

THE DIGITAL GAIA



A SKETCH OF A DIGITAL ARCHITECTURE FOR GLOBAL REGENERATION

OUR PLANET IS ALIVE

To understand why we have such a perfectly balanced climate on planet Earth is conducive to life that has been developing for 3,8 billion years on our watery planet, we need to accept and postulate that the planet is alive. The fact that the Earth is alive, is a basic understanding of Indigenous knowledge. The damage we have done to the biosphere will soon pass tipping points that will take her millions of years to rebalance into a new homeostasis, most likely without the human species, unless we act with this insight and with action the size and speed needed to turn the tide as fast as we can. Key to the [Plan to Cool the Planet](#) is the fast assembly (most parts exist) of a Digital Architecture for Global Regeneration or Digital Gaia.

THE CURRENT DESTRUCTIVE ECONOMY AND FINANCIAL SYSTEM NEEDS TO BE REPLACED

This digital architecture will be the basis to create a new global regenerative economy and financial structure while the old system withers. We and all stakeholders know the current destructive system is past its expiry date and is just propped up by financial steroids to postpone its demise. It is in no way able to avert a climate catastrophe, as 26 COPS and still increasing greenhouse gas emissions have proven. And now we are very close to the falling of the climate tipping point dominos. If that were to happen faster than expected (the phrase most used by new measurements of the consequences of climate change) we may, as James Lovelock, the father of the Gaia theory, so eloquently wrote, descend into a heart-wrenching future of collapse bringing us to the point were: "the few breeding pairs of people that survive will be in the Arctic where the climate remains tolerable". At the same time, the collapse of the current financial-economic system right now would also mean global chaos and mass casualties on an unimaginable scale. Current stakeholders, like central bankers and people in the reinsurance industry, are aware of all this but do not know how to replace it. There is a sort of omerta around it. But in the best possible scenario we would bring a new regenerative economy to life within years, while the old one starts on a managed descent instead of an uncontrolled collapse. Forgive my brazenness, but the house is on fire. We lack time for diplomacy and elegance. I hope the solution to the transition lies partly in this article.

WHAT WOULD THIS ARCHITECTURE - THE DIGITAL GAIA - LOOK LIKE?

Here is an outline of the elements of how this digital platform could be shaped. Please note that it will need a collective of much smarter people than myself to actually bring this architecture to life.

THE FIVE PILLARS:

1. OPEN FUTURE, A PLATFORM & MARKET PLACE TO BRING ALL REGENERATORS TOGETHER

This global, but partly regionalized [Open Impact](#) will bring all stakeholders of regeneration together with their skill sets, possibilities, finance, project proposals and needs together to create a global **regenerative project ecosystem**, powered by hybrid finance including the automated payout of carbon credits based on satellite measurements of biomass increase and a bunch of other instruments.

This platform and marketplace is easiest visualized as the Facebook for all regenerators, companies, institutes, specialists, financiers, projects alike. There are **two aspects** which are of crucial importance to make it work as a "project generating machine" creating millions of small and large regenerative projects for nature regeneration, community regeneration, speeding up circular production and community involvement.

These two aspects are:

- a well defined **taxonomy for stakeholders** to create coalitions, based on blockchain regulated smart contracts to get all parts together for project management of regenerative projects of whatever kind.
- a well defined, in depth, scalable **onboarding procedure** through a structured interview making sure the new member agrees to the vision and covenant to be part of the regenerative efforts of the planet and an interview to make sure the profile of the new member has sufficient and correct detail to be found for inclusion in regenerative project making.

2. THE ARARA CHAIN STORE AND APPLICATION, CONNECTING THE GLOBAL POOR TO INFORMATION, COMMUNICATION AND FINANCIAL REWARD FOR REGENERATION

An application, called the [Arara App - pitch deck in progress](#) connecting especially the rural the poor, initially in the global south, to the internet, and give them access to information, communication, (micro-) finance and income based on their regenerative work by harvesting carbon credits, and market access, whether it be reforestation, plastic recycling or any of the other of thousands of possibilities described in [Project Drawdown](#) or [Regeneration.org](#)

The best way to visualize this application is by thinking of it as a combination of the Starbucks and Uber of Regeneration, in essence shaped as a design held by a foundation with for-profit franchises per country or large jurisdiction for roll out with the emphasis on people and planet but with room for reasonable profit in the form of transaction fees. Obviously the fees need to be small and not exploitative as they are with Uber.

