cash? Interested in the idea, the neighbors agreed to try the visionary approach and each of them took time during the meeting to develop their own individual visions for the current year. They finally came back together to create a shared vision and included Emma's idea—that they could pool their commitments to provide goods and services in order to each reach their own visions. Together, they wrote about their visions and even drew a picture that went up on the wall of Emma's salon.

Phase B: Assessing the Current Reality

Assessing the current reality is about clearly understanding the gap between the present situation and the vision. This is vital in order to create a solid foundation for any actions that are taken. This phase involves taking inventory of available resources, identifying obstacles and challenges, and analyzing current capabilities and gaps within the system. By gathering feedback from the community and engaging in thorough observation and investigation, this step ensures that the community's current reality is well understood, providing a comprehensive baseline for planning, expressing commitments, pooling, and decision-making.

It is often the case that people simply value their money (or lack thereof) above all else. Lots of us are not used to identifying other forms of resources. A healthy common-pool coordinates the flow of many different types of resources. Commons must take into account more than just financial resources to ensure sustainability and well-being. It is important to consider multiple dimensions of human experience, including social, cultural, and environmental aspects.



Integral Resources

Integral Human Design proposes a framework consisting of six resources or resources to address these dimensions holistically based on traditional values:

Economic Resources:



The management of resources, financial systems, production, and distribution within the commons. This includes addressing issues like income distribution, wealth creation, employment opportunities, and economic resilience.

Social Capital/Resources:



The relationships, networks, trust, and reciprocity among members of the commons. Social capital is crucial for fostering cooperation, sharing knowledge, and building a sense of community. It can help create a supportive environment in which people are more likely to contribute to the commons. Note that the creation of commitments or promises, their acceptance and validation, and their fulfillment, create a virtuous cycle that builds social capital (trust). When this cycle breaks, it is a huge loss to a community and needs to be repaired.

Human/Spiritual Resources:



The combination of individual skills, knowledge, creativity, health, as well as spiritual development, values, and beliefs. This resource focuses on personal growth, self-awareness, and the ethical and moral foundations that guide human behavior. Investing in human and spiritual capital can lead to increased productivity, innovation, well-being, and a deeper sense of meaning and purpose.

Political Resources:



The ability to influence decision-making processes, policies, and institutions that govern the commons. Political capital involves the engagement of individuals and groups in the political sphere, their capacity to voice their concerns, and the overall distribution of power within the commons. It helps to ensure that the interests and needs of all members are taken into account and that the commons is governed effectively and fairly.

Infrastructure Resources:



The physical infrastructure that supports the functioning of the commons, such as transportation, communication, energy, and water systems. These systems enable the movement of goods, services, and information, and are essential for the functioning of the commons.

Natural Resources:



The environmental resources, such as clean air, water, fertile soil, and biodiversity, which support human life and well-being. A healthy commons must protect and regenerate these resources to ensure their long-term availability for future generations.

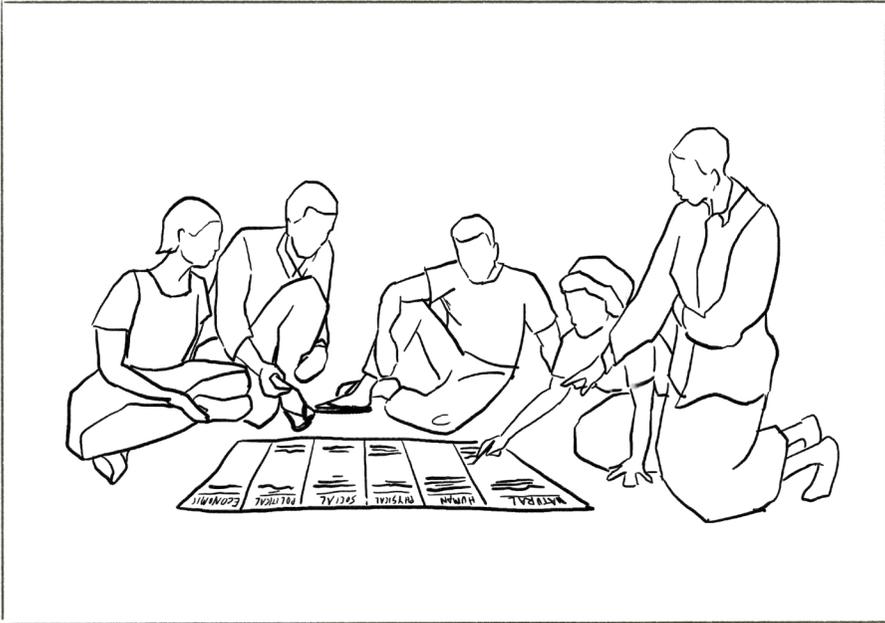


Figure 17. Mapping Your Resources

Exercise: Resource Mapping

1. On a big piece of paper, create six columns for the six integral resources.
 -

 2. Go through each resource and name resources available and needed for each individual in the group. Those resources that are in abundance for the community should be listed at the top of the column and those that are scarce should be toward the bottom. Make sure this is also informed by the six integral resources—for example, you could prompt people to mention offerings that might not be commercially recognized but do add value to the community.
 -

