

G A I A

Monetary Mechanics

Liquidity, Progressive Demurrage, and Restoration Investment — How Gaia Works in Daily Life

A technical companion to the Gaia White Paper

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Two Practical Questions the White Paper Doesn't Fully Answer

The Gaia Technical White Paper specifies how money is created, how it is destroyed, how the homeostatic loop works, and how the governance system is structured. Two practical questions that arise immediately from daily use are not fully addressed there:

First: if I invest Gaia in a restoration project, can I withdraw that capital whenever I choose, or is there a minimum commitment period? What is the relationship between my capital investment and the Gaia creation credits the project generates?

Second: if Gaia has a demurrage cost of 3–5% per year, what happens to the ordinary person who uses Gaia to pay their grocery bill, their electricity, their rent? Are they penalised for keeping their monthly living expenses in their account? Should there be a demurrage-free threshold for basic liquidity?

These are not edge cases. They determine whether Gaia is a viable everyday currency for ordinary people or whether it is only practical for those with sufficient surplus to absorb demurrage costs. This paper answers both questions precisely.

A monetary system that penalises the subsistence farmer for keeping her grocery money in her account while the billionaire easily absorbs the same percentage cost has replicated the fundamental injustice of the system it replaces. The demurrage structure must be progressive or it is not equitable.

Part One: Restoration Investment Mechanics

The Core Principle: Gaia Is Created by the Ecosystem, Not the Investment

The most important thing to understand about restoration investment in Gaia is that Gaia creation credits are not triggered by the act of investment. They are earned continuously by the verified ongoing health of the restored ecosystem.

This distinction is fundamental. In a conventional green bond or carbon credit system, the investor pays for a defined outcome and receives a certificate at a defined point in time. The certificate exists regardless of whether the ecological outcome is maintained. This is why carbon credit markets have been so extensively gamed — once the certificate is issued, there is no ongoing verification requirement.

Under Gaia, the ecological state is measured continuously by satellite. Gaia creation flows continuously as long as the ecosystem is healthy and improving. The moment the ecosystem degrades, Gaia creation slows. The moment it is destroyed, Gaia destruction begins. There is no certificate. There is only the current verified state of the living ecosystem.

Can I Withdraw My Capital Investment?

Yes. You can withdraw your capital investment at any time. There is no minimum investment period enforced by the protocol.

But the consequences of withdrawal need to be understood precisely:

- If you withdraw your capital and the restoration project continues — because it has alternative funding sources, because it is self-sustaining, because another investor steps in — the ecosystem remains healthy and Gaia creation continues, flowing to whichever parties are verified as the restoration operators.
- If you withdraw your capital and the restoration project collapses — because it depended on your funding and has no alternative — the ecosystem degrades, Gaia creation slows and eventually stops, and Gaia destruction begins as the degradation is verified. You may have already received restoration credits during the period the project was active. Those credits are not reversed. But the income stream stops.
- If you withdraw your capital and actively clear the ecosystem — selling the land for development, for example — Gaia destruction begins immediately and is proportional to the verified ecological damage. The destruction fee is applied to the broader network through supply contraction, not to your specific account (unless you are a registered Gaia participant with an active validator stake in the project).

The key design insight: the protocol does not need to enforce a minimum investment period because the economics enforce it automatically. A restoration project with unstable short-term capital earns less total Gaia than a project with stable long-term funding — because the ecosystem takes years to reach its maximum GPHI contribution rate. Investors who withdraw early leave most of the Gaia creation income on the table. The incentive for long-term commitment is financial, not regulatory.

The Restoration Investment Timeline

The following table shows how Gaia creation evolves over the lifetime of a typical forest restoration project, illustrating why long-term capital is financially superior to short-term investment regardless of minimum commitment requirements:

Stage	Ecological State	GPHI Contribution	Gaia Creation Rate
Year 1	Forest planted, verified by satellite. Minimal biomass established. Soil disturbance from planting.	Very low — restoration activity verified but ecological benefit minimal. GPHI contribution small.	Low Gaia creation rate. Restoration operator begins earning but slowly.
Year 3	Canopy closing. Carbon sequestration beginning. Early biodiversity returning.	Moderate — measurable ecological improvement. Carbon sequestration verified.	Gaia creation rate increasing. Investment beginning to generate meaningful returns.
Year 5	Forest established. Significant carbon sequestration. Biodiversity indicators improving strongly.	Significant — all GPHI pillars showing positive contribution from this project.	Gaia creation rate substantial. Annual return on restoration investment clearly positive.
Year 10	Mature forest. Full ecological function. Watershed protection active. Maximum biodiversity.	High — maximum GPHI contribution from this ecosystem type. Contribution sustained indefinitely.	Maximum Gaia creation rate. Investment fully justified. Ongoing income stream.
Year 20+	Sustained healthy ecosystem. Self-maintaining with minimal intervention.	High and stable — ecosystem now earns Gaia indefinitely with minimal ongoing cost.	Indefinite income stream. Long-term capital structure fully justified.

