GreenAnt White Paper

Friday, October 28, 2022

GreenAnt

GreenAnt B.V., is a private limited company duly organized and validly existing under the laws of the Netherlands. It is registered with the Dutch Trade Registry under registration number 82892121 and has its registered office in The Hague, the Netherlands.

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Glossary

Tree-grower	The grower takes direct care of the trees and is responsible for their survival.
Tree-planter	The planter makes the investment and advances the project to plant the trees.
Blockchain developers	Blockchain developers and companies belonging to the GreenAnt tech community, who are constantly improving on the GA-DAO.
AI Data analysts	Usually companies, but also individuals, who focus on AI development for carbon analysis.
UAV Monitoring (UAVA)	Usually companies, but also individuals, who focus on UAV development for carbon analysis.
RSC	Companies and agencies, providers of satellite imagery and analysis.
Carbon Standards	Carbon standards are able to provide third-party validation, confirming $GA allocations and convertibility of the natural asset into carbon offset values.
Research and Development	Institutions, NGOs and organizations who support similar research and innovation around the world.
GreenAnt Investment Fund	Investment fund intended to support similar for-profit and not-for-profit projects, as well as GA-DAO growth, where investment decision-making is decentralized and community-based.
GreenAnt Administration	GreenAnt Team, for general operation, setting-up costs and market development.
Others	Supporters, community-builders, activists, marketing agencies, prizes, and

	awards, etc.
GA-DAO Reserve	Trees' reserve used to replace trees that died prematurely. Their yields are used to fill empty $GA.
PES	Payment for Ecosystem Services
DeFi	Decentralized Finance running through blockchain smart-contracts

1. INTRODUCTION

1.1 Bridging the gap between nature conservation and fintech

A working global market that offers Payment for Ecosystem Services (PES) is necessary for the survival of the planet and cannot be funded through unreliable and donation-based initiatives (Adhikari, 2009; Thompson, 2017). It is necessary to build an accessible network capable of sharing resources and skills to offer all the efforts necessary for the enhancement of reforestation and preservation initiatives across the world. In this white paper, GreenAnt proposes the introduction of its Decentralized Autonomous Organization (GA-DAO) to build a decentralized network capable of gathering and calculating the accurate value of specific data, offering to bridge the gap between Decentralized Finance (DeFi) and PES. GA-DAO's actors are farmers, landowners, governments, carbon standards, Remote Sensing Companies (RSC), investors, etc. These stakeholders are naturally scattered around the world but seek to find a secure place to interact. GA-DAO runs on Polygon Blockchain, and it is ruled by a blockchain-based smart contract. The community's cornerstones are GreenAnt Non-Fungible Tokens (GA-NFT), which are the blockchain individual GA-NFTs of all the trees monitored and organically farmed by actors within the network. GA-NFTs are, hence, virtual copies of living, existing trees which carry the specific metadata for each of them, generating unique hashes through their geographical coordinates. Holding at least one GA-NFT is the mandatory condition to be a GA-DAO's member, being the GA-NFT GreenAnt's main product. GA-NFTs yield to their owners one GreenAnt cryptocoin ($GA) as a reward for each kilogram (kg) of carbon stored in the tree that they are linked to. Therefore, $GA is GA-DAO native cryptocurrency. Through blockchain-based carbon sequestration, GreenAnt aims to offer a

financial gateway for all climate-conscious individuals, farmers, institutions, and businesses to profit from their environmental efforts and investment.