 3. Trace the sources of all the resources mentioned. What does the community import? Note down the local resources (found within the group) with a star and foreign resources (found outside the group) with a square. The resulting resource map will form the basis for developing a vision and action steps.
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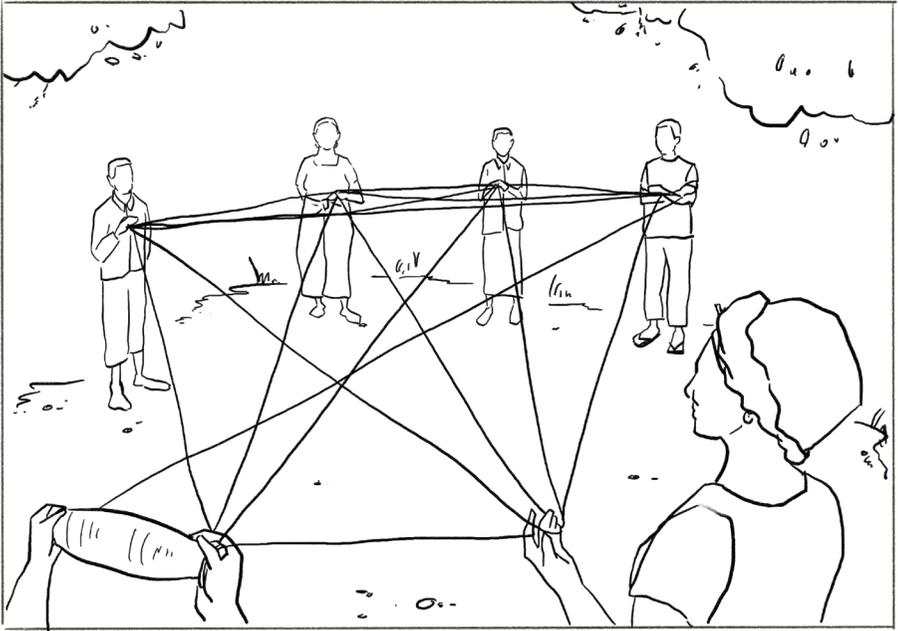


Figure 18. Mapping Your Network

Exercise: Web of Symbiosis

This game will help you internalize how interdependence works in an ecosystem and how it can be applied to human communities. The outcome of this exercise is a visual and tangible representation of the community's interconnectedness, capacity, and potential for mutual support. It highlights the role and value of common-pooled resources in facilitating the fair and efficient sharing of valuable resources.

1. **Circle formation:** Make sure you have a piece of clothes line, rope, or ribbon handy. Have the group stand in a circle after they have mapped out their resources.
 -

 2. **Have everyone hold hands in a circle and imagine the support that they can offer each other.**
 -
-

3. **Starting the weave:** The first person holds the end of the clothes lines, rope, or ribbon and says out loud what goods or services they can offer to the group. This could be anything from childcare, hair braiding, or farming to other professional services or goods.
—
4. **Building the network:** Someone in the group who needs that good or service raises their hand. The person offering the service throws them the rope, while keeping hold of the end of the rope. The person who receives the rope then repeats the process: They share a good or service they offer, and throw the spool to someone who needs it, while still holding their part of the rope.
—
5. **This process continues until everyone has both offered and accepted a good or service—or until you have run out of rope! The result should be a web of rope woven between all group members. To strengthen the pattern, the group can do several rounds of this exercise and even get creative with different services.**
—
6. **The group then gently lays the woven pattern on the ground. This serves as a metaphor for the community's collective strength and abundance of their own goods and services and may lead to further discussion.**
—

This exercise demonstrates the strength of interdependence and the vulnerability of isolation, highlighting the importance of building systems that support and sustain all participants. Begin by fostering open communication, ensuring every group member has the opportunity to both offer and accept goods or services. Encourage respect for all contributions, regardless of their perceived value, and reinforce the idea that the community's strength depends on the interconnectedness and trust between its members. Emphasize the role of reciprocity in maintaining these bonds and explain the process of the exercise clearly. Ensure that everyone understands the rope as a representation of promises tied to goods and services, underscoring the importance of mutual commitments in sustaining the community.



Figure 19. Practicing Exchange

Exercise: Beyond Barter Game

Beyond Barter is designed to teach principles of resource coordination practices—sharing resources fairly to reach a common vision. The game consists of two rounds: Barter Trade and Pooling, each highlighting different economic models and their efficiencies in resource distribution. 3+ players are needed as well as a steward.

Materials needed:

- A bag of beans or other small prizes (*representing production/rewards*).
 - Some blank paper which you will cut into pieces the size of business cards. You will need four cards for each player to write their names along with any goods or services they offer. (*They should end up with four cards all written the same, e.g.: Jane's Chicken.*)
 - A timer or watch.
 - A basket, bowl, or gourd large enough to hold the cards from each player while seeing them all face up. (*I prefer a large winnowing basket—but you could also use a serving platter.*)
-

The basic idea:

The cards represent the commitments to the resources of the players. The beans represent the benefits that accrue from the commitments, and are held in trust by a steward. We will imagine that exchanging to find a matching set of three cards is proof that needed resources have been gathered and the beans are your resulting rewards/production/harvest. Swapping with others to get three of a kind (like three cards marked Jane, Jane, Jane) is like getting together what you need to get Jane's chickens, while the beans will represent the eggs you will get as a result from the chickens. Below are the game rounds and setup:

Round 1: Barter Trade**1. Setup:**

- a. Each player receives four random cards from the steward (who oversees the beans).
- b. Players must swap cards with each other to collect a full set of three of a kind (e.g., three cards saying "Jane's chicken").

2. Gameplay:

- a. Players swap cards with other players until they form a set of three of a kind. Note that both players should equally benefit from the swap.
- b. Upon forming a set, the player can trade it for a bean with the steward.
- c. The steward verifies the set, then gives the player one bean and takes the set of cards and mixes them into a pile. The player must draw three new random cards and return to swapping.

3. End of Round:

- a. After 10 minutes, close the market!
 - b. The player with the most beans wins the round.
 - c. Count the beans each player has earned. Use a piece of paper to keep track of each round.
 - d. Example tally with 5 players:
 - i. 2 players got 1 bean each. ($2 \times 1 = 2$)
 - ii. Another 3 players got 2 beans each. ($3 \times 2 = 6$)
 - iii. The overall total is $(2+6)=8$ beans.
-