What Capital Structure Does Gaia Incentivise?

The continuous verification and creation mechanism naturally incentivises specific capital structures for restoration projects:

Endowments and Permanent Capital

Capital that is committed indefinitely — foundation endowments, sovereign wealth fund allocations, conservation trust structures — earns the maximum total Gaia over the ecosystem's lifetime because it captures the full income stream from establishment through maturity and beyond. These are the most efficient capital structures for Gaia generation.

Long-Term Bonds and Green Infrastructure Debt

10–30 year restoration bonds, analogous to infrastructure bonds, capture most of the Gaia income stream and are appropriate for institutional investors with long liability structures (pension funds, insurance companies). The Gaia creation income provides the debt service, making these bonds self-funding if the ecology is verified as healthy.

Equity in Restoration Companies

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Investors who hold equity in restoration operators earn proportional Gaia creation credits as the company's portfolio of projects generates ecological value. This is the most flexible structure and the most appropriate for impact investors, family offices, and high-net-worth individuals.

What Is Explicitly Discouraged

Short-term speculative investment — funds that invest in restoration projects to earn early Gaia credits and then withdraw before the ecosystem matures — earns far less total Gaia than patient capital. The system does not prohibit this, but it does not reward it. Rotation strategies that move capital between projects seeking early-stage credits will consistently underperform relative to long-term committed capital, because the earliest phases of restoration earn the least Gaia.

Part Two: Progressive Demurrage and the Living Allowance

The Equity Problem with Flat Demurrage

The Gaia White Paper specifies a demurrage rate of 3–5% per year on Gaia holdings. This is the correct design for the system's primary purpose: preventing passive accumulation without ecological contribution, and incentivising the productive deployment of surplus Gaia into restoration.

But a flat demurrage rate applied to all holdings equally creates a significant equity problem. The billionaire holding 10 million Gaia pays 300,000–500,000 Gaia per year in demurrage — a trivially manageable cost for someone with that level of wealth, and a strong incentive to deploy into restoration. The subsistence farmer in Kenya holding 50 Gaia — enough for this month's groceries and a small emergency reserve — pays 1.5–2.5 Gaia per year. This is not passive accumulation. This is a person keeping their grocery money in their account.

Charging the subsistence farmer demurrage on her grocery budget is not an incentive to deploy capital productively. It is a tax on liquidity that falls hardest on those who can least afford it. It replicates in miniature the fundamental injustice of the current monetary system — where the costs of the system's design fall disproportionately on those with the least margin to absorb them.

The solution is a progressive demurrage structure with a demurrage-free living allowance.

The Progressive Demurrage Structure

Holdings	Demurrage Rate	Design Rationale	Typical Holder	Who It Affects
0 – 500 Gaia	0%	Demurrage-free living allowance. Covers approximately 3–6 months of basic living expenses for the median global person. Freely spendable on daily transactions without penalty.	Subsistence farmer, daily wage worker, basic household	Everyone
500 – 10,000 Gaia	3% on amount above 500	Working capital and modest savings range. Small business operating balances, small investment holdings. Demurrage applies only to the surplus above the living allowance.	Small business owner, regenerative farmer, restoration operator	Middle-income participants
10,000 – 1,000,000 Gaia	4% on amount above 10,000	Significant accumulated holdings. Strong incentive to deploy into restoration projects rather than hold passively.	Institutional investor, large restoration operator, wealthy individual	Wealthy participants
Above 1,000,000 Gaia	5% on amount above 1,000,000	Large-scale accumulated holdings. Maximum demurrage rate. At this level, annual demurrage cost is substantial and deployment into restoration is clearly superior to passive holding.	Sovereign wealth fund, major corporation, ultra-high-net-worth	Large institutional holders

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The principle behind the structure: demurrage should pressure those with surplus into productive ecological deployment. It should not penalise those with subsistence holdings for keeping their living expenses liquid. The 500 Gaia threshold is a proposed starting point — the correct number depends on what 500 Gaia buys in a mature Gaia economy, which the sandbox phase will establish empirically.

How This Works in Practice — Four People

Person	Holdings	Annual Demurrage	Practical Impact	Net Effect
Maria — Detroit single mother	120 Gaia (monthly income equivalent)	0% — entire balance within living allowance	Zero. Maria's grocery and bill payments face no demurrage. Gaia works as her primary currency without penalty.	Full demurrage-free access. Gaia is a better everyday currency than fiat for Maria.
Amara — Kenyan regenerative farmer	800 Gaia (savings + working capital)	0% on first 500, 3% on remaining 300 (= 9 Gaia/year)	Minimal. Amara's living balance is protected. Her modest surplus faces small demurrage — incentive to deploy into her next restoration project.	Living allowance protects subsistence. Small surplus incentivises productive deployment.
Thomas — Polish restoration operator	15,000 Gaia (business operating balance)	0% on 500, 3% on 9,500, 4% on 5,000 (= 285 + 200 = 485 Gaia/year)	Moderate. Thomas's operating balance faces meaningful demurrage. Incentive to deploy into next restoration project rather than hold idle.	Business accounts face real demurrage cost. Incentive to keep capital working.
Sheikh Abdullah — sovereign wealth fund	50,000,000 Gaia	5% on vast majority (= ~2,480,000 Gaia/year)	Very high. At this scale, annual demurrage is enormous. Deployment into restoration is clearly superior to passive holding.	Maximum demurrage pressure. Sovereign wealth fund has strong incentive to become the world's largest restoration investor.