1.2 Why do we do this?

At the beginning of 2022, GreenAnt Team launched its DeFi structure while running its first project in Thailand in cooperation with the Thailand Institute for Scientific and Technological Research. On this occasion, we met thousands of farmers. One of those was Arthit, a 67-years-old Thai farmer who has been cultivating her land since she was 12 years old with her own grandfather. Unfortunately, Arthit lost her husband at the age of 32 because of the pesticides that she, her grandfather and all village farmers had to use on their farm even if, everyone knew they were harmful. Those pesticides would end up in the deep-water reservoirs and will be consumed by the village residents and every animal feeding from the land, including those crops. However, her grandfather and her fellow farmers never had the power to stand against pesticide sellers and local credit loaners who formed a coalition, forcing them to use pesticides and borrow money at a very high rate. Arthit's just never knew how to finance the shift to more sustainable farming practices. When we met Arthit, she explained us the business model she needed from us. Building a fintech platform able to turn trees into assets, breake everyone free from illegal lander, pesticide and empower people, especially women, with finance. We learned from her and many other to build the system we present in this document. Using GreenAnt's cutting-edge technology to monitor and trade the carbon sequestered on her land, Arthit is warranted access to global, decentralized financial services, giving her true power over her own crops, and the ability to protect it and her entire community's health. She immediately stopped using pesticides and started ant farming as a bio-pesticide, instead. Meanwhile, using remote sensing, GreenAnt Network keeps highly accurate track of the health of Arthit's forest and tokenizes her trees with blockchain, turning them into financial valuable assets. This is truly what motivates us, every day, to develop GreenAnt's Decentralized Autonomous Organization: supporting organic shift and climate change adaptation through innovative and empowering products.

1.3 The Five Problems and their possible solutions

The worldwide challenges posed by climate change require global efforts to align behind a feasible solution aimed at reducing its impact and adapting to its consequences. One of the key strategies

implemented to reduce carbon emissions has been to stimulate reforestation to enhance carbon sequestration and biodiversity conservation. However, traditional PES faces the following five problems that prevent those solutions from being integrated into existing financial mechanisms, which impact their effectiveness and scalability, worldwide. Those include: 1. Limitations of inaccurate verification; 2. Lack of trust among actors; 3. Local idiosyncrasies; 4. Coordination problems; and 5. Poor property rights. (Adhikari, 2009; Bui et al., 2006; Pagiola et al., 2005; Samii et al., 2014; Thu Thuy et al., 2009; Zhang et al., 2008)

1.3.1 Limitations to verification

It is virtually impossible for actors involved in reforestation projects to verify and assess the measurable impact of their monetary and resource investment impacting their initiatives. That is because data verification is essential for conducting an accurate risk assessment and effective planning, while its absence discourages potential further investment. Moreover, data collection can be susceptible to human biases and could even be caused by an incidental underinvestment in a project's technological adaptation. That's why, it is crucial to implement accessible, globally trusted standards to monitor each stakeholder's tree-growth through top-notch machine learning and remote sensing solutions, thus, diversifying information sources while stimulating redundancy. Gathering traceable and accurate data about every tree's carbon sequestration informs decisions and prevents failures, therefore, enabling PES to be valued as a financial asset-solution. However, this requires the development of a network able to make state-of-the-art technologies available to every tree-grower on the planet delivering them open source.

1.3.2 Lack of trust among actors

A certain level of trust is necessary in every human interaction. However, actors cannot develop trust if they are scattered around the world and their interactions are limited in time and geography. To solve this, GreenAnt offers a decentralized GA-DAO by decentralizing members' incentives to work towards the common goal. In that case, stakeholders' profit will not be generated from internal payments, but rather will be calculated from the value created by the GA-NFTs and the $GA, which are the valued product of the community's work. Since the complete and honest collaboration among multiple stakeholders is the only way to generate profit for all parties involved, actors will have no incentive to

be deceitful to each other. In fact, the use of blockchain technology completely nullifies the above scenario because of its underlying security in recording every transaction occurring in the network, in a decentralized, unmodifiable and publicly accessible ledger.

1.3.3 Local idiosyncrasies

Pollution surpasses borders, and the undesirable impact of global warming is felt universally, which is why a global problem of this scale requires a global solution to match it. However, the world structure is divided into separate, sovereign nations, each with different regulations and pre-existing conditions to the management of their land and resources, such as those regarding land ownership for the purpose of this white paper. Therefore, any under-consideration or misrepresentation of local idiosyncrasies can jeopardize the success of international reforestation projects, no matter how well funded or meticulously prepared. This means that it is more efficient if such projects are operated by local organizations, while knowledge and services are shared across borders. Decentralization makes the network more connected and effective, mitigating problems that can arise from local peculiarities.