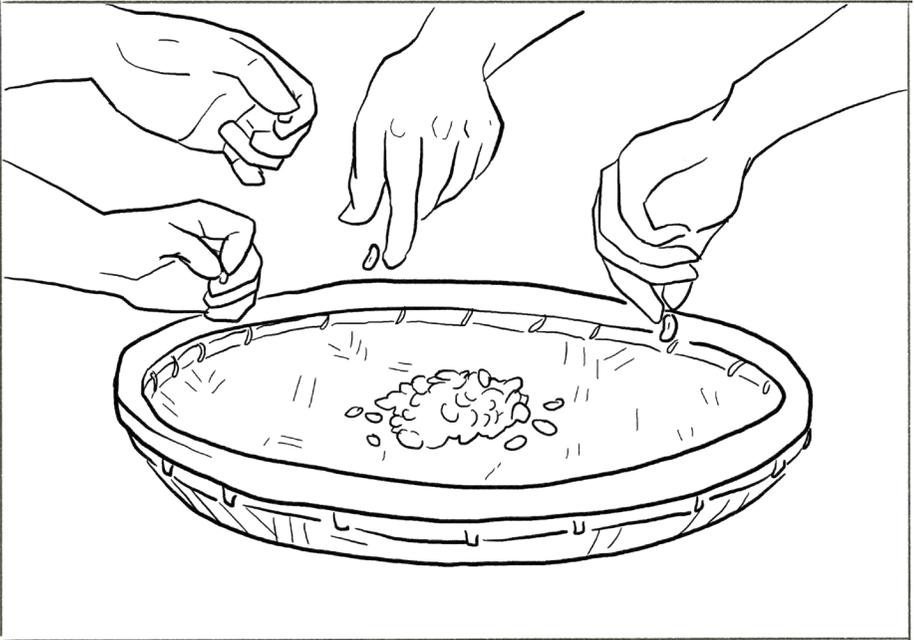


Figure 20. Beans as Rewards

Round 2: Pooling

1. Setup:

- a. Return all beans and cards to the steward and mix up the cards.
- b. Players again receive four random cards.
- c. A basket (representing a common-pool) is introduced. (If there are a lot of players, have a basket for each group of five players.)

2. Gameplay:

- a. Each player must contribute one card to the basket (spread out and facing up). This is their seed into the commons.
- b. Players can swap any card in their hand with a card from the basket or with each other directly (1:1).
- c. Again players must form sets of three of a kind to earn beans. They will turn in completed sets to the bean steward, who will give them a bean and new random cards and return the old cards to the basket. Note that the basket should always contain the original (seeded) number of cards in it as swapping is done 1 for 1.

3. **End of Round:**

- a. After 10 minutes, count the beans each player has earned.
 - b. Congratulate whoever won the most beans this round but be sure to keep track of how many beans were earned in Rounds 1 and 2.
 - c. Example tally with 5 players:
 - i. 1 player got 1 bean. ($1 \times 1 = 1$)
 - ii. 1 player got 3 beans. ($1 \times 3 = 3$)
 - iii. 3 players got 4 beans. ($3 \times 4 = 12$)
 - iv. The overall total is $(1+3+12)=16$ beans.
-

Analysis and Insights

Each round demonstrates different resource coordination/economic models:

1. **Barter Trade** highlights the inefficiencies of direct trading.
 2. **Pooling** mimics ancient forms of resource coordination, showing the advantages of collaborative resource management, reciprocal exchange, and sharing, leading to potentially higher rewards.
-

Case Study: Phase B



During their second meeting, Emma's group mapped out their resources in six broad categories—economic, social, human/spiritual, political, infrastructure, and natural resources. Kevin had **building skills and leftover timber**, Beatrice had a **smartphone for record-keeping**, Grace **baked top-quality bread** but lacked a consistent market, Jane **sewed clothes and mended tears**, Yusuf had **grocery stock** but got stuck when customers bought on credit too much, and Emma offered **haircuts and styling**. Jane also had a strong voice in the local **church** and the **council of elders**, and Kevin was part of the **Rotary Club**. Emma had access to a **freshwater well** and Kevin had a private **forest** near his home. Together, they discovered a hidden abundance of resources and talents right in their own backyard. They then played the rope game and created a physical web of their potential connections to each other as a way to visualize their network. Emma's group then played the Beyond Barter game to simulate exchanging commitments. The mapping of their resources was drawn up and went on the wall next to the vision they had made earlier.

Phase C: Develop Strategies and Action Plans

This phase bridges the gap between the shared vision and the current reality. By comparing the two, we can identify and prioritize specific discrepancies based on their potential impact. Feasibility is assessed to determine how best to address these gaps. The process involves setting SMART objectives—Specific, Measurable, Achievable, Relevant, and Time-bound—for each action step. Clear, actionable steps are designed, responsibilities and resources are assigned, and timelines are established to guide implementation. The phase culminates in the creation of a final Action Step Chart, serving as a roadmap for achieving the group’s vision. Each component of S-M-A-R-T plays a crucial role:

Specific steps eliminate confusion and provide clear direction, ensuring everyone knows exactly what needs to be done. **Measurable** steps allow the group to track progress and recognize when milestones are achieved, maintaining motivation and providing opportunities for adjustments if needed. **Achievable** steps keep the group focused and prevent overcommitment, ensuring that goals remain within reach and creating a sense of progress. **Relevant** steps align with the group’s larger vision, preventing wasted effort on actions that don’t contribute to the end goal. **Time-bound** steps set target dates, creating urgency and helping the group stay on track.

By setting SMART goals, the group builds a clear, actionable, and realistic roadmap to bridge the gap between the current reality and their shared vision. This structured approach enhances group cohesion, accountability, and motivation, allowing members to see measurable progress toward their objectives.

To create SMART action steps, begin by identifying key goals needed to transition from current reality to the shared vision. Consider all six key resources—social, human/spiritual, political/governance, physical/infrastructure, natural, and financial—and how they contribute to the vision. For each goal, brainstorm potential action steps that meet the SMART criteria. Assign responsibility to individuals or groups for each step to ensure accountability and ownership.

Each step can be viewed as a “mini vision,” providing a sense of accomplishment and maintaining motivation throughout the process. Coordinating tools, such as common-pooled resources, can help manage tasks and resources effectively, ensuring fairness and accountability. These tools create fluidity in resource distribution and exchange, keeping the group aligned and moving steadily toward their shared vision.



