The purpose of The Sacred Groves is to provide a platform whereby environmentally sensitive individuals, entities and institutions can participate in the conservation, restoration and creation of sustainable ecosystems of indigenous natural forests and bio-diverse habitats all over the world.

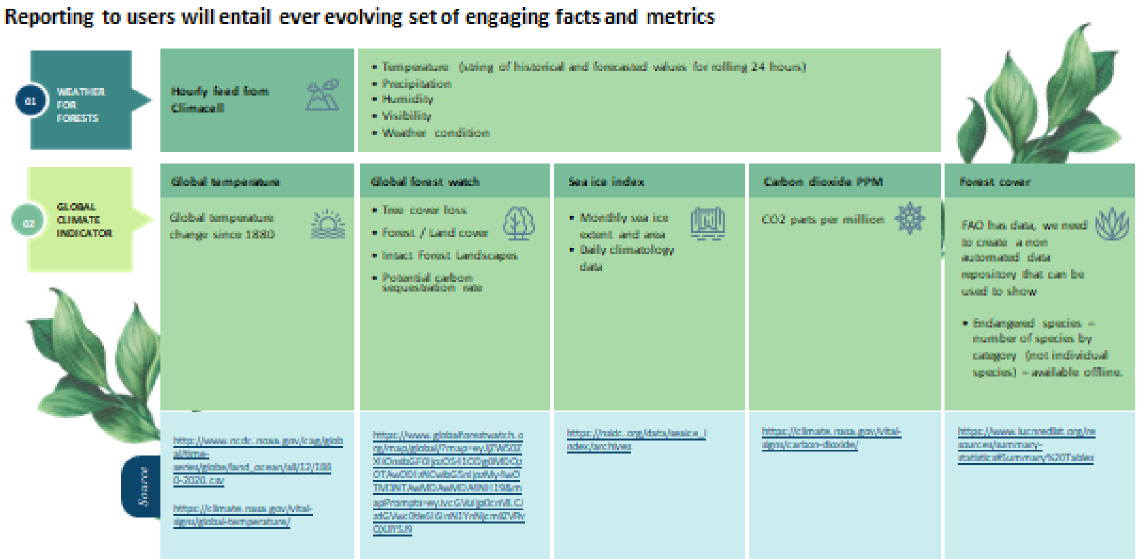
Using technology, advanced analytics and the latest forest management practices, these natural habitats will come under the protection of millions of inspired individuals and entities all over the world.

This document aims to provide a high level overview of the technology and analytics capabilities of the Sacred Groves platform and is divided into the following sections:

Section 1 Data and Analytics - Sacred Groves Website

The Sacred Groves Website presents a variety of data and information for public consumption. The following sections outline the data sources as well as the methodology used for this purpose.

Section 1.1 Global Climate Indicators



In order to define the scale of the problem of climate change, five Global Climate Indicators are presented on the homepage of the Sacred Groves website under the section "Why do we care". This information is sourced from third parties and linked via APIs. The description and sources of these indicators are:

(a) **Forest Cover loss:** Soccer pitches of trees lost since landing on the page. Source: https://www.globalforestwatch.org/ Global Forest Watch (GFW) is an online platform that provides data and tools for monitoring forests. By harnessing cutting-edge technology, GFW allows access to near real-time information about where and how forests are impacted by changes in land use around the world.

(b) **Biodiversity threats:** Percentage of assessed plant species, which are threatened. Source: https://www.iucnredlist.org/statistics Established in 1964, the International Union for Conservation of Nature's (IUCN) Red List of Threatened Species has evolved to become the world’s most comprehensive information source on the global extinction risk status of animal, fungus and plant species.

(c) **Pollution Impact:** Percentage of world cities with moderately unhealthy AQI (Air Quality Index). Source: https://aqicn.org/map/world/ provided by The World Air Quality Index project, which is a non-profit project started in 2007. Its mission is to promote air pollution awareness for citizens and provide unified and world-wide air quality information. The project provides transparent air quality information for more than 130 countries, covering more than 30,000 stations in 2,000 major cities, via its two websites: aqicn.org and waqi.info.

(d) **The Carbon Emissions Crisis:** Concentration of CO_2 in the atmosphere. Source: https://www.esrl.noaa.gov/gmd/ccgg/trends/monthly.html Earth System Research Laboratories (ESRL) - National Oceanic and Atmospheric Administration (US Department of Commerce). ESRL's Global Monitoring Laboratory (GML) of the National Oceanic and Atmospheric Administration (NOAA) conducts research that addresses three major challenges - greenhouse gas and carbon cycle feedbacks, changes in clouds, aerosols, and surface radiation, and recovery of stratospheric ozone. The observatory at Mauna Loa, Hawaii captures the data on global CO_2 concentrations.

(e) **Global Warming**: Hottest years on record. Source: https://www.nasa.gov/feature/2020-tied-for-warmest-year-on-record-nasa-analysis-shows National Aeronautics and Space Administration (NASA) feature on global temperature rise.

(f) **Global Sea Ice Loss**: Source: https://nsidc.org/data/seaice_index The monthly Sea Ice Index provides information on changes in sea ice in the Arctic and Antarctic. It is a source for consistently processed ice extent and concentration images and data values since 1979. Monthly images show sea ice extent with an outline of the 30-year (1981-2010) median extent for that month. Other monthly images show sea ice concentration and anomalies and trends in concentration.

Section 1.2 Impact Calculator

The Sacred Groves Website offers an Impact Calculator for potential Guardians to estimate the positive impact their contribution could make on key metrics, over the ten year tenor of a Sacred Groves Cluster (SGC).

Section 1.2.1 Carbon Sequestered

Technical paper on the estimation of Carbon Sequestered

Introduction:

Carbon sequestration is an extensively researched topic. The measurement approaches vary from conducting a physical survey to remote sensing. The United States Department of Agriculture has published guidelines for claiming credits for forestry and other activities through their guidance paper [1]. Our objective in this technical paper is to provide the basis for estimation of carbon sequestered in the natural habitats protected by Sacred Groves. Given that the company is in the early stages of its journey, the methodology for carbon sequestered is still preliminary. It will undergo significant recalculation and an analytically advanced methodology shall be published by the end of 2022. The current methodology leverages empirical studies conducted by various researchers in estimation of carbon sequestered for various tree girths and species. The team used this along with tree counting through remote sensing images as inputs for the estimation of carbon sequestered by Sacred Groves managed forests.