1.3.4 Coordination problems

The two problems mentioned above are solved through decentralization, but also highlight the issue of coordinating such a global aspiration. The lack of coordination among stakeholders, for example, could lead to the poor evaluation of risks, resulting in the loss of resources. Therefore, the successful coordination of actors is essential to achieving GreenAnt's ambitious goals, where we believe that the congruence of interest and incentives among stakeholders can lead to spontaneous coordination if the resulting knowledge and data are open source made, easily readable, accessible, and thus, trustworthy. In fact, GA-DAO is inherently designed to match these conditions.

1.3.5 Poor property rights and profitability

Decentralization and common interests among stakeholders are long-term and self-sustainable goals, as long as they are profitable to all actors involved. Otherwise, they would either result in the exploitation of the employed efforts and resources, or their squandering, or both. Trees should be pillars of finance because they are among the most valuable assets existing on the planet. They sequester carbon and mitigate the effects of climate change, decreasing the risk of the entire economic system

falling apart due to a climate catastrophe. That is why GreenAnt considers trees as an attractive vehicle providing intrinsic value to its $GA currency, while blockchain offers the possibility to identify and easily trade tokenized versions of these invaluable assets. Without this technology, trees would be indistinguishable and difficult to be globally traded. Blockchain offers the technological basis for a currency to have its supply determined by the amount of carbon the community of farmers manages to save or store in their grown trees. By gathering calculated data of those nurtured trees, GreenAnt manages to generate value for each tree planted and grown before distributing profits among its stakeholders. Furthermore, trees' tokenization solved yet another major problem faced by PES scheme implantation: weak property rights enforcement. Property rights in many countries around the world, in Southeast Asia as well, are not appropriately enforced, which paves the way for illegal practices to occur such as land-grabbing, while preventing farmers from accessing equitable financial services and effective tools for their practice. Hence, in order to bridge the gap between PES and DeFi it is essential to build an efficient property right system over the existing PES's generators, like trees.

1.4 Decentralized Finance and its applications in the fight against climate change

GA-NFTs aim to secure the tradability of trees' carbon storage, offering them as valuable financial assets. Because of its environmental value and global corporate interest in trees' carbon sequestration, GreenAnt made it possible through its $GA to generate blockchain-secured yields trading the value inherent in the natural asset. The resulting financial transactions would not only enhance all trading parties' financial accessibility to a worldwide market, but would also secure a higher ROI for impact investments. In fact, insufficient financial accessibility represents one of the main causes for farmers to resort to polluting practices. Financial exclusion is oftentimes caused by weak property rights enforcement and currency volatility, which prevents impoverished communities in developing economies from joining the financial market and, subsequently, improving their living conditions.[1] Through GA-DAO's blockchain technology, GreenAnt aims to not only grant farmers access to financially valuable products that would help enhance their financial status, but also it would offer them a secure way to raise capital on DeFi platforms, besides existing traditional financial providers. Raising capital is essential to decreasing their dependency on illegal lending practices, supporting investment

[1] All references made in this paper of farmers' living standards, financial accessibility and blockchain usage are based on the GreenAnt Team experience in the field between January and April 2020, in cooperation with the Thailand Institute for Scientific and Technological Research. A copy of the resulting study report will be provided upon request.

in climate change adaptation, steering farming techniques away from pesticides and toxins, and improving farmers' living conditions (Giné & Yang, 2009). Finally, securing higher ROI for impact investment would naturally stimulate an increase in investment in green, environmental products, thus, triggering a virtuous circle once successful.

2. TOKENOMICS

2.1 GA-DAO

GA-DAO, also referred to as the "community" or the "network" in this document, is composed of everyone who holds a GA-NFT. The network includes a community of people from around the world who mainly interacts through a Discord GA-DAO Official Channel, which is, then, divided into local branches where members meet, online or offline, share common interests, exchange benefits, knowledge, and resources.