Figure 21. Putting it together—Resources, Action Steps, and Vision

Developing an Action Step Chart is an essential step in turning a shared vision into reality. For each action step, set a realistic due date and accountable person to keep the group on track and ensure steady progress. A visual representation of the SMART Action steps and journey can be particularly rewarding and effective. Many groups create this using three manila papers: one for mapping the current situation (resource mapping) (left), one for the groups vision (right) and the Action Step Chart, which links the two together. This visual timeline bridges the gap between where the group is and where they aim to be, providing clarity and motivation.

Regular reviews and adjustments are key to the process. Monitoring progress allows the group to assess what is working and make necessary changes to address challenges or adapt to shifting circumstances. This flexibility ensures that the group remains aligned with its goals and continues moving forward effectively.

While the tension between the current reality and the shared vision may feel daunting, it is also a powerful driving force. With SMART action steps, a clear timeline, and a committed, accountable team, this tension can be harnessed to propel the group toward success, transforming aspirations into tangible outcomes.

Practical Coordination of Resources

This section outlines how communities can establish and sustain a pool to achieve their collective vision. How to coordinate resources effectively is a practical challenge that many communities face after defining their vision and mapping available assets, especially in contexts where money is scarce. A pool of commitments offers a collaborative solution by aggregating contributions from individuals, groups, and businesses into a shared system. This approach fosters fair and transparent exchanges, enhances community bonds, and builds economic resilience.

Based on the resource mapping exercise, initial seed commitments are solicited and reviewed with stewards to ensure buy-in and mutual accountability. These commitments are then formalized and registered, often with witnesses to build trust and credibility. For each accepted commitment, the pool stewards must specify the limits and relative value of those goods, services, or certificates.

With the groundwork laid, the pool is launched. Members receive training, and analog or digital platforms are tested for smooth functionality. A launch event helps to promote the initiative, while initial contributions and exchanges are facilitated with ongoing support. This stage is crucial for creating momentum and demonstrating the pool's potential.

Once operational, the focus shifts to balancing and growing the pool. Community feedback is collected and implemented to refine operations, rules, and protocols. Efforts are made to enhance engagement, diversify commitments, and connect to more commitments that can strengthen the pool's resources and impact.

- In Rotational Labor Associations (ROLAs), community members take turns hosting and organizing activities where the group contributes labor and resources to benefit one another. The host prepares tasks, tools, and materials and ensures the group is provided with ample refreshments. Commitments formalized as vouchers can act as tokens of appreciation for labor and resources, enabling participants to exchange contributions even if they are unable to attend the activity. The host would swap their own vouchers into the pool (digital or physical) for those of the participants and send them directly to the participants for their support in the ROLA. At the end of each session, achievements are celebrated, and the next host is identified to continue the rotation.
 - Community markets bring together members to exchange goods and services using commitments, fostering economic interaction and mutual support. Members can also pre-sell labor or other offerings as vouchers, creating a dynamic space for both immediate and future exchanges.
 - Community services focus on activities like building infrastructure, restoring ecosystems, and offering training. Organizers contribute commitments to compensate participants, ensuring fair recognition for their efforts and laying the groundwork for the next steps in the community action plan.
 - Endowment and lending pools enable communities to provide financial support and resources to individuals and businesses. Through structured rules and community oversight, loans are issued against commitments, reducing reliance on cash. Borrowers create vouchers as promises for valuable services, or to repay loans, facilitating a system in which repayments occur through goods, services, or monetary contributions. By managing risks, vetting borrowers, and encouraging continuous contributions, these pools sustain economic growth and resilience.
 - Jubilees are annual or cyclical gatherings where community members' debits and credits are reviewed and balanced to ensure fairness. Members with high debts contribute more through labor, goods, or fines, while those with high credit receive more support. These gatherings also serve as opportunities to reflect on learnings, revise action plans, and celebrate communal achievements with music, food, and festivities.
-

Case Study: Phase C—Games and Action Steps



Emma's group crafted SMART action steps displayed as an Action Step Chart, focusing first on being able to share their resources fairly by creating a simple pool of commitments as gift cards.

They agreed that each person would seed the pool with ten of their own unique written gift cards, each representing \$10 USD worth per member of a specific good or service: loaves of bread from Grace, haircuts from Emma, carpentry from Kevin, and so on. They agreed on rough equivalences using national currency—for instance, each good or service would be valued against the dollar—and the group could choose to change this rule if 75% (quorum) of them agreed. A cap or limit of \$400 USD worth of each voucher per participant ensured no one overextended themselves early on. So Emma could not put into the pool more than \$400 USD of her vouchers (while pulling out other vouchers). Since the pool was a basket in Emma's shop, everyone trusted her to follow the rules and keep track of usage on a ledger they could all see.

At the same time, they planned a rotating labor association. Every two weeks, they would gather at the shop or home of someone in the group (who would pay them in gift cards) to undertake a bigger task: painting a wall, repairing a roof, or installing shelves. Unlike random favors, these labor sessions would be recorded as an ongoing cycle of reciprocal support. The group also discussed how to handle defaults or disputes. They decided on small repayment gatherings. If someone's voucher became overdue or impossible to redeem, the group could meet to negotiate alternative forms of compensation—a partial exchange, delayed delivery, or reassigning the job to another member.

Emma scheduled the next meeting to finalize details. There, they tackled the question of legality. Were there licenses required to pool and exchange gift cards? Emma agreed to consult a local ward representative and a lawyer friend. Both advised that as long as the vouchers were simple “commitments” or “IOUs” rather than broadly exchangeable money or currency, the group was on solid ground—especially if they were not charging interest or doing money-lending, which would require a license in their country.

By the end of week three, it was time to launch. Everyone arrived with ten unique, handwritten, and signed vouchers worth \$10 USD each—“10 dollars’ worth of Bread” from Grace, “\$10 dollars’ worth of Groceries” from Yusuf, “\$10 worth of Hair Styling” from Emma—and dropped them in a small basket at Emma’s salon. She jotted each voucher and each exchange in a paper ledger.