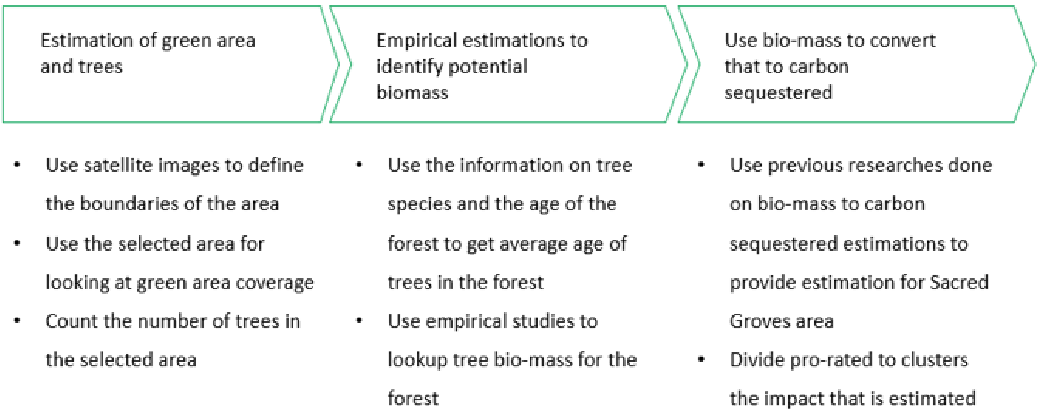
Literature Review:

There are many research studies that have covered carbon sequestering in the past. A paper from University of New Mexico [2] links carbon sequestered to the biomass of a tree. Using the formula for carbon dioxide (CO_2), the carbon component of biomass can be approximately converted into carbon dioxide. The weight estimation is also arrived at through approximation of width of stem and the height [3]. Wanglong Sun et al [4] compared multiple approaches of carbon sequestration - Inventory-based methods, soil type method, and biomass model, which were the main forest estimation methods used in China. Through their research paper, Grant M et. Al [5] made an estimation of carbon sequestered through the available stock of forests and also the potential for new saplings and new plantations. Tao Zhou et al [6] in their paper have discussed carbon sequestering of forests based on forest age. This also helps in forecasting future carbon sequestering potential for similar exercises. While a similar exercise for biomass estimations has been done by Aditi Sharma [7], carbon sequestering estimations using tree girth [8] and many more such studies have been carried out.

Method:

The method for estimating carbon sequestered for the natural habitat areas managed by Sacred Groves is as follows:

Exhibit – method for estimating carbon sequestering at cluster level



As explained in the exhibit above, there are three stages to the estimation exercise:

(a) <u>Estimation of green areas and trees</u>:

- The first step is to define the boundaries of the area being supported by Sacred Groves. For this, the team used satellite images provided by Google Earth. The boundary was marked based on the latitude and longitude pin drops along the boundary, provided by an on-field surveyor.
- The second step is to assess the green area coverage. For this, the team used static images from Google Earth to assess the green coverage of the area.
- Finally, the watershed algorithm [9, 10] is used to extract the tree crowns and count the number of trees. Adjustments are made in areas of high tree density.

(b) <u>Empirical estimations to identify potential biomass</u>:

- In this case, the team relied on survey reports of the location and identified the species of conifers and broad-leaved trees that exist in the ecosystem.
- There are multiple empirical studies that various researchers have done as a part of their thesis on biomass estimation for different geographies and species. Our team leveraged the relevant studies done to estimate the biomass.

(c) <u>Use biomass to convert that to carbon sequestered:</u>

- The last stage is the conversion of biomass into carbon sequestered. For this as well, the team has relied on various published research papers and empirical estimations as mentioned above in the literature search.

- The outcome of the above exercise is the estimated carbon sequestered by the entire tree inventory of the forest/ protected habitat. The last stage of this exercise is to distribute this impact pro-rated on the area per SGC.

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7. Aditi Sharma, BIOMASS CARBON ESTIMATION OF IMPORTANT NORTH–WESTERN HIMALAYAN TREE SPECIES, UHF,NAUNI,SOLAN

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Section 1.2.2 Pollution Reduction

Technical paper on the estimation of Pollution Absorption

Introduction:

Pollution reduction is another significant benefit of trees and plants. While the studies on impact of trees in reducing pollution are well documented [1,2,3], a majority of the research has been done in urban areas. The reason being that pollutants are primarily released in the atmosphere in urban areas. As per research by Nowak et al [4], pollution removal by urban trees in the United States has been estimated at 651,000 tonnes per year. Trees and forests in the Conterminous United States removed 17.4 million tonnes of air pollution in 2010; what is interesting in this study is that contrary to common perception, most of the pollution removal occurred in rural areas, with most of the health impacts and benefits seen in urban areas.

Through this paper, Sacred Groves estimates the impact on pollution based on empirical studies, as listed in the References. The methodology for measuring the extent of pollution reduction shall be further refined by the end of 2021.

Literature review:

Air pollution is absorbed by trees and plants in two ways:

(a) Atmospheric gases are absorbed by the leaf stomata where they get diffused and combined with the water films to create acids.

(b) Another way of absorption of pollution is through the plant surface [5]. Particulate matter can easily get trapped in the waxy, hairy leaves of trees and shrubs. When it rains, most of these particles are washed away by water into drains. Another research by Baró et al [6] applied the i-Tree Eco model to quantify the ecosystem services “air purification,” “global climate regulation,” and the ecosystem disservice “air pollution” associated with biogenic emissions. As per Baro, the effect of trees on air pollution is substantial in absolute terms, but it is quite modest if we compare it to overall emissions. A similar study was conducted by Francesca et al [7] that quantified the impact of trees on O_3 and PM10 in the city of Florence.

Method:

The first step is to define the boundaries of the area being supported by Sacred Groves. For this, the team used satellite images provided by Google Earth. The boundary was marked based on the latitude and longitude pin drops along the boundary, provided by an on-field surveyor.

Based on available literature on the ecosystem, the varieties of the trees in conifers and broad leafed trees are identified to map empirical impact of trees on the pollutants. Conifers are considered to be the best species for air pollution reduction due to the structure of their leaves [8].

Once the flora estimations are done for the area supported by Sacred Groves, the pollution reduction impact is calculated and prorated on the area per SGC.

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Section 1.2.3 Biodiversification Coverage Indicator

Introduction:

Biodiversity can be measured at many different levels including genetic, species, community, and ecosystem. One way to measure biodiversity is to assess species richness of an ecosystem, which is the total number of distinct species within a local community. While having many species generally coincides with having a diverse and healthy ecosystem, the evenness also needs to be considered. Evenness refers to the equality of the proportion of each species within an area or community. For instance, when one species dominates the area while the others are very rare, the biodiversity in this area is lower than in an area with species of equal abundance. Therefore, areas with many species that are relatively equal in abundance have the highest values of biodiversity.

Estimating Biodiversity:

The differences in richness and evenness between two communities can be visualized by rank-abundance curves. If the number of species is equal, the shape of the line can tell us which community is more diverse. If the line is flat, there is high evenness among species. However, if the line quickly dips, the evenness is low. If richness and evenness are both different between two communities, biologists must use equations to calculate diversity. These equations weigh the importance of each component differently, and a consensus on which equation is the best at calculating diversity is still debated.

Sometimes there are too many species in an area that it is unrealistic to count every single species. For example, a single tree in the Amazon Rainforest may contain hundreds of species of beetles. To circumvent this problem, ecologists use sampling tools called quadrats. A quadrat is simply a frame with a known internal area. For example, to measure the species richness of a one-acre field of grass, ecologists randomly place the quadrat in the field and count the species within the quadrat, instead of counting all of the species within the acre. They may also systematically sample by using transect tapes. Transects are stretched across the field, and quadrats are then placed along the transect at regular intervals. This method is semi-random and ensures ample coverage of sampling across the entire field to estimate its biodiversity.