Members are divided into two groups, *active* and *inactive*. Active members receive GA-NFTs as a reward for sharing their services with the community. Inactive members hold GA-NFTs that they could purchase from active members. However, the latter can always become active if they start contributing to the community, turning into GA-NFT beneficiaries. Active members constitute tree-planters, tree-growers, Remote Sensing Companies (RSC), Non-Governmental Organizations (NGOs), Data Validators (DV), Ambassadors, Institutions, Researchers, Governments, and others who are actively contributing to the network. It must be noted that the GA-DAO holds all the active GA-NFTs generated, while inactive accounts or "old" GA-NFT holders will no longer be considered members of the network if they do not hold any active token. On the GreenAnt website, members can launch a project and become *promoters*, to ask other users for services to run the project. Then, the GA-NFTs generated by each project will be distributed among the participant community members, pursuant to Section 2.3.5.

2.2 DAO structure

The GA-DAO is the main backbone of the GreenAnt mechanism. Although initially launched and promoted by GreenAnt B.V.,[2] it aims to be a fully independent functional entity, within 12 months from

[2] A private limited company duly organized and validly existing under the laws of the Netherlands.

its launch on the 1st of November 2022. The DAO structure is composed of many concentric layers, as illustrated in Figure 1 on the right.

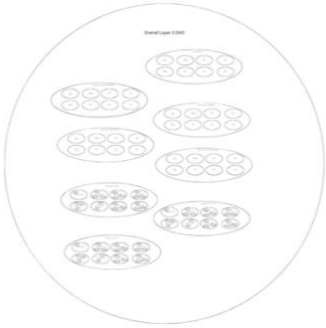

Figure 1: GA-DAO diagram. It is possible to see the most external circle representing the Layer 3 DAO within there are the Layer 2 and Layer 1 DAOs

Layer 1 revolves around each individual project launched by a member of the community above described, as an approved *promoter*. Meaning that every time a promoter proposes a project, and approval is granted to it, a DAO is created to manage that project. Thus, Layer 1 DAOs can be virtually unlimited. However, they will be sub-categorized under larger Region-specific and Sector-specific DAOs, as explained below.

All the regions in which GreenAnt is operative in are organized through Regional Layer 2 DAOs, which include all Layer 1 DAOs operating in each region. For example, all Layer 1 DAOs operating in Thailand will be grouped in the Regional Layer 2 DAO specific to Thailand. Another category exists specific to DAOs' Sector of activity. For example, Layer 2 DAO exists for blockchain developers and all the developers who are part of it and who are active collaborators in the various projects operating within that DAO, regardless of their geographic location. Finally, all Layer 2 DAOs and Layer 1 DAOs are part of the main GA-DAO, which coordinates all the work of GreenAnt worldwide, and which is also referred to as Layer 3 DAO.

2.3 GA-NFT

GreenAnt uses Polygon as its blockchain network, on which it has already generated two native products: GA-NFT and $GA. We aim to generate 1 trillion GA-NFTs in 30 years, planting and/or growing an equivalent number of trees. Under GreenAnt supervision and management, the GA-NFTs representing trees are insured to remain nurtured and alive for a period of 10 years.[3] At the initial stage, the pace of tree tokenization will be slow, but is expected to increase over time.[4] In scientific terms, the

[3] As further explained later in the text, according to (Hou et al., 2019; Kongsager et al., 2013), 10 years is the minimum period of time that a tree has to live for it to have the impact we desire on the environment and, it is the maximum period that a tree-grower is willing to commit in its nurturing, on average.

[4] More specific information about the pace of the tokenization process can be directed to the GreenAnt Team at: info@greenant.farm

formula calculating the number of active GA-NFTs is: $x = t - ot$, where t is the number of trees planted and ot is the number of trees that are older than 10 years.

The GA-NFT's smart contract receives information and generates $GA according to the amount of carbon stored in each tree. Automatically and every six months, $GAs are generated and delivered to the respective GA-NFT holders by the smart contract. (Figure 2, to the right)

The GA-NFTs are available on OpenSea and GreenAnt's own marketplace, accessed through the website. There will be no supply cap, as we hope to plant as many trees as possible, but the number of GA-NFTs is expected to increase constantly until 2036 when the GA-NFTs' supply will stop increasing and become constant.