Emma was in charge of making sure that no voucher could be pulled out of the basket without an equal value of other vouchers going in. She also collected a yearly membership fee in vouchers. This “insurance kitty” would help reimburse anyone who wound up holding a defaulted voucher. Any excess would be given back to the members each year.

With the seeded commitments giving birth to a common-pooled resource, anyone in the group could put up to an additional \$300 worth of their own vouchers in to pull out \$300 of any other vouchers. This gave them the ability to purchase things they needed on credit when they didn’t have enough cash, and pay back later by accepting their own vouchers back from the pool. For example Emma could get bread on credit from Yusuf, and repay him by redeeming her vouchers via giving him and his family haircuts.

Phase D: Implement and Adjust

This phase focuses on bringing plans to life while staying adaptable to changing circumstances. SMART action plans in the Action Step Chart are executed systematically, with regular monitoring and evaluation to ensure progress stays on track. Data and feedback are continuously collected, fostering a process of ongoing learning and research. Strategies are adjusted dynamically based on insights from feedback and the evolving current reality, ensuring that the group remains responsive and effective in achieving its shared vision.

Throughout all activities, there are key guiding principles that build success. Communities are encouraged to have a clear vision, in correspondence with the current reality, which creates structural tension—the engine required for action steps toward realizing a desired goal. They are also encouraged to celebrate achievements and to foster motivation as successes build up. Transparency, accountability, innovation, inclusivity, and trust are essential, as are practices like monitoring progress, diversifying resources, and ensuring ample time for reflection. New members can join pools through training and agreements, and regional networks can form to expand the impact of overlapping pools.

When working as stewards, we are responsible for sharing and passing on wisdom by documenting community activities, learnings, and impacts through transaction histories, photos, videos, and testimonies. Stewards document community resources (baseline to current), the group's vision, and the status of their action plan. Stewards evaluate and prepare impact stories, presenting these at celebrations and other community events. Stewards must also demonstrate the impact of their work, such as the value moving through the pools. These deliverables are crucial for renewing the work with the community and ensuring that services continue to be appreciated.

By prioritizing clear rules, patience, and appreciation to sustain operations, these systems ensure long-term viability. Regular monitoring, credit clearing, and sharing success stories will inspire continuous growth and participation, creating resilient networks that support thriving, interconnected communities.

Navigating Tension

Ecosystems, communities, relationships, trust—they all can break down. Floods come and wash away topsoil, droughts scorch entire landscapes, a child in school fights with a friend, neighbors quarrel over boundaries, or trust is eroded by broken promises. Still, these fractures are not the end of the story. In nature, new seeds take root in the rubble, sprouts push through cracked earth, and mycelial networks mend their circuits. Similarly, communities have the innate capacity to rebound—if we learn how to listen, respond, and weave ourselves back together.

Conflict is a natural part of any evolving system. Far from being an outright failure, it reveals where fault lines, unspoken needs, or power imbalances exist. Just as an ecosystem is more than the sum of its parts, so, too, a community's strength is measured by how it heals and adapts when tensions arise. Tension is actually where we can find our common visions and move from our current reality. Often, what we see as conflicts are tensions that we may have overlooked.

When conflict surfaces, many feel shame or an urge to hide it. A lot of cancerous growths (giant pumpkins) are rooted in holding onto fear and shame around conflict. Yet the breakages in an ecosystem—decaying logs, disturbed soil, even floods—are often entry points for new growth. Conflict illuminates hidden assumptions and unmet needs, providing a chance to revisit (and refine) the group's protocols, membership, and boundaries.

Naming and normalizing: Give conflict a name and a space. Acknowledge when someone feels hurt, or when a dispute about resource usage (whether labor, goods, or money) arises. "We are in conflict," said calmly, can defuse blame and open a door to solutions. Normalize the reality that conflict is not "bad" but a sign of tension and change.

Listen for the need: Shouting signals an unmet need. Silence can do the same. If someone defaults on commitments in a ROLA or fails to repay a loan, that might indicate deeper issues—illness, a sudden family crisis, or distrust in the group's rules. By asking, "What do you need?" or "What is your concern?" you can address root causes rather than symptoms.

Many pools: Instead of placing all resources in one big, top-heavy system, we encourage each person or household to issue and steward their own commitments. This spreads out both authority and risk; no single member can dominate the network or feel voiceless. In practice, everyone is empowered to offer, accept, or decline commitments on their own terms, which provides a natural check on power imbalances.

Community Circles and Elders' Forums

Just as the Mijikenda have the Dhome, or a “fireside gathering” where elders settle debts and resolve grievances, many cultures have their own method for bringing people together to speak honestly and openly. A “community circle,” where the group sits in a literal or figurative circle, with a simple object (a talking stick or gourd) granting each speaker the floor in turn, can work wonders. The presence of a recognized elder, steward, or mediator helps participants feel heard while maintaining a shared sense of order.

1. Initiate:

Call a gathering or circle when conflict escalates beyond one or two people. Announce the purpose (e.g., “to find a just solution to Katana and Lucy’s broken agreement”).

2. Speak in turns:

Each party has a chance to share their view without interruption. A steward or elder restates what was said, ensuring understanding.

3. Offer solutions:

The circle can propose remedies (e.g., extra labor to make up debt, delayed repayment, partial forgiveness, or a rotating schedule to accommodate personal constraints).

4. Formalize and record:

The group documents the agreement—sometimes with a handshake, signature, or token. This record is entered into the group’s ledger or memory.

When commitments or trust are broken, you can introduce a “repair” interval. This period, like a Jubilee gathering, gives the person who owes a debt or failed to fulfill a commitment the chance to catch up or compensate in another form. It is important to clarify exactly how and when the broken promise can be remedied, including alternative forms of reciprocity if an immediate fix isn’t possible. Pair the parties with a more experienced steward who can help them learn new skills, locate resources, or address underlying issues (health, childcare, housing) that caused the breach.

Shared meals, music, prayer, or cultural ceremonies can help mend social bonds. Taking time to celebrate small successes together or remember common ancestors fosters empathy and rehumanizes each participant beyond the conflict. Instead of waiting for the annual Jubilee, the group can hold small “forgiveness gatherings” whenever a conflict is resolved. A symbolic ritual (like pouring water on parched ground) can underscore the new beginning.