While quadrats and transects may pick up most of the species, some rare species may go unnoticed. In this case, ecologists may use a species accumulation curve, which represents the cumulative number of species seen in a series of quadrats. The y-axis of the curve represents the total number of observed species, whereas the x-axis represents the number of quadrats for which species have been enumerated. The total number of species in the first quadrat represents the first point on the graph. Each successive point represents the number of new species found in each new quadrat sampled, plus all of the species from the previous quadrats. At some point, there will be few or no additional species found in each new quadrat sampled, and the curve will approach an asymptote, which is an estimate of the total number of species present. Even if the asymptote is never reached because of many rare species, biologists can estimate the total number based on this curve.

If comparisons need to be made among different areas or scales, alpha, beta, and gamma diversity measures are used. Alpha-diversity (α) refers to the number of species in an area. Beta-diversity (β) compares two different areas and is the sum of species unique to each area. Gamma-diversity (γ) is the number of species in many areas combined into a region. By using these measures, biologists can get an idea of diversity over space, including both small and large scales.

Reference: https://www.jove.com/science-education/10596/measuring-biodiversity

Biodiversification Coverage Indicator

Being an early stage startup, Sacred Groves has chosen a stochastic measurement approach based on the principle of a sample representing the characteristics of a population. For the purpose of the Impact Calculator, Sacred Groves has made an assumption that 10% of the area of the forest is a large enough sample to represent the full biodiversity of the population. The Biodiversification Coverage Indicator represents a simple arithmetic construct representing the percentage of SGCs divided by the sample size. In essence, as soon as the number of SGCs become equal to or more than the sample size the Biodiversification Coverage Indicator becomes 100%.

Over a period of time Sacred Groves aims to adopt more sophisticated methods to assess biodiversity of the areas being supported.

Example of Gigrin Prysg woodland in Wales -

1. Size of the woodland: 11.80 acres
2. Number of SGCs: 3,436

Impact over 10 year period

1. Total estimated carbon sequestered: 175.49 Kgs per cluster
2. Total pollution removed: 0.41 Kgs per cluster
3. 100% Biodiversification coverage achieved at: 338 SGCs

Section 2 Creation of Sacred Grove Clusters (SGCs)

Section 2.1 Demarcation of area supported by Sacred Groves

In order to identify and demarcate the area supported by Sacred Groves, a surveyor is appointed by the company to visit the site in order to provide a status report on the forest area and physically record the coordinates (latitude and longitude) of the area. Alternatively, if the area coordinates are already available from the local authorities, they are used as an input.

These coordinates are then used to plot the polygon, which forms the boundary of the forest area. In order to geo-map the area and obtain its satellite images, the team used Google Earth as per the specifications given below:

- Center coordinates (latitude and longitude format)
- Zoom Level (zoom = 20)
- Image size in pixel (e.g. 640*640)

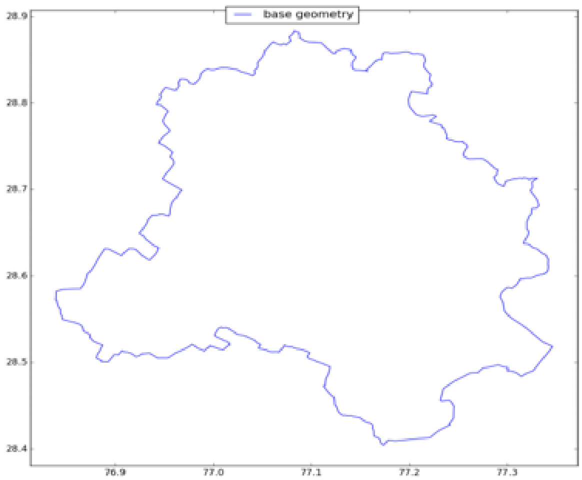
Exhibit showing an example of the boundary extraction from satellite maps

Coordinates of the boundaries

polygon
1

76.8388947	28.5726624
76.8401245	28.5714724
76.8401674	28.5696275
76.8401913	28.5695522
76.8423776	28.5626414
76.8438303	28.5618782
76.8437916	28.5565426
76.8455044	28.554104
76.8458602	28.5500119
76.8525086	28.5480013
76.8609749	28.5454749
76.8644468	28.5436729
76.8663673	28.5415542
76.8676032	28.5361423
76.8713283	28.5344136
76.8724565	28.5337105
76.8735857	28.5329734
76.8736018	28.5329284
76.873722	28.5325924
76.8742856	28.5310168
76.8742911	28.5287422

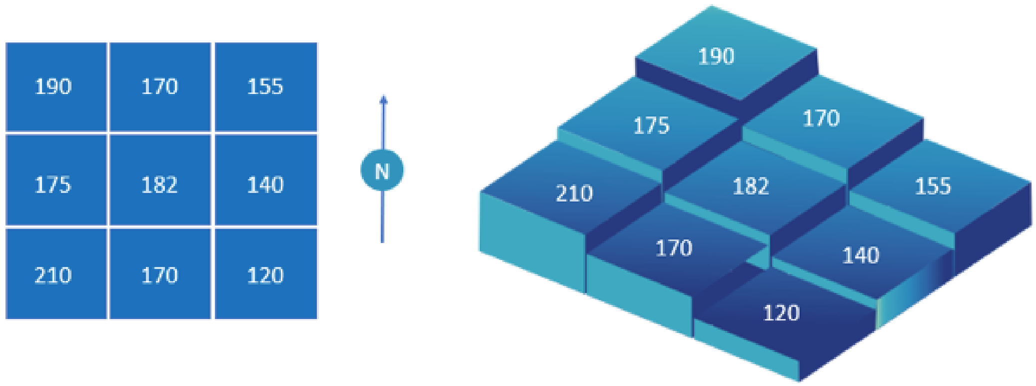
Polygon that created by the coordinates



Section 2.2 Derivation of Planar Equivalent Surface

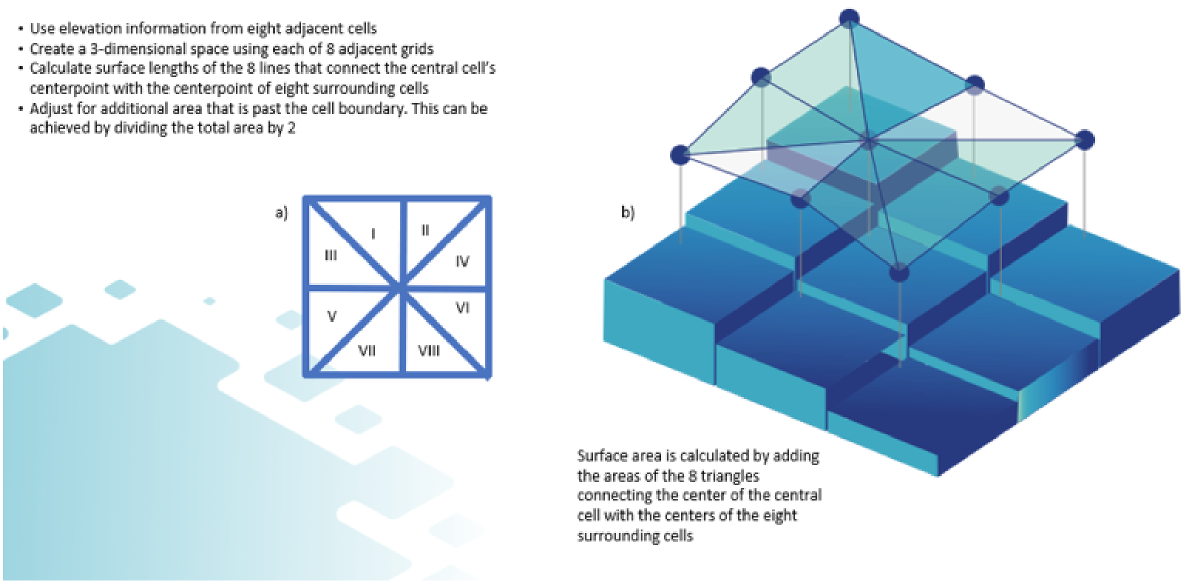
The surface of the earth is not flat; it is characterised by features such as mountains, valleys, peaks, ridges and troughs that need to be converted into equivalent land area in order to ensure all Sacred Groves Clusters (SGCs) are of the same equivalent area. The team used the Digital Elevation Model (DEM) to calculate this equivalence.

