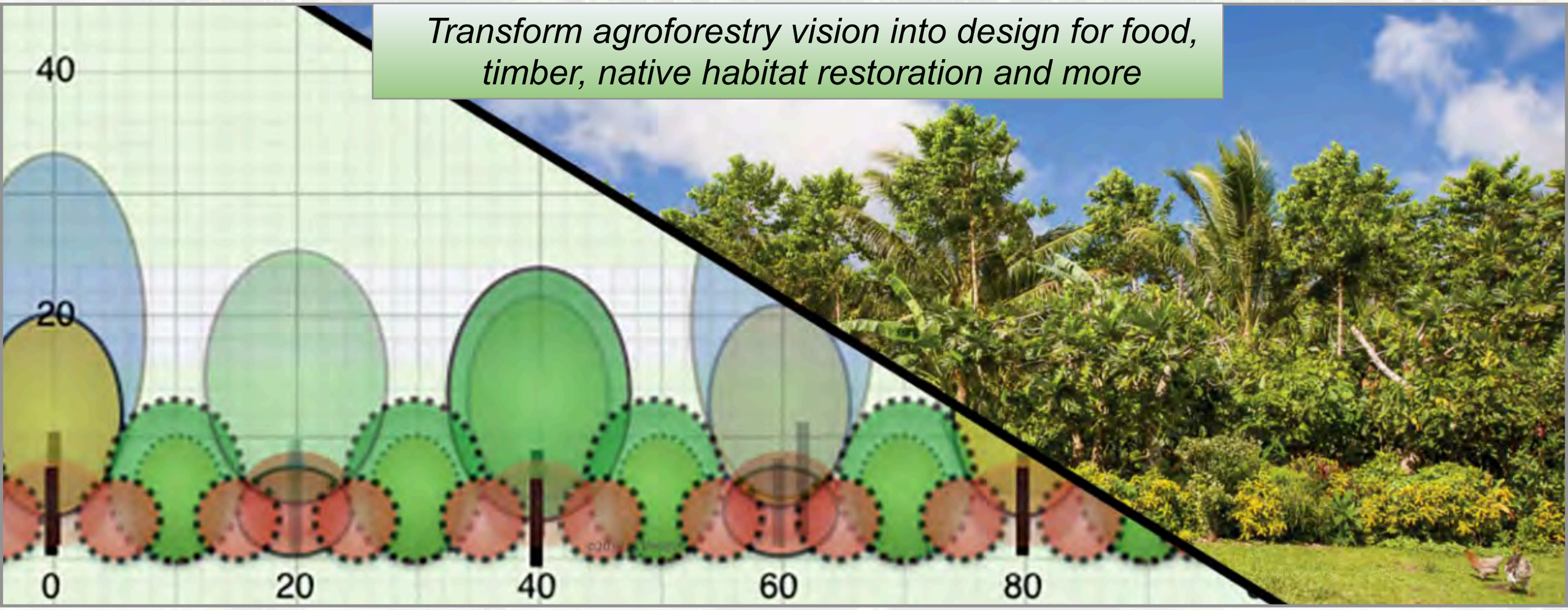
AgroforestryX