The Role of Stewards in Conflict Resolution

Stewards are not just administrators; they are the gardeners who notice stress signals early—someone missing repeated meetings, personal disputes, a shortage of goods, or suspicion brewing. By acting preemptively, they can:

1. **Detect early tension:**

Stewards check in with households, read transaction data (if digital), or listen to rumors. A quick chat or home visit can address misunderstandings before they explode into the open.

2. **Offer mediation and guidance:**

Having trained in conflict-resolution techniques, a steward can facilitate or co-facilitate circles. They can also bring in external mediators if the issue is too close to home.

3. **Implement adjustments:**

Whether adjusting pool limits, reevaluating valuations, or allowing new forms of repayment, stewards collaborate with the community to maintain a healthy, adaptive system.

Re-Learning from Ecosystems

Nature demonstrates resilience by cycling through phases of growth, disturbance, decomposition, and reorganization. Consider forests after a fire: new seeds emerge with sunlight, nourishing fungi break down debris, and what was once a calamity becomes part of life's renewal.

1. **Periodicity:**

Like seasons, communities, too, have periods of expansion, hibernation, and rebirth. Conflicts often mark the beginning of a new cycle.

2. **Diversity:**

Ecosystems that thrive after disturbance have wide species diversity. In resource-pooling, diversity means many kinds of commitments, multiple stewards, and flexible norms—so a single “shock” doesn't collapse the entire system.

3. **Feedback loops:**

In a healthy forest, the interplay between plant roots, fungi, and animals quickly redistributes nutrients. Equivalently, a conflict is a feedback loop telling us something is out of balance, prompting realignment.

Case Study: Phase D



After the kick-off seeding, the first big labor session focused on Kevin's mother's leaking roof. They had planned to fix a café wall, but Kevin's mother's crisis took priority. Half the group still wanted to do the café job on time, so conflict arose: How could Kevin fulfill his earlier carpentry pledge? Emma convened a short gathering circle, reminding them that tension signals a gap between current reality and their shared vision. Grace and Jane offered to reschedule the café task; Kevin promised an extra carpentry hour the following week. Everyone logged the compromise in Emma's ledger, an example of how small conflicts could spark creative, community-minded solutions.

Within a month, they noticed the positive impact. Anyone holding the allowed vouchers (even clients outside the pool who had bought them) could trade in any of their vouchers at Emma's shop for those in the pool to get what they needed (up to their agreed limits). Grace sold bread more consistently, and Yusuf's store gained a broader customer base, even from those short on cash. Emma had fewer salon cancellations, because now clients could redeem vouchers there. Several new neighbors heard about the system and wanted to join, prompting the group to consider how to scale gracefully. Some had no phones or basic phones only, while Beatrice owned a smartphone that could run an open-source ledger app. They decided to remain mostly analog, with Emma continuing to track trades in the physical ledger, but also to let Beatrice test a digital interface for those who were comfortable with it.

By the second month, they had completed three rotating labor projects: a new signboard for Emma's salon, the café wall painting, and an improvised bookshelf in the school. A few conflicts arose—Grace's oven broke and she couldn't redeem bread vouchers until it was fixed, and one neighbor consistently tried to take out grocery-credit vouchers from the pool without exchanging any commitments in return. In each case, they followed their gathering-circle process and used the stewardship kitty to cover shortfalls or spread the risk. They revisited the voucher limit, deciding to let participants have limits of up to \$500 USD if they had successfully fulfilled their earlier pledges.

They also began measuring their progress. Once a week, Emma tallied the number of trades, recorded how many hours of group labor happened, and asked who felt they had bridged a cash crisis thanks to the pool. This informal impact-tracking helped everyone see the tangible benefits. In the third month, they decided to hold a small Jubilee celebration. Over sodas and music, they reconciled any outstanding vouchers and recognized neighbors who had gone above and beyond—like Yusuf, who had accepted back (redeemed) all his grocery-credit vouchers without complaint, and Kevin, who frequently juggled two or three tasks a week. People with surplus vouchers sometimes donated them to the insurance kitty, ensuring that new members could get on board without fear of being left unprotected.

With each accomplishment, Emma would remind the group how it mirrored healthy natural ecosystems and ancestral practices—emphasizing that, just like a healthy forest floor, their network thrived on diversity, constant feedback loops, and adaptive responses to stress. In the same way that fungal strands link roots to share nutrients, their pool connected commitments of hairdressers to bakers, carpenters to shopkeepers, teacher-tutors to tailors, ensuring that everyone's talents and needs found a place to circulate.

When the group grew to more than twenty-five members, Emma proposed switching to a digital ledger system because she was tired of having to write the record by hand. Beatrice showed Emma how to use Sarafu.Network to create her digital vouchers and pool, in the same way as Beatrice also made her own digital vouchers and pool.

Having multiple overlapping pools meant that people holding the vouchers digitally could use any of the pools without having to rely on Emma's. This step ensured even connectivity and reduced Emma's personal liability. It also laid the groundwork for more advanced digital ledger experimentation, while those with paper vouchers would be limited to when Emma was willing to allow exchange.

By that point, some participants wanted a stable coin and cash option to trade with families outside the group. Beatrice allowed \$300 dollars' worth of everyone's vouchers into her pool and also allowed people to buy those vouchers using a stable coin called cUSD. Emma was content with local voucher swaps as a ROLA in her pool without adding a stable coin, but she also started allowing for commitments of volunteer hours to be exchanged in her pool. Their evolving network could accommodate and connect many approaches, so long as they remembered the principle of pooling by **curating** and **valuing** resources while **limiting** risk, and enabling **exchange** just like an interconnected living system.