All satellite information systems provide the elevation for a grid structure based on latitude/ longitude details and the size of the grid. The information at the grid level is provided as below:



The cells may be pictured 3-dimentionally as a set of adjacent columns

Based on the information provided, through a Digital Elevation Model, the calculation of surface area is done as shown in the exhibit below, following the steps detailed:



Surface area is calculated by adding the areas of the 8 triangles connecting the center of the central cell with the centers of the eight surrounding cells

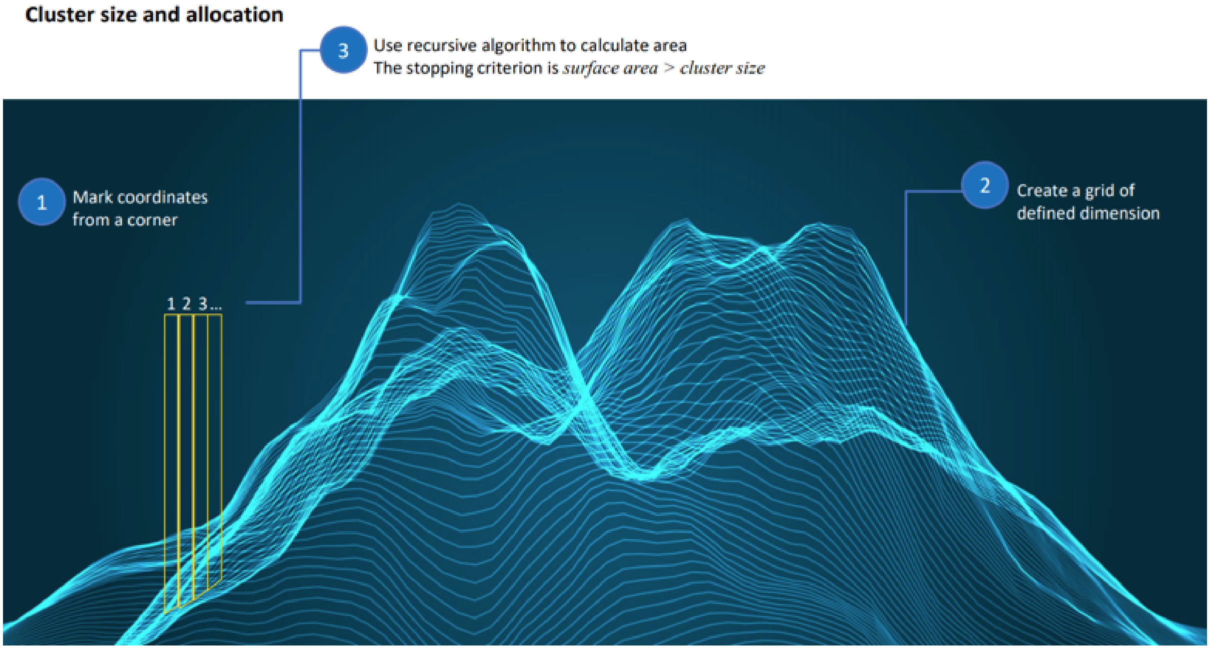
(a) The known input of the grid and the height (height is available for each grid through DEM), is used to derive slope.

(b) The slope is in turn used to derive the length of the slant using the cosine of the slope.

(c) Once the slant length is available, the surface area for each of the adjacent grids is calculated and adjusted for the triangle area as shown in the exhibit above. This calculation is done for all the grids that are available in the area selected. The team then smoothens the information to calculate the equivalent planer surface area, which can be used for creating Sacred Grove Clusters (SGCs).

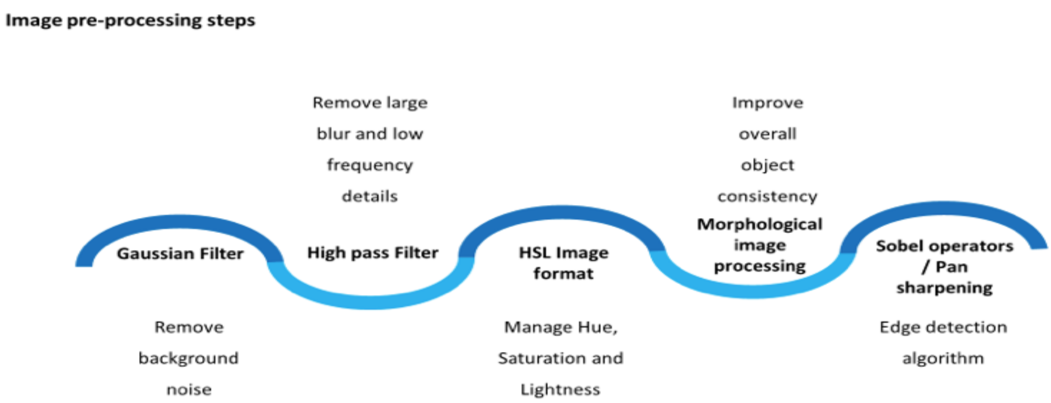
Section 2.3 Define SGCs

Once the planar area is derived, the next step entails allocation of this area into clusters of equal size, using an iterative algorithm. The calculation logic for the algorithm is shown in the exhibit below:



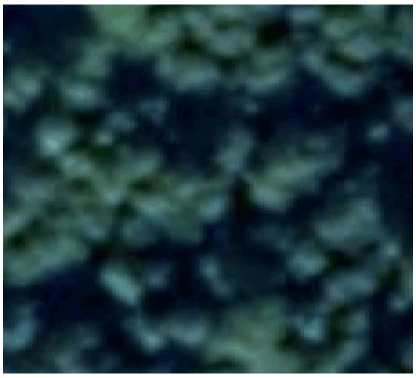
In order to minimize error in the area allocation of a cluster, a recursive algorithm is used. The algorithm creates multiple loops at boundaries to ensure that the increment is repeatedly reduced thus ensuring negligible error in the size of clusters.