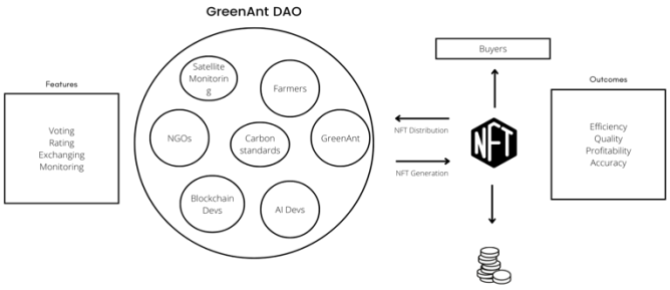

Figure 2: A Layer-1 DAO in operation

2.3.1 GA-NFT status

a. Active GA-NFT

When a tree is alive and monitored, its corresponding GA-NFT is defined: *active*. An active NFT generates 1 $GA for each kg of CO2 stored and can be traded by paying a 1% royalty to the GreenAnt Investment Fund (detailed in a separate section, shortly). For a 10 years period from the time when the tree is tokenized, the tree-grower has an obligation to keep the tree in good health and report about its standing to GA-DAO's point of contact. Active GA-NFTs generally yield $GA every six months to their stakeholders, as monitoring data are received by the respective GA-NFT.

b. Deactivated and burned GA-NFT

If a tree dies or becomes unsuitable for monitoring, its corresponding GA-NFT is deemed: *deactivated*. A deactivated NFT is only considered so, if the timber of the said tree is verified to have been used sustainably even though the tree is dead. In that case, a deactivated GA-NFT will not generate more $GA, but can still be traded. However, in the absence of evidence that the timber of a dead tree has been used sustainably, then, the corresponding GA-NFT is recognized as: *burned*. GreenAnt will always assume first that the timber has been used unsustainably unless there is clear of evidence of the contrary. The owner of a deactivated or burned GA-NFT that is younger than 10 years will automatically receive a newly tokenized tree in substitution, picked randomly from GreenAnt's virtual forest through

its smart contract. This reserve of tokenized trees used for such cases represents 5% of every project, as will be further explained in Section 2.3.5.

c. *Old GA*

A GA-NFT is considered "old" when it has been active for more than 10 years. After that, it can still continue to produce $GA, but the owner is no longer entitled to obtain a new one in case the tree dies. Similarly, the tree-grower in such a case will no longer bear the obligation of keeping the tree in good health.

2.3.2 GA-NFT structure

To join the GA-DAO as a member, every stakeholder must hold at least one active GA-NFT, which structure reflects opportunities provided by holding that one token, at least. The structure can be divided in two parts: Metadata and Features.

Metadata

1. Image/Audio: This is optional, it is usually added to increase the token's value with an artistic addition.
2. Species: This indicates the tree species as determined by the farmer and verified by the remote sensing company in-charge of such a verification.
3. Date planted: This states the month and year the tree has been planted, as indicated by the farmer and verified by the remote sensing company in-charge of such a verification.
4. Longitude: GPS coordinates that generate a unique longitudinal hash for each GA-NFT.
5. Latitude: GPS coordinates that generate a unique latitudinal hash for each GA-NFT.

Features

Features allow GA-NFTs' holders to interact within the GA-DAO as illustrated in Figure 3, below.

1. Royalty: A 1% royalty fee is paid to GreenAnt's Investment Fund to finance projects' development grants, marketing, and other, jointly approved costs.
2. General Voting Rights: Every GA-NFT holder obtains General voting rights

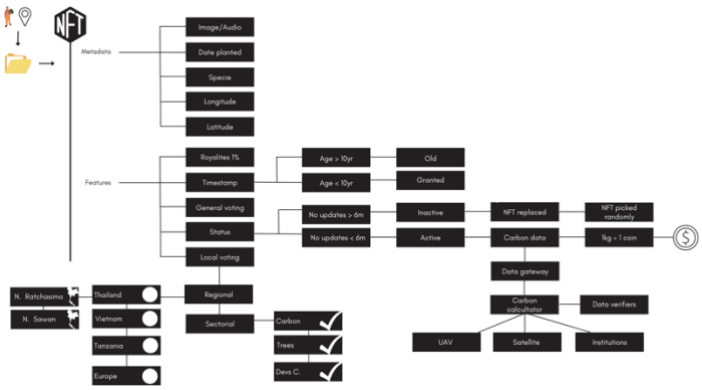

Figure 3: GA-NFT structure diagram

that allow them to vote regarding proposals on the subject of Layer 3 DAO. Each proposal is first evaluated by the GreenAnt Administration before being made public. Decisions regarding the nature of the investments made by the GreenAnt Investment Fund's resources are voted over through this General Voting route.