The Anti-Gaming Design

The demurrage-free living allowance applies per verified identity, not per account. This is a critical design constraint. Without it, a wealthy holder could create multiple accounts and split their holdings to multiply their demurrage-free threshold — effectively eliminating demurrage through account proliferation.

The identity verification system — one of Gaia's acknowledged open technical problems — enforces the one-person-one-allowance rule. This is another reason why identity verification is not merely an equity concern (ensuring Maria in Kenya receives her Universal Ecological Dividend) but also a monetary integrity concern (ensuring Sheikh Abdullah cannot split his holdings across 20,000 accounts to avoid demurrage on his surplus).

Until a robust identity verification system is operational, the demurrage-free living allowance should be applied conservatively — at a low enough threshold that the gaming incentive is minimal even if some

account splitting occurs. The living allowance can be increased as the identity verification system matures and anti-gaming enforcement improves.

The Adoption Argument

The progressive demurrage structure with a living allowance is not only more equitable. It is more likely to achieve adoption.

If Gaia charges demurrage on every Gaia in every account from the first unit, ordinary people will not use Gaia for daily transactions. They will convert in and out of fiat for each transaction, holding Gaia only when they expect appreciation to exceed the demurrage cost. This makes Gaia an investment vehicle, not a currency — undermining the adoption that the entire system requires.

With a demurrage-free living allowance, Gaia is a superior everyday currency for the median person: no inflation (unlike fiat), no demurrage on your working balance, and a store-of-value property tied to planetary health. The ordinary person's experience of Gaia is not 'a currency that slowly costs me money to hold' but 'a currency that doesn't inflate away my savings and rewards me for living within the planet's means.'

Part Three: Liquidity and Investment — The Complete Picture

Combining both design elements, here is how a typical Gaia participant manages their monetary life:

Purpose	How It Works Under Gaia
Daily transactions (groceries, bills, transport)	Held within the demurrage-free living allowance (up to 500 Gaia). No demurrage. Freely spendable. Gaia works as a practical everyday currency without penalty.
Emergency reserve (3–6 months expenses)	Also held within the living allowance if below the threshold. No demurrage on emergency savings up to the threshold level.
Modest surplus (above living allowance, below 10,000 Gaia)	3% annual demurrage on the surplus. Incentive to deploy into a restoration project or the Ecological Restoration Fund. Not punitive at this scale — a gentle pressure toward productive use.
Restoration investment	Capital deployed into a verified restoration project. Earns continuous Gaia creation credits proportional to verified ecological improvement. Can be withdrawn at any time but early withdrawal leaves most income on the table.
Large surplus (above 10,000 Gaia)	4–5% annual demurrage. Strong incentive to deploy into restoration. For institutional holders at this scale, demurrage cost makes passive holding clearly inferior to restoration investment.

The complete picture for an ordinary person: Your grocery money: demurrage-free. Gaia works like cash for daily life. Your emergency fund: demurrage-free. Gaia is a safe store of value for small balances. Your surplus: gentle pressure to deploy into restoration. Not punitive, but consistently pointing in the right direction. Your restoration investment: earns Gaia continuously as the ecosystem heals. The longer you stay in, the more you earn. For the first time, a monetary system’s mechanics make the ecologically aligned choice the financially obvious choice at every level of wealth.

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Conclusion: Practical Mechanics in Service of the Mission

Two design questions that appear technical reveal, on examination, some of the most important equity and adoption considerations in the entire Gaia framework.

The restoration investment mechanics — continuous credit tied to ongoing ecological state rather than investment event — make Gaia restoration genuinely aligned with ecological outcomes in a way that carbon credits and green bonds cannot achieve. They cannot be gamed by short-term investment cycles because short-term investment earns the least. They incentivise the patient, long-term capital structures that ecosystems actually require.

The progressive demurrage structure with a living allowance makes Gaia a viable everyday currency for ordinary people while maintaining strong incentives for productive deployment of surplus. It distinguishes between a subsistence farmer's grocery money and a sovereign wealth fund's passive holdings — and treats them appropriately differently.

Together, they answer the question of whether Gaia is a currency people can actually live in, or merely an investment vehicle for those with sufficient surplus to manage its mechanics. With these design choices, the answer is clear: Gaia is designed to work for everyone, at every level of wealth, in every context from daily grocery shopping to long-term institutional restoration investment.

A monetary system that works for the subsistence farmer and the sovereign wealth fund manager in the same day, with the same currency, pointing both of them toward ecological restoration through their own financial self-interest — that is the design goal. These mechanics are how it is achieved.