Tree Counting: the Sacred Groves team has additionally used satellite images to glean information on tree counts using a defined zoom level. The images are first subjected to pre-processing as shown in the exhibit below:

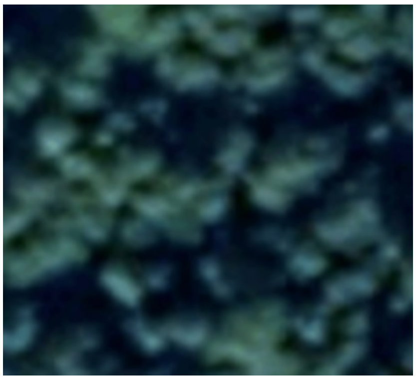


Screenshots post each stage of image processing:

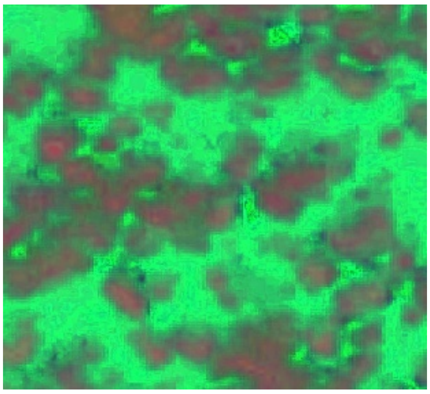
1. Raw image



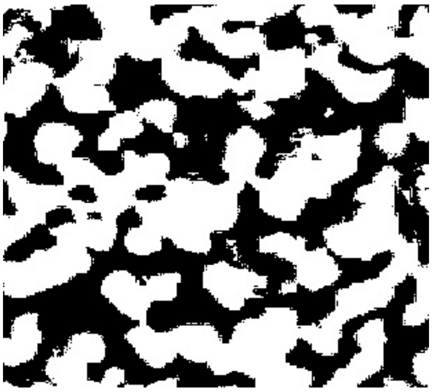
2. Image filters (Gaussian & High Pass)



3. HSL Image format

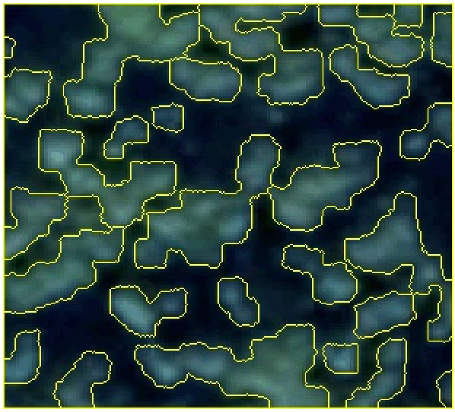


4. Morphological image processing



5. Edge detection algorithm

6. Watershed algorithm



After the image is pre-processed, the watershed algorithm is used for tree counting. As shown in the exhibit, the watershed algorithm leverages the edge detections from the crown of the trees. It is further optimized with a few business rules to ensure error reduction. The outcome is an automated tree count for the protected forest area.

Going forward, the team intends to leverage advanced analytics related to unsupervised learning and deep learning to classify tree types and identify tree features.

Section 2.4 SGC Allocation Logic

The Sacred Groves believes that all natural habitats are of significance and must be protected and conserved. To this end, over time, Sacred Groves aims to bring a variety of habitats in various geographies under its custodianship; thus offering Guardians a chance to participate in the process of protection, conservation and restoration of habitats all over the world. Accordingly, when Guardians choose to support multiple SGCs, Sacred Groves allocates a proportionate number of clusters to represent the varied habitats and geographies.

As an example,
Area 1 has total 200 available clusters
Area 2 has total 400 available clusters

At this point, if a Guardian acquires 200 SGCs, s/he will be allocated 67 clusters from Forest 1 and 133 clusters from Forest 2.

At the moment, Sacred Groves is in the start up phase and has two habitats under its custodianship (Gigrin Prysg and Coed Rhyal woodlands in Wales), therefore Guardians shall be allocated clusters proportionate to these two habitats.

Going forward, as Sacred Groves brings additional areas across different habitats and geographies under its custodianship, the allocation logic will be applied in a more comprehensive manner. Below is the waterfall of allocation logic envisioned:

1. Level 1 - Habitat Diversity: proportionate allocation will be done across multiple habitat types based on availability
2. Level 2 - Geographic Diversity: within the same habitat type, proportionate allocation will be done across different geographies
3. Level 3 - After the first two filters, proportionate allocations will be done across multiple areas within that geography based on availability

As an example, assume Sacred Groves has the following availability across habitats and geographies:

Habitat/ Geography	Trop. Rainforest		Mangrove		Woodland		Wetland		Total SGCs*
	Area	SGCs*	Area	SGCs*	Area	SGCs*	Area	SGCs*	
Country1	A	80					A	60	
	B	40					B	80	
	C	100							
	Total	220					Total	140	360

Country2	A	90	A	50			A	70	
	B	150	B	40					
			C	80					
	Total	240	Total	170			Total	70	480
Country3	A	100	A	90					
			B	30					
	Total	100	Total	120					220
Country4					A	60	A	50	
					B	80	B	40	
							C	80	
					Total	140	Total	170	310
Country5					A	40			
					B	90			
					Total	130			130
Total SGCs		560		290		270		380	1,500

*Available SGCs

Applying the waterfall logic, the scenarios of allocation of 10/ 25/ 50 SGCs will be as below:

Habitat/ Geography	Trop. Rainforest		Mangrove		Woodland		Wetland		Total SGCs^
	Area	SGCs^	Area	SGCs^	Area	SGCs^	Area	SGCs^	
Country1	A	0/1/3					A	0/1/2	
	B	0/1/1					B	1/1/3	
	C	1/2/3							
	Total	1/4/7					Total	1/2/5	2/6/12
Country2	A	1/2/3	A	0/1/2			A	0/1/2	
	B	1/2/5	B	0/1/1					
			C	1/1/3					
	Total	2/4/8	Total	1/3/6			Total	0/1/2	3/8/16

Country3	A	1/2/3	A	1/1/3					
			B	0/1/1					
	Total	1/2/3	Total	1/2/4					2/4/7
Country4					A	0/1/2	A	0/1/2	
					B	1/1/3	B	0/1/1	
							C	1/1/3	
					Total	1/2/5	Total	1/3/6	2/5/11
Country5					A	0/1/1			
					B	1/1/3			
					Total	1/2/4			1/2/4
Total SGCs		4/10/18		2/5/10		2/4/9		2/6/13	10/25/50

^Allocated SGCs

Legend:

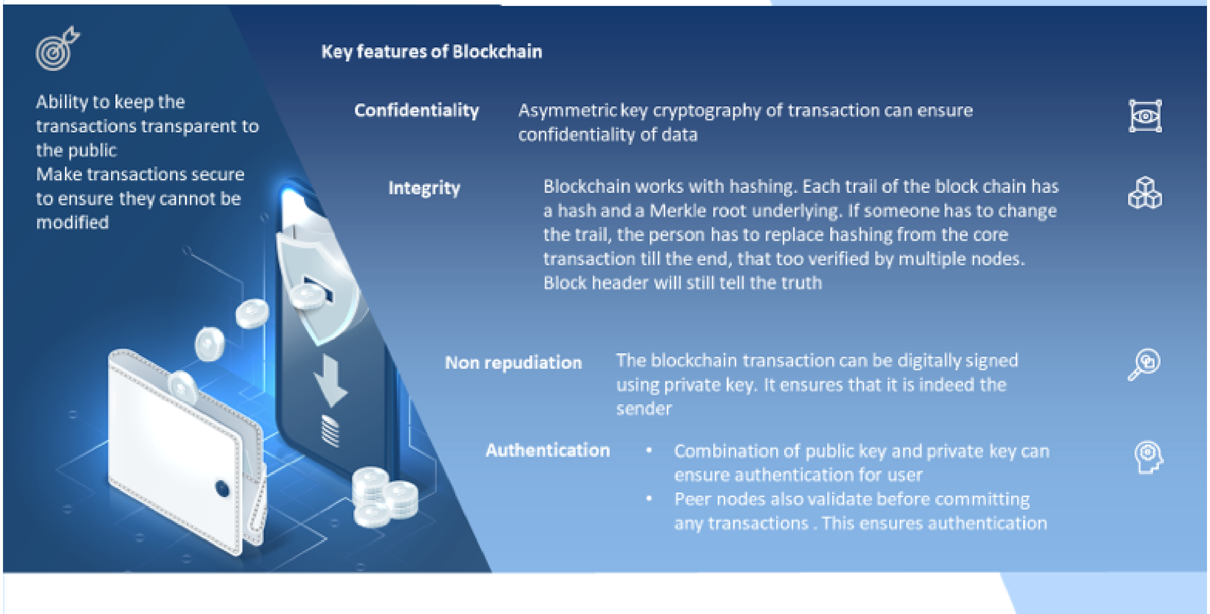
Level 1 allocation	Level 2 allocation	Level 3 allocation

As is evident from the above scenarios, the larger the number of SGCs acquired, the better will be the coverage of habitats and geographies.

Section 3 Secure SGC transactions on Blockchain

In order to ensure transparency, efficiency and security in the allocation and transactions of SGCs, Sacred Groves elected to employ Blockchain technology for posting transactions.

Some of the key features, that were the reason for choosing blockchain are given in the exhibit below:



Key principles of posting transactions on the distributed ledger

(a) Confidentiality – The information can be shared amongst participants using a combination of public key and private key. In layperson terms, consider the public key as an email id (which is known to everyone) and private key (password to open the mail). This ensures that users can maintain confidentiality when they perform transactions amongst themselves and want to maintain confidentiality.

(b) Integrity – Blockchain works with an interesting mathematical concept called hashing. In layperson terms, it is a mathematical formulation, which always gives the same number of hash values (x number of characters) for a given input. For example a document containing 20,000 pages and another document containing one line of instruction, can both be converted into x number of hash values. This concept coupled with generation of a Merkle root (which uses only hash values of multiple transactions) ensures that it becomes extremely difficult (if not impossible) for any user to change the blocks of transactions that have already been committed on the distributed ledger.

(c) Non Repudiation - Every user has their own set of certificates and wallet. This ensures that each transaction has been initiated by the right people and can not be disputed by any user.

(d) Authentication – Authentication of information happens at multiple levels both during the commit of transactions on distributed ledger and at the time the recipient user accepts the transactions, ensuring robust and fail safe authentication of transactions

(e) Transparent – the transactions block can be viewed through an explorer, which makes the transactions completely auditable by anybody, by having view only rights. While confidentiality can also be maintained by showing Guardian ID rather than name, it clearly makes the assignment and ownership trail of clusters completely transparent.

As shown in the exhibit below, public and private blockchain networks are available, with unique pros and cons:

Difference between private and public blockchain

	Private blockchain	Public blockchain
Access	Authorized users, authenticated identified individual	Anonymous user
Security	Pre-approved participants, voting / multi-party consensus	Anyone can join peer network, consensus mechanism (trade-off of hacking vs. cost of transaction)
Efficiency	Smaller network, faster transactions	Heavier network – permission-less, slow transaction speed
Scope and scale	Trusted / whitelisted network	Independent parties act as members
Energy efficiency	Higher energy efficient	Low energy efficient

Sacred Groves has decided to choose the private blockchain network as it is more energy efficient and transactions can be executed faster, while fulfilling the requirements of transparency and security. After evaluating the various open source blockchain offerings, the Sacred Groves has selected Hyperledger Fabric on the IBM Blockchain Platform (https://www.ibm.com/blockchain/hyperledger), for the implementation of posting cluster transactions.

Section 4 Information for Guardians

Section 4.1 Cluster level information - Metadata

Once Sacred Grove Clusters (SGCs) have been defined, the algorithm stores the cluster information in the form of metadata such as cluster coordinates, cluster id, country name, cluster elevation/ altitude, cluster slope, landform type, surface type and tree presence. This is used to provide reporting to Guardians when they are allocated the clusters. The information is precise at each cluster level, to ensure Guardians can drill down to precise micro information for their allocated cluster.

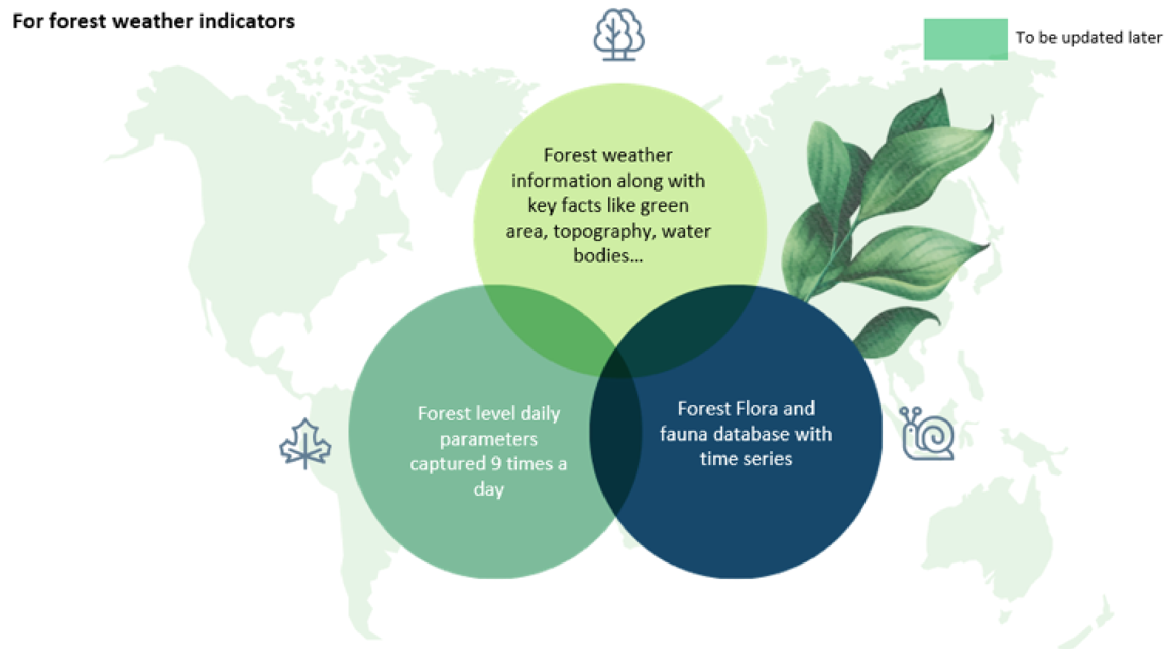
Cluster elevation - The altitude at which this cluster is located

Cluster slope - In case the cluster is on a mountain/ hill slope, then this captures that slope

Landform type - This captures if the cluster is on a hill/ mountain/ plateau etc.