Here is the whitepaper for this project: [Arara Chain Store and App Summary](#)

3. THE GLOBAL AND LOCAL EARTH CURRENCY

Once the platform and the Arara App have sufficient volume, the introduction of a regenerative currency to provide the flywheel of regeneration by keeping the currency circulating within the regenerative economy, in the form of fungible but stacked tokens, better known as a crypto currency on blockchain. The most obvious candidate is the existing currency [SEEDS](#). [What is SEEDS?](#) by the organisation: [Hypha](#).

A brilliant deepdive you can find in this presentation:

▶ How to do a DHO/DAO: Guide for groups building new paradigm organizations

The big difference is that there is nothing crypto about the Earth currency. Here are some of its features:

- The currency is distributed, so there is no central bank. Initial issuance will be against existing fiat currencies. Additional issuance rights need to be discussed. They probably will be in the hands of lower regional DAO governance structures.
- Transactions and ownership with the Earth currency are completely transparent above the level of household spending.
- The currency is stacked with bioregions having their subledger currency, for instance the watershed area of a river, with the river as a legal person the possible issuer of e.g. the local Nile-Earth currency. This local currency is spent best within the bioregion and when spent outside the region, a part of the currency's value falls back to the commons of that area.
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4. THE ROLE OF BLOCKCHAIN AND TOKENS IN REGENERATING OUR PLANET

The inclusion of blockchain connected through 100% internet connectivity for all communities is another key pillar of the digital architecture for global regeneration. This enables rapid, detailed and transparent sharing of information and finance across the globe, allowing for funds to enter into innumerable projects to regenerate nature and communities around the globe based on the automated measurement and payment of ecoservices (PES) for this work at a scale, speed and granularity that so far was impossible to organize. It allows the engagement of hundreds of millions of people in the tropical zone of the planet to be rewarded for taking part in the regeneration and cooling of the Earth, by awarding them carbon credits and additional ecoservice awards to the units of land (possibly hectares) under their care, by making each unit a digital piece of land, the size of a soccer field. The monitoring power of modern satellites and the computing power of modern distributed server capacity* makes it possible to individually monitor and measure the 14,9 billion hectares of land, 5,4 billion or 36% of which lies in the tropical zone. Regeneration and access to ecoservices starts by individuals, communities, municipalities, organisations and corporations registering their land to the global regeneration map, for which the [RESTOR database](#) has provided the foundation, combined with the amazing capacities of the European Space Agency satellite programs such as [ESA open source computing project for the Biomass mission goes live - Earth Online](#) and possibly the [Navigator | One Earth](#).

**Bitcoin has given blockchain and cryptos a bad name because of its terrible energy footprint, with a technology known as “proof of work”. Modern cryptos have a magnitudes smaller footprint, possibly to the tune of 1% of Bitcoin, through the verification method called “proof of stake”.*

5. COMMUNITY DECISION MAKING AND EXECUTION: DAOS AND SMART CONTRACTS

The inclusion of new forms of bottom-up democratic decision making, based on technology-enabled decentralized, autonomous organizations or [DAOs](#) makes it possible for communities, organizations and businesses alike to have a decentralized governance based on the tokens that the members can use to vote. This makes it possible for these organizations to decide to not delegate power “up” to centralized small teams of people, such as management teams or city councils or to higher levels of government. It reverses power structures, and puts the pyramid on its point. If autonomy is partially outsourced to larger regions, it is always done so temporarily and totally reversible.

Decisions, once made, can be stored as smart contracts. These are programs stored on a blockchain that run when predetermined conditions are met. They are used to automate the execution of an agreement so that all participants are assured of the outcomes decided on, as the execution is front loaded at the time of the decision, based on the details of the decision to be put on a time path, so that when conditions are met, they are implemented without any intermediary’s involvement or time loss and if so wished, made transparent. For example: in April 2022 a community decided that 20% of all ecosystem service income will go for the next five years to the improvement of education in the community, these funds will be paid out automatically in the future as and when they come in. This also automates other parts of a workflow, triggering the next action when conditions are met.