At their final gathering of the year, each participant reflected on their initial one-year vision. Beatrice noted that tutoring sessions now felt more secure, as families who used to wait for payday could trade vouchers immediately. Jane had discovered new clients who previously assumed they couldn't afford tailoring but could now offer other services allowed in the pool in exchange for tailoring commitments. Emma herself was proud that her salon business was steadier in off-season months. More than anything, the group recognized that the conflicts they faced were not setbacks, but prompts to adapt. Tension, as they had learned, was less a sign of failure than a sign of growth—something to guide them toward deeper reciprocity and stronger communal ties. The group revised their personal and collective visions, re-mapped their resources and developed new action steps for the next year and placed these all on Emma's shop wall.

In this way, Emma's local network came full circle, embodying the teachings rooted in her ancestors' practices, grounded by careful planning and conflict resolution, and growing through patient, evolving steps. Emma's story offered hope and an actionable template for other grassroots economists who were ready to unite a circle of neighbors, shops, and service providers. Through pooling commitments, structured labor rotation, and practical tension realization and resolution, Emma's community reclaimed a measure of economic sovereignty—demonstrating what it means to practice grassroots economics in a way that truly benefits everyone. Emma then went on to train stewards to work with their communities in many other communities around Kenya.

Weaving It All Back Together: A Closing Reflection

We began this book by looking at how **fungal networks** and **social systems** naturally coordinate resources in ways that are symbiotic and resilient. We explored how “**pools of commitments**” can replace or complement money, uniting people around shared purpose. We recognized that each of us holds seeds of abundance that only bloom when placed in a **common-pool**—an open space that thrives on reciprocity and trust.

Across the reflections, we explored:

Part 1:

How **mycorrhizal networks**, **Mweria traditions**, and **digital ledgers** share the same core economic protocols: **curation**, **valuation**, **limitation**, and **exchange**. We saw how extractive financial systems centralize these protocols by removing our ability to directly pool and exchange—and also how decentralized technologies and ancient customs are rebuilding our connections.

Part 2:

How to act as **stewards** and “trainers of trainers,” mapping your community’s resources, designing shared visions, and weaving **rotating labor associations**, common-pools, or endowments. In building new cycles of trust, we learned the importance of celebrating each small success, clarifying roles and boundaries, and periodically clearing or “Jubilee-ing” the ledger to keep everything in balance. We learned how to:

- Develop a common vision and map out our abundant social, human/spiritual, political, economic, infrastructural, and natural resources.
 - Design ROLAs (rotating labor associations) and community pools, weaving each person’s commitments into a robust web of mutual support.
 - Evaluate progress through action step charts, celebrating milestones and fine-tuning next steps.
 - Embrace conflict not as a failure but as a signpost, prompting creative course corrections that strengthen community ties.
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These practices mirror the rhythms of a living system, where every node—be it a mycorrhizal fungus, a Mijikenda elder, or an online group—coordinates resources for the well-being of the whole. Weaving throughout this guide is a message that grassroots economics, rooted in pooled resources, is inherent to all living systems. Our role is not to invent it but to remember, honor, and reapply these protocols, whether in coastal Kenyan villages, bustling urban centers, or online communities. Bringing it together:

Nature’s template: Whether we examine fungal networks or ancient Mweria customs, each demonstrates the same four protocol functions: **curation, valuation, limitation, and exchange.**

Our ancestors meet us today: Where centralization and colonial traditions broke or erased communal resource practices, new decentralized digital tools combined with ancestral wisdom are reinvigorating them—opening fresh pathways for inclusivity and resilience.

You are a steward: Visionary stewards and trainers of trainers anchor the process by bridging local culture with structured planning, ensuring that each group can connect and adapt their common-pools in their own unique context

Conflict and tension: Just as forests regrow after storms and floods, each challenge that your community faces can yield stronger bonds and deeper clarity about what truly matters.

An invitation to you: Let these protocols guide new or renewed connections in your community. Let tension pull you from current reality to a thriving future that you can see in your heart and mind. Let commitments knit together hearts, homes, and local economies. By pooling resources, knowledge, and spirit, we heal the fractures that keep us isolated and instead become co-creators of shared well-being.

Remember, this is not the end but a starting point—one that you and your community will build upon. By practicing the steps outlined in this guide, you take part in an ancient, ever-evolving tradition. May your own story of grassroots economics grow deeper roots, branch across continents, and blossom into a future where every voice is heard, every need is met, and every ecosystem flourishes in harmony.

As you put this guide down and return to your community—your local ecosystem—ask yourself:

Which seeds of abundance do I hold?

With whom can I form a pool of commitments?

How can I respond to tension or conflict as a teacher, rather than an obstacle?

Every promise given and accepted strengthens that shared soil. Every conflict faced with compassion and clarity is a chance to restore the circle. Every cycle of giving and receiving reaffirms that we are all part of one community, connected by invisible threads of love and reciprocity.

Let us step forward, tending our gardens, stewarding our Kaya, weaving old and new wisdom. **In doing so, we create a future where we, our neighbors, and the land itself can grow in balance—connected, resilient, and alive.**

Thank you for walking this journey. May the seeds you plant today become the nourishment and bounty of generations to come.

Appendix

ROLAs Across Earth

I am in awe that these practices can be found everywhere that humans lived and migrated. Below is a short, incomplete list of just a few of the ancient names given to practices and groups similar to what are described as Rotating Labor Associations (ROLAs) across the planet. Please enjoy diving into the similarity as well as the nuance and uniqueness of these practices honoring our ancestors and those of whomever you are connected to on the planet.