Surface type - This captures the type of surface i.e. Land / Water

Section 4.2 Forest level Information



Guardians will have access to the forest level information pertaining to those forests where their clusters are located. As shown above, local forest related information is broadly divided into three broad heads. Two of these three will be activated immediately, while the third one will be done after collecting sufficient history.

Section 4.2.1 Weather Information

Forest/ natural habitat weather information will be available to Guardians on an almost real time basis, along with general information pertaining to green cover, topology, water bodies, etc. Parameters such as humidity, precipitation, temperature, visibility and weather condition are extracted using Climacell API on an hourly basis.

Section 4.2.2 Flora and Fauna Database

This database will be initially compiled using information provided by local forest authorities or surveyors or ecologists who conduct surveys or monitor the local biodiversity of the forest area. Over time, it shall be fine tuned by Sacred Groves/ partners on the ground.

Section 4.2.3 Ecological Impact - Time series data of forest health indicators

This part of the reporting will be done over time as sufficient data points become available for meaningful analysis. It aims to capture time series data of various climate and forest health parameters using geospatial imaging to demonstrate the climate and ecological impact of the forest/ natural habitat.

Section 5 Guardian Engagement

Sacred Groves has a variety of engagement options for Guardians ranging from earning points and badges to connecting with other Guardians.

Section 5.1 Grove Points and Badges

Grove Points is a mechanism that gives Guardians a numerical score for their efforts and can be earned by Guardians by performing the following actions:

1. Purchasing SGCs
2. Gifting SGCs
3. Complete Profile
4. Syncing contacts
5. Inviting friends to join the platform
6. Linking Social Media Accounts
7. Sharing content on Social Media
8. Creating Squad(s) - Admin
9. Become a Squad member - Member (Invites only)
10. Messaging on the platform for Initiating the Thread

Grove Points Formula

The rationale behind selecting the above actions for the allocation of Grove Points is to strike a balance between financial contribution (Capital) and social influence (Influence) as both are equally important for driving meaningful change. Capital will facilitate more and more biodiverse habitats to be brought under conservation, while Influence will drive meaningful change by inspiring others. Capital will be measured by the number of SGCs acquired and Influence will be measured through the actions listed above.

Grove Points will be based on the principle of value determined by quantity multiplied by assigned points.

Grove Points Calculation Logic							
	Activity	**Effect**	**Time**	**Money**	**Effort**	**Impact**	**Impact %**
Capital							
1	Purchasing SGCs	0	50	100	50	300	24%
2	Gifting SGCs	50	10	100	30	290	24%
	Total Capital	***50***	***60***	***200***	***80***	***590***	***48%***

Social Influence							
3	Complete profile eg. profile photo, family acct etc.	20	40	0	40	100	8%
4	Sync contacts	60	10	0	30	100	8%
5	Invite friends	20	10	0	20	50	4%
6	Link social accounts	60	10	0	20	90	7%
7	Like, share Sacred Groves content on social media	20	10	0	40	70	6%
8	Create a Squad	80	20	0	40	140	12%
9	Join a Squad	20	10	0	10	40	3%
10	Message (creating discussion thread)	30	10	0	10	50	4%
	Total Influence	***310***	***120***	***0***	***210***	***640***	***52%***
	Total	**360**	**180**	**200**	**290**	**1,230**	**100%**

The various components used for determining the weightages for each activity are detailed below:

(a) Effect: refers to the potential multiplier or Ripple Effect of the activity
(b) Time: refers to the time spent engaging with the application
(c) Money: financial contribution
(d) Effort: refers to the effort involved in completing the task, with extra points given for navigating outside application
(e) Impact: is calculated as a summation of the above components, with the Money component being assigned a double weightage.

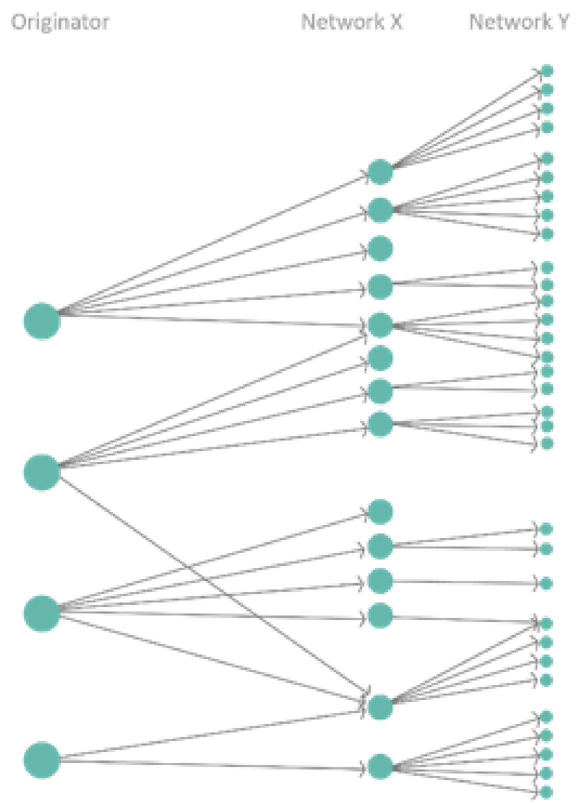
Levels based on Grove Points: Badges

Based on the Grove Points, there will be ten main levels with 10 intermediate levels. The main levels will be represented by badges based on Flora and Fauna endemic to the country/ natural habitat being supported. For example, at present, a woodland in Wales is being supported so the ten badges will be derived from the flora fauna of this region and each level will have one badge. In future, as more natural habitats get supported, further ten badges of that particular habitat will get added. So going forward, each level will have multiple badges representing each of the habitats under Sacred Groves.

Section 5.2 Ripple Effect

The Ripple Effect is a powerful concept which enables Guardians to experience the impact of their actions on others. For instance, an action of acquiring and gifting SGCs or sharing the social media posts of Sacred Groves may spur others into taking similar actions, thus expanding the sphere of influence. At the moment, there is a feeling of helplessness around the topic of Climate Change with most people thinking they cannot make a meaningful difference. By quantitatively demonstrating the multiplier impact or "Ripple Effect" of taking meaningful actions, Sacred Groves hopes to inspire many.

Exhibit showing the creation of Ripples by Guardians



Sacred Groves will be actively tracking and quantifying the following to calculate the Ripple Effect of a Guardian.

(a) Diffusion function – rate of affected people out of total target (N) : This function is used to denote the propensity of a user to further influence a certain portion of the target audience. This gives the Guardian an understanding of how much direct additional impact s/he is able to generate across the Sacred Groves platform.

(b) Decay function – rate of change of diffusion : This function is used to denote the loss of the propensity of the Guardian's network influence across levels from 1st level referrals to further influence additional new users and those users further influencing more users.