Distribution of PES for Nature Based Solutions goes automatically once agreed without further human interference and is completely transparent online for stakeholders. Transactions can be scheduled in an agreed pattern and because of the near zero transaction costs can also be as frequent as possible, even daily if so decided. Also, they can be pre-defined as stopping after a period of time or stopping if some of the parameters suddenly changes, e.g. satellite monitoring sees a decrease in biomass on a piece of land. Deviation from earlier decisions needs a new round of

decision making of the token holders which then is again written in the ledger, overriding the previous decision. The transparency of token ownership and related decision making and transactions of PES rewards also avoids hoarding and corruption and thereby limits the options for corruption of power and money hungry individuals and psychopaths who, in the current system, are not kept in check.

The policy guidelines for developing good governance and decision making of communities in the program are crucial to creating a positive effect on the well-being of the local people, creating the circumstances for thriving socio-biodiversity. In this regard the authors like to point to the Elinor Ostrom Design Principles. Elinor Ostrom shared a Nobel Prize in Economics in 2009 for work exploring “The Tragedy of the Commons” and elaborating how communities are successful at managing common pool resources, or not. The work demonstrates how a community can be self-sustaining without one element exploiting another.

Ostrom's Eight Design Principles

1. Define clear group boundaries	5. Use graduated sanctions for rule violators
2. Match rules governing use of common goods to local needs and conditions	6. Provide accessible, low-cost means for dispute resolution
3. Ensure that those affected by the rules can participate in modifying the rules	7. Make sure the rule-making rights of community members are respected by outside authorities
4. Develop a system, carried out by community members, for monitoring members' behavior	8. Build responsibility for governing the common resource in nested tiers from the lowest level up to the entire interconnected system

Source: [David Dao, 2018 Decentralized Sustainability](#)

These eight principles also shape the design rules of smart contracts, which David Dao calls Ostrom Contracts as distributed governance is woven into the contract's structure.

Design of Ostrom Contracts

1. Token-based Membership	5. Graduated Stakes for Rule Violations
2. Rules determined via Blockchain Governance	6. Challenge Response Game for Dispute Resolution
3. Proposal System for Members	7. Censorship Resistance through Decentralization
4. Machine Learning & Monitoring	8. Hierarchical Nested Contracts

Source: [David Dao, 2018 Decentralized Sustainability](#)

Bringing these five pillars of the digital architecture to bear on the current depleted and damaged global ecosystem holds the potential for activating hundreds of millions of people in the Global South to regenerate their own lands and communities with the influx of finance, the connection to information, communication and markets. But maybe the most important of all is the restoration of the vibrancy and color of the socio-biological diversity of these regions and the return of dignity and respect taken from them in five centuries of colonial repression.

THE RESURRECTION OF THE COMMONS AND THE CREATION OF THE GLOBAL COMMONS

DAOs allow for distributed power, changing the nature of ownership. In a world that focuses on the governance and regeneration of its commons and the fair distribution of the proceeds of those commons, a whole new decentralized form of ownership emerges. This does not only apply to the global commons of atmosphere, oceans and possibly in the future land organized bottom-up in socio-bioregions, it also applies for instance to the power and ownership of the internet, which needs to be distributed and owned by no one in particular, belonging to global digital commons. It would be important to apply the [ipfs protocol](#) to the architecture, instead of the http protocol. This allows it to be operated in a distributed P2P way, making it more resilient, with more bandwidth most importantly and independent of large powerful parties holding key server parks. It can be stored on blockchain as well with options like Ethereum 2.0 or Polkadot. This allows for distributed decision power over the internet and it is getting traction under the name of [Web3](#).

[Patagonia, a great move for the global commons.](#)

This digital architecture for global regeneration is just a beginners sketch and once the design project takes on more clarity and detail, we will see new roles enter into it for technologies such as the Internet of Things (IoT) and other forms of Artificial Intelligence (AI) combined with newly discovered properties of nature such as the [Earth BioGenome Project](#). The discovery of life's embedded intelligence will open up whole new vistas of application to create amazing opportunities in the future, which are slowly emerging in the science and application of biomimicry.

The regeneration of the planet will slow down, hopefully stop and possibly even reverse the destruction of biodiversity and the evolutionary work of 3.8 billions of life's development on Earth. This also protects us from what Mark Carney calls the "tragedy of the horizon", destroying future possibilities because of our limited ability to imagine it and care for the future.

APPLYING THE DIGITAL ARCHITECTURE IN THE RACE TO REGENERATE THE EARTH

The digital architecture is a crucial design to avert the greatest catastrophe possibly since the Earth was hit by an asteroid 65 million years ago and certainly since the onset of our species on Life's continuously changing stage a few hundred thousand years ago. So where do we start to apply it?

FORESTS WILL SAVE OUR SPECIES IF WE REGENERATE THEM

Forests are planetary organs of our planet that cool in at least three powerful ways:

- Storage of water in its soils and vegetation and sequestration of atmospheric carbon¹
- The biotic pump function irrigating the continents and transporting heat to the outer atmosphere
- The creation of clouds increasing the albedo-effect of the planet reflecting energy back into space

Emerging science² supports the insights that the combined cooling effect of these three mechanisms (the list is longer, mind you) is much stronger than currently understood. Forests can really cool our planet!

Through forest and forest-like smart landscapes, including agroforestry and climate-smart cities, we can cool the planet at the speed and scale needed to avert a climate catastrophe. Restoring nature at scale will not only harvest significant amounts of CO₂ but will also effectively restore the cooling capacity through the hydrological cycle, driven by the interaction between forests and the atmosphere and the recreation of lifegiving soils, securing carbon.

The now famous [Climate Tipping Point article](#) shows us that the only tipping point we can directly avert by taking action on the ground is the tipping point of dieback of the Amazon Rainforest. Stopping a run-away drying out and collapse of that enormous planetary organ will not only slow climate change, the destruction of biodiversity and the derailment of global food production. There will be positive effects on the other tipping points as well, slowing their glide to collapse as well. In the best case scenario we will see a series of trophic cascades reversing them in ways we do not yet understand. It is likely for instance that the regeneration of the Amazon Rainforest will have a positive effect on the great rainforests of western North America, which in turn will cool the Greenland ice sheet. In this way, the [AMOC](#) will be strengthened again not just by cooling the tropical Atlantic Ocean directly by sucking in more humidity into South America but also via the slowing of ice melt on Greenland, etc. This is all speculation as it is beyond the horizon of current science as far as I know. Surely the interaction between the climate tipping points, both in negative and positive ways, needs to be modeled as one of the most urgent projects of climate science.

STRATEGIC INTERVENTIONS TO (HOPEFULLY) AVERT A CLIMATE CATASTROPHE

We ARE in the climate tipping points that will make life hell on Earth and we have just a few years to have any chance to stop them by COOLING the planet. This should be the strategic goal. Of course the processes of decarbonizing the economies, accelerating the energy transition and moving to circular production must go on, but 26 COPS have shown that those efforts will never speed up enough to avert a climate catastrophe, so we need to act before we have planetary organ failure.

Would love to have a group of wise people and Earth system thinkers come together to set the priority list, but for me the clear number one is averting the collapse of the Amazon Rainforest. In fact regenerating the power of this immense planetary organ with its huge effect on the hydro, oxygen, carbon and nutrient cycles and its immens cooling capacity should top all the lists as it is also closest to the point where intervention is no longer possible. The Amazon regeneration likely has a positive effect on the AMOC, cooling the tropical Atlantic ocean, mitigating the increasingly

¹ <https://cbmjjournal.biomedcentral.com/articles/10.1186/s13021-018-0110-8/tables/2>

² [Revealing the widespread potential of forests to increase low level cloud cover.](#)

destructive storms there and the greening of the western North-American rainforests that in turn will possibly cool the weather over the Greenland ice sheet.

In case anybody has any doubt on the amazing energy exchange that is taking place in this area, I would like to quote this amazing calculus by Peter Bunyard who also quotes Antonio Nobre:

The quantities of energy involved in the transformation of water into water vapour are prodigious. Over the Amazon Basin, the incidence of sunlight provides up to the equivalent of the energy released from 20 atomic bombs (each 15KT of TNT equivalence) per second; one can calculate that the transformation of that energy into water vapour absorbs the energy equivalent of 15 atomic bombs worth per second, hence up to 75 per cent of the incident sunlight (Bunyard, 2011). Put another way, as Antonio Donato Nobre has done: How the Biotic Pump links the hydrological cycle and the rainforest to climate 20,000 million tonnes of water are evapotranspired each day over the Legal Amazon of Brazil (5 million square kilometres [author note: so not even the whole of the Amazon]), in comparison with 17,000 million tonnes of water that flow into the Atlantic Ocean via the River Amazon. The energy for that daily evapotranspiration is equivalent to the total energy production for 135 years of Itaipú, the largest hydroelectric plant in the world (Nobre, personal communication, 2006)