Country / Scope	ROLA - Local Names / Terminology	Reference (where available)
Andes, South America	ayne, fozena, convite, cambio, mozono	Guillet (1980)
Belgium	Reciprocal exchange	Lambrecht (2003)
Bhutan	Exchange labor	Tshotsho (2023)
Burundi	Ikibina	Otake, Y. (2019)
Canada	Rotating Bees	Wilson (2001)
China	Hé Zuò Shè, (合作社), Huàn Gōng Zǔ (工组), Hù Zhù Zǔ (互助组)	Wang (2019)
Congo	Likiimba	Suehara (2006)
Denmark	Fællesarbejde	
Dominica	Reciprocal altruism	Macfarlan (2012)
Eastern Uganda	Moyket, or Isyeet ak komek (work of beer)	Shiraishi (2006)
Finland	Talko / Talkoot	
Haiti	Agrarian exchange labor	Pierre (2005)
Iceland	Samstarfsvinna	
India	Shramdaan / Gotul	Karanth (2002)
India (Ladakh)	Phaspun, chucchog, bes, rares	Norberg-Hodge, Helena (1991)
Indonesia	Gotong Royong, Agrarian labor exchange	Giligan (2004)
Ireland	Meitheal	Bruce Ferguson, P. (2017)
Japan	Yui (結い)	Suehara (2006)
Kenya (Luo)	Nyoluoro	
Kenya (Mijikenda/Kamba)	Mweria / Mwethia	
Malaysia	Tolong Menolong	Ahmad, M. S. (2024)

<i>Many (incl. Philippines)</i>	<i>Collectively performed reciprocal labor</i>	<i>Gibson (2020)</i>
<i>Maya (Belize and Guatemala)</i>	<i>Labor exchange Networks</i>	<i>Downey (2020)</i>
<i>Mexico</i>	<i>Tequio</i>	<i>Colín, E. T. (2014).</i>
<i>Mozambique</i>	<i>Mboiamo, Ajuda Mutua</i>	<i>Fumagali & Martin (2023)</i>
<i>Nepal (Newar)</i>	<i>Bola, Parma</i>	<i>Bhattarai (2006)</i>
<i>New Zealand (Māori)</i>	<i>Whānau Work / Mahi Tahī</i>	<i>Cram, F. (2021).</i>
<i>Norway</i>	<i>Dugnad / Fellesarbeid</i>	<i>Tangevold, M. (2015).</i>
<i>Norway</i>	<i>Reciprocal non-monetized exchange</i>	<i>Gezelius (2014)</i>
<i>Ottoman Istanbul</i>	<i>Reciprocal labor</i>	<i>Aras (2020)</i>
<i>Papua New Guinea</i>	<i>Singsing</i>	<i>Cox, J. (2016).</i>
<i>Peru, Andes</i>	<i>Minga</i>	<i>Manosalvas (2021)</i>
<i>Philippines</i>	<i>Bolo / Bayanihan</i>	<i>Hollsteiner, M. R. (1961)</i>
<i>Rwanda</i>	<i>Ibyizo</i>	
<i>Senegal</i>	<i>Ndem / Tontine</i>	
<i>Somalia</i>	<i>Goob</i>	<i>DeLancey, V. (2019)</i>
<i>South Korea</i>	<i>Pumasi / Pumal (품앗이/ 품알)</i>	<i>Cha, S. L. (2012)</i>
<i>Sri Lanka</i>	<i>Aththam (අත්තම) Attam - paddy agriculture</i>	<i>Gunasinghe (1976)</i>
<i>Sri Lanka</i>	<i>Exchange Labor</i>	<i>Ulluwishewa (1984)</i>
<i>Sudan</i>	<i>Naffir</i>	<i>Elzubair, A., & Murad, A. A. (2024)</i>
<i>Tanzania, Sukuma</i>	<i>Hanga</i>	
<i>Uganda</i>	<i>Kuguzanya / Kirimbi / Kibanda</i>	
<i>UK / Ancient Celtic</i>	<i>Bee, Rotating Bees</i>	<i>Wilson (2001)</i>
<i>USA, Kentucky</i>	<i>Workin' (collective house-building)</i>	<i>Slone, Verna Mae, 1980</i>
<i>USA, New York</i>	<i>Contemporary reciprocal labor exchanges</i>	<i>Harper (1997)</i>
<i>USA, Ohio</i>	<i>Labor exchange</i>	<i>Long (2003)</i>
<i>USA, Tennessee</i>	<i>Swapping work</i>	<i>Donalson (2015)</i>
<i>Venezuela</i>	<i>Garden labor exchange</i>	<i>Hames (1987)</i>
<i>Vietnam</i>	<i>Hốp (hốp)</i>	
<i>Western America</i>	<i>Reciprocal Farm Labor</i>	<i>Erasmus (1956)</i>
<i>Zimbabwe</i>	<i>Kumi Kumi</i>	

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If you want to contribute to this work, consider the following:

1. Form reading groups, story circles, and fireside gatherings with young people and elders.
 2. Reuse, remix, and share these ideas along with open source software and hardware that implement common resource pools.
 3. Show your support to Grassroots Economics, a small non-profit foundation in Kenya—for example, by seeding pools on [Sarafu.Network](#).
 4. Follow the ancient protocols: Express your commitments, create, seed, and give reciprocal access to common resource pools that you care about.
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Grassroots Economics: Reflection and Practice

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William O. Ruddick

10 February, 2025

Grassroots Economics Foundation

Notes

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What if our everyday transactions could feel more like a shared celebration than a competition? What if ancient practices of mutual service—found in Kenyan villages, Amazonian forests, and every corner of the globe—could help us transcend scarcity and rebuild economies rooted in care?

In *Grassroots Economics: Reflection and Practice*, William O. Ruddick reveals how communities worldwide have quietly protected an immense wisdom—one that mirrors how nature organizes itself to flourish. Drawing on his decades of work among the Mijikenda people of Kenya and his global experience championing local economies, Ruddick offers a powerful framework for reclaiming our capacity to pool resources and promises.



Inside you'll discover:

How fungal networks and ancient rotating labor associations (Mweria) illuminate the same simple protocols for thriving together.

Practical steps to map your community's resources, seed common-pools of commitments, and facilitate exchange beyond money.

Real-life stories of how everyday people use these approaches to strengthen neighborhoods, secure basic needs, and celebrate shared abundance.

Tools for mediating conflicts, measuring impact, and scaling to digital platforms—without sacrificing community trust.

This guide is for anyone seeking to weave natural wisdom with modern tools, revitalize mutual support systems, and ignite an economy where no one is left behind. It's an invitation to reclaim the ancient art of community-driven prosperity—in which every promise made and kept brings us closer to thriving, together.