3. Local Voting Rights: These are granted only to active holders of GA-NFTs that are specific to their field of activity in their respective Layer 2 DAOs. For example, developers will have Local Voting Rights over the improvement of the code, while modifying the code will have to be agreed by the entire community. RSC will have Local Voting Rights over the way data are gathered and regarding issues concerning the regions they work in. Tree-growers and tree-planters are granted Local Voting Rights regarding project management decisions, which will also include other stakeholders involved in such decisions, such as RSCs, and data analyzers.
4. Status: GA-NFTs also keep track of the age of trees and receive data about the amount of carbon stored in each of those natural assets, based on which $GA is generated. If data are received, the GA-NFT remains *active*, and when the data flow is interrupted for more than 6 months, the GA-NFT becomes *inactive*.
5. Timestamp: If a deactivated GA-NFT is aged less than 10 years, GA-DAO smart contract randomly picks another GA-NFT from its reserve and allocates it to the previous shareholder. If the deactivated GA-NFT is aged more than 10 years, the holder loses the asset-substitution attribute when the asset had been evidently deemed: burned.

2.3.3 Voting system

Holding a GA-NFT means being able to claim voting rights. There are two kinds of voting rights: General Voting rights and Local Voting Rights, as shown in Figure 3 and explained above. The holders who are active contributors to the DAO could cast one full vote, while inactive stakeholders, who had bought their NFTs from active members, could cast only half a vote for each NFT they own. Finally, anyone can submit a voting proposal for a project, but this would need to be approved by the GA Administration first, before being made public to be voted over by all stakeholders.

2.3.4 Tokenization process

Trees are tokenized once the Metadata are collected. Firstly, a promoter, usually a tree-planter or an organization, will launch a project. Once the project has received support from enough actors to start,

tree-growers or tree-planters will ask the relevant remote sensing company to provide a map of the plot of land and a list of the geographical coordinates of it. The map is then filled by tree-growers and/ or tree-planters with the species they deem fitting the landscape and would keep track of the date they had planted each tree. Once all the information is gathered, they are submitted to the data-verifier for validation. After the authorization to proceed is officially received, GreenAnt Administration uses the data to generate the GA-NFTs and then delivers them to members of the project-specific Layer 1 DAO.

2.3.5 GA-NFT distribution

Carbon sequestration can be effective only if implemented on a large scale, with the most sophisticated technologies, and the support of the millennia-long experience and heritage of farmers' best-practices. All active members of GA-DAO are able to launch a project on a piece of land that they have legal power or ownership over, if it could contain more than 20 trees. Once a *promoter* launches a project following the indicated criteria, other participants can join and will receive a percentage of the GA-NFTs generated in that piece of land, as indicated in Figure 4 above.

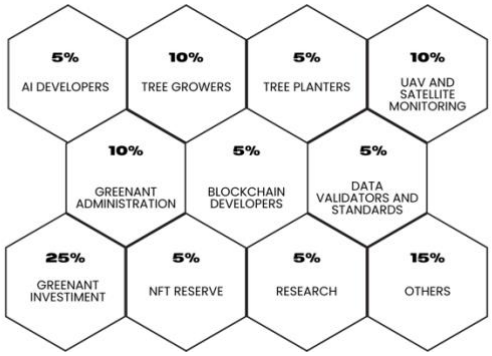

Figure 4: The GA-NFT distribution displayed above it is only an example and it is susceptible to project-specific changes

Distribution Table

5%	Tree-grower
5%	Tree-planter
5%	Blockchain developers
5%	AI Data analysts
5%	UAV Monitoring (UAVA)
5%	RSC
5%	Carbon Standards
5%	Research and Development
25% + 1% royalty	GreenAnt Investment Fund
5%	GreenAnt Administration