(c) Drift function – forward propagation multiplier in terms of n

Section 5.3 Squads

Guardians can be connected with other Guardians in multiple ways -

(a) Prior contacts who've joined Sacred Groves
(b) Interests: Guardians can choose their areas of interest from a comprehensive list available on the Sacred Groves platform: Afforestation, Biodiversity, Blockchain, Carbon Sequestration, Climate Change, Coastal wetlands, Community Welfare, Conservation of Natural Habitats, Deforestation, Desertification, Emissions, Environmental Journalism, Extinction of Species, Floods, Forest Fires, Geospatial Imaging, Global Warming, Indigenous People, Peatlands, Pollution, Renewable Energy, Rewilding, Sustainable Development Goals (SDGs), Sustainable land use, Waste Management, Zoonotic Diseases, Other
(c) Activities: Similar to Interests, Guardians can also choose their preferred activities from a comprehensive list available on the Sacred Groves platform: Bird watching, Carbon footprint tracking, Composting, Cycling, Eco Friendly purchasing, Eco tourism, Electric vehicles, Energy efficient home/ workplace, Environmental Activist, Gardening, Member of Environment groups/ clubs, Nature hiking/ trekking, Nature photography, Plant rich diet, Rainwater harvesting, Recycle Reduce Reuse, Ride sharing, Support environment charities, Tree planting, Use renewable energy/ solar, Volunteering, Other

Based on the above, Guardians can form Squads (or groups), whose members can interact with each other via messaging and set goals and targets. Features of a Squad:

(a) A Squad would have an administrator who manages the Squad (typically the Guardian who initiated/ formed the Squad) and can invite and remove member Guardians.
(b) Guardians can search for Squads who may share Interests or Activities that they are interested in and request for joining.
(c) Each Squad can adopt a name and profile picture as per their preference (admin privilege).
(d) Squads (admin privilege) can set goals for the team members to build enjoyment and engagement. The Squad Goals shall be across the following dimensions:

Goal Objective	**Number**	**Time in days**
Acquire SGCs		
Grove Points target		
Gifts		
Add Squad members		

Section 5.4 Messaging

Driving people to take meaningful actions is integral to our success. We believe that the environmentally sensitive community across the world has a need to connect and bond over topics of common interest. This community is growing and is actively seeking ways to communicate with each other in a manner that is private, secure and intuitive.

The messaging section shall create a reason for our Guardians to come back to our platform.

There will be two channels of messaging:

- One-to-one: Guardians messaging each other on our platform
- One-to-many: Guardians messaging Squad members, similar to a messaging board where all Squad members will be able to see and respond.

In the initial stages messaging will be text based and will evolve in time to include reactions, emotions, images and videos as we scale up the platform.

While there would not be any policing on the platform, adequate safeguards will be built to safeguard from porn, anti-social elements, terrorism etc allowing us to be compliant with International laws and regulations.

We are using Firebase as a messaging service, which is a product from Google Cloud, this also is generally known as FCM.

Section 5.5 Gifting

Why Gifting?

All over the world people express affection, appreciation, strengthen relationships, build connections and celebrate occasions through gifting. Gifting is an emotionally involved interaction and Sacred Grove Clusters are uniquely positioned to make excellent gifts for environmentally sensitive individuals.

Challenges of Gift Giving:

(a) Choosing an appropriate gift can be a matter of stress.
(b) Due to our time constrained lifestyles, sometimes it just may not be physically possible to shop for an appropriate gift.
(c) We often want to give something unique and special but are just not able to come up with appropriate ideas.
(d) The process of buying a gift has hidden costs. If the process is physical, there is a cost to travel, gift wrapping and time spent. If the gifts are virtual then they can be perceived as impersonal.

SGCs make a unique gift:

(a) For a nominal price the gift giver can make a lasting impact. The price of a Sacred Groves Cluster can be compared to popular gifts such as a bouquet of flowers.
(b) It is a convenient digital experience. The end to end transaction takes just a few minutes.
(c) It's a unique idea that does not exist anywhere else in the world.
(d) It’s attractive design and customer experience can be personalised to suit any occasion e.g birthdays, anniversaries, special moments such as promotions, graduation, marquee achievements, remembrances, etc.

How does Gifting work?

The process of gifting has been designed to make the experience interactive, intuitive and customisable.

<u>Step One</u>: Sign up as a Guardian. In order to gift an SGC, the Gift Giver must be signed up as a Guardian.

<u>Step Two</u>: Select the number of SGCs to gift.

<u>Step Three</u>: Choose an occasion. With an extensive library of designs and occasions the Guardian can select a digital gift tailored to suit any occasion.

<u>Step Four</u>: Input personal details. Add the contact details of the recipient (email or mobile number), a personalised message and the gift is sent right away.

Step Five: Receive Gift. The Gift Receiver gets a notification through an email or message on the mobile number provided. The receiver has to accept this gift within 30 days of receipt of the notification, else the gift goes back to the giver.

Transaction processing

(a) Selection of eligible SGCs from the Gift Giver's pool - Once the Gift Giver decides on the number of SGCs they wish to give, from the pool of SGCs held by the Gift Giver, the system selects the SGCs which have the longest remaining tenor with the minimum remaining tenor being 1 year. The Gift Giver may choose to send SGCs as a gift either at the time of initial acquisition or at a later date. It would be pertinent to mention here that the tenor of an SGC is ten years at the time of acquisition and at the time of gifting, the same timelines shall be applicable. In other words, the tenor or validity of the SGC shall not be renewed or altered in any manner simply by the action of gifting. Further, in order to ensure the Gift Receiver has an adequate length of time to enjoy and participate in the process of conservation, the minimum remaining tenor of the gifted SGC has been set at one year. In case the Gift Giver only has SGCs which have a short tenor (less than 1 year remaining), they will not be able to gift SGCs from the existing pool and will need to acquire additional SGCs for gifting.

    To illustrate with an example, Guardian A has 15 SGCs which were acquired at different points in time - 8 in Aug 2020, 5 in Jan 2022 and 2 in Apr 2023. In Dec 2029, Guardian A wishes to gift 10 SGCs to a friend. In this case, Guardian A will be able to gift only 7 SGCs - the system would select 2 SGCs from the 2023 pool (remaining tenor 6 years) and 5 SGCs from the 2022 pool (remaining tenor 7 years). The SGCs from the 2020 pool would not be eligible for gifting as the remaining tenor is less than a year.

(b) Transfer Processing - The SGCs selected for gifting are transferred into an escrow account and a corresponding deduction is made from the Gift Giver's account. A notification is sent to the Gift Receiver along with a code asking them to accept the gift. As soon as the Gift Receiver accepts the gift, the gifted SGCs get transferred from the escrow account to the Receiver's account with the transaction being recorded in the blockchain ledger; a notification is also sent to the Gift Giver. In case the gift is not accepted within 30 days, the SGCs revert to the Gift Giver from the escrow account and no change is made to the blockchain ledger.

Custom Gifting Experiences - Partnerships

Over time Sacred Groves aspires to create custom gift experiences with partners on their e-commerce platforms. These gift experiences are likely to have unique designs and messaging that is customised and unique to the partners. White label opportunities will also be explored as per partner requirements. The range of partners could vary from e-commerce platforms, celebrities, sports teams, events, etc.

Fees & Charges

At present, no Transfer Fee is being charged for gifting SGCs. The Sacred Groves reserves the right to introduce a nominal Transfer Fee once the platform achieves critical mass.