THE GREAT GREEN WALL FOR THE AMAZON RAINFOREST

The most urgent of these large projects is the creation of the Great Green Wall for the Amazon [Averting the Tipping Point of Dieback](#) of the great forest before the dieback gathers pace and becomes an unstoppable run-away effect. Applying the digital architecture for global regeneration will be crucial in rolling out a project of this size within years rather than decades, involving thousands of projects, a whole catalogue of financial sources and the involvement of certainly hundreds of thousands of people directly paid through the system, improving the well-being of millions of people in the region.

PROOF OF CONCEPT - A PILOT PROJECT WITH INDIGENOUS PEOPLE IN THE LEAD

Initial discussions with some of the Guajajara leadership living in the 413.000-hectare [Araribóia Indigenous Territory](#) and outside parties involved in regenerating this large, partly destroyed forest land, indicate the willingness to apply the regenerative architecture to govern the revival of the area. It would be part of a mosaic of projects in the wider Maranhao region and include [tokenization](#) for nature protection as the basis for Payment for Ecosystems. Here is a [Rough sketch of Araribóia digital set up.docx](#).

WARNING: WE NEED TO REGULATE THE CARBON CREDIT MARKET TO AVERT A GOLD RUSH BY THE WEALTHY OF THE WORLD

Indigenous people find the idea that land can be owned outrageous. Generations come and go, they are temporary stewards with usufruct rights and obligations to care for it. They belong to the land, not the other way around or to put this in a wider perspective, we belong to the Earth, the Earth does not belong to us.

Just the Amazon Rainforest in and by itself may be able to absorb as much as 5 Gigatons of carbon per year if it is cared for and bounces back. This huge carbon sequestration service to humanity

(apart from oxygen, water, food, medicine etc) could have an annual value of 500 billion USD per year by the end of this decade if we manage to revive it. It has the largest Payment for Eco Services potential of any place on the planet. The whole tropical zone has a potential that is more than triple these numbers. Theoretically we should be able to sequester half of global emission, so you are looking at possibly a market value of 1,8 trillion per year by 2030.

The custodian communities can design their own set of rights, obligations and decisions on how to invest or use income streams from PES, but all deals need to be based on certain founding principles such as caring for the land, the biosphere, the water bodies and harvesting resources only to the point that the land and the biosphere will stay healthy. This also means that the custodians are the ones who decide what can and cannot be done with the land based on the guiding principles.

In order to not unleash a new wild west gold rush for carbon credits, a new round of financial colonialism, we need to start regulating the markets now, based on the Indigenous understanding of the relation between humans and land, which means that in the digital set up **land cannot be owned**, but can be used responsibly with a set of rights and obligations to pass it on to future custodians at least as healthy as it was received from the previous custodian, by the people who care for it. Now that does not exclude deals that make reasonable ROI; custodians can make deals with outsiders for investment based on future income.

They can also use the future harvest of ecoservices as a basis for investment finance, once the credit pipeline deals are in place. Also partnerships can be set up with no cash from the custodians as they bring in a revenue sharing deal for carbon harvesting over a timeline.

CALL TO ACTION

I am calling on the smartest minds, who are connected to the urgent need to regenerate our world, to heal our future, to join in the effort of finalizing the architecture design and bring a huge coalition together to implement it to cool the planet, stop the destruction of biodiversity, create huge streams of funds to the Global South to give the exploited communities the means to fight these crises and regain the dignity that has been robbed from them in the process of colonization and exploitation of this chapter in the human journey that is now closing fast, whether through design to avert collapse or through collapse itself.

Let us make COP27 the focal point of our efforts to roll out this digital architecture as part of the Marshall Plan to cool and regenerate our beautiful, living, intelligent planet of which we are all born, our only mother Earth.

“Never doubt that a small group of thoughtful, committed citizens can change the world; indeed, it is the only thing that ever has.” Margaret Mead

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