15%	Others
5%	GA-DAO Reserve

2.4 $GA generation process

One $GA is generated for every kg of CO2 sequestered by each tree. Data is gathered and verified through several layers of monitoring including satellite imagery, machine learning technology, and specialized personnel in the field. The data collected is stored through decentralized storage services such Arawave, and Ethernity Cloud or using centralized tools, such as Amazon's AWS, and then communicated to the GA-NFTs through an Oracle Chain, which then generates $GA accordingly. GA-NFTs burn, deactivate, and are generated by stakeholders' willingness to counteract climate change. $GA are generated by smart contracts based on scientific calculations and can be burned only by converting them to Carbon Offsets. Once $GAs are generated, they can be swapped, their supply is unlimited, and GreenAnt hope to generate as many as possible because their increase means an increase in carbon sequestration.

2.4.1 $GA conversion in carbon offsets and "empty" coins

$GA's stakeholders ask the carbon standard to convert their $GA into standard carbon offsets, after the conversion the $GA coin is burned, thus stops to circulate as cryptocoins. While $GA can have a value in carbon offsets to legally compensate for emissions, GA-NFTs can never be converted and can only be used as DeFi assets. Furthermore, $GA can become "empty" if the tree that generated them dies, and its timber is used unsustainably, meaning that the CO2 sequestered has been released again into the atmosphere. Empty coins will have the same value as full coins only within a period of 10 years from their planting, and GreenAnt will use its Reserve yields to compensate the stakeholders for their loss.

2.3.1 GreenAnt Investment Fund

GreenAnt Investment Fund holds 25% of the overall generated $GAs, plus 1% royalty for each GA-NFT or $GA transaction. GreenAnt DAO uses these resources to invest in other projects around the world to promote sustainability, social justice, and peace. The fund represents the treasury of GreenAnt DAO, and illustrates the resources used by the GA community working every day on an impactful project. It will also allocate resources to market the GA initiative and support similar impactful projects worldwide to expand its effect and outreach. Decisions in these regards will have to be approved by stakeholders through General Voting, with prior authorization from the GreenAnt Administration.

2.4 Benefits for actors involved

This matrix displays the benefits that incentivize the members of GA-DAO to share their resources with the network. It presents three benefits available through stakeholders' participation:

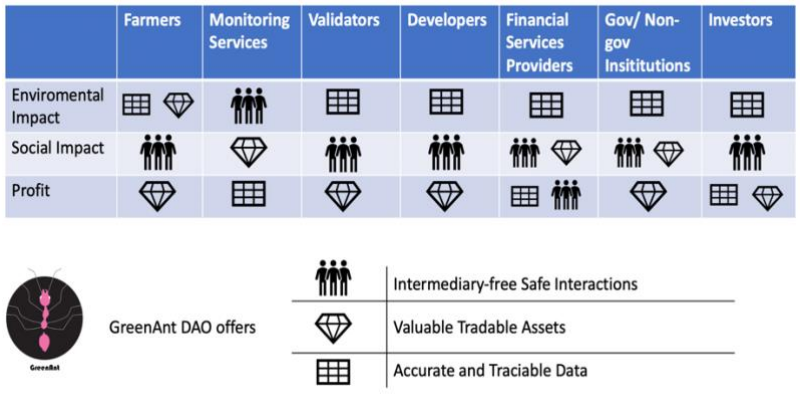

Figure 5: Category benefits displayed

1. Direct interaction among actors who would not have been able to interact otherwise, such as an insurance provider with a farmer in a foreign country;
2. Generation of standardized and tradable assets through the tokenization of carbon offsets and trees' carbon storage;
3. Generation of accurate data through the monitoring of large amounts of individual trees.

The matrix also assumes that stakeholders in the networks would aim to pursue those three main goals in different ways: Environmental impact, Social Impact, and Profit (Figure 6, above).

3. TIMELINE

On the 2nd of November 2022, GreenAnt will unveil its first MVP and offer for sale the first 500 GA-NFTs at the WebSummit22 in Lisbon. The capital raised during the campaign will be used to start the second project in Thailand in January 2023. Testing of the MVP will lead to the presentation of the first version of its GA-DAO, in February 2023. In March 2023, GreenAnt will start the trees' monitoring process, thus delivering the first $GA yields to GA-NFT holders by September 2023 (Figure 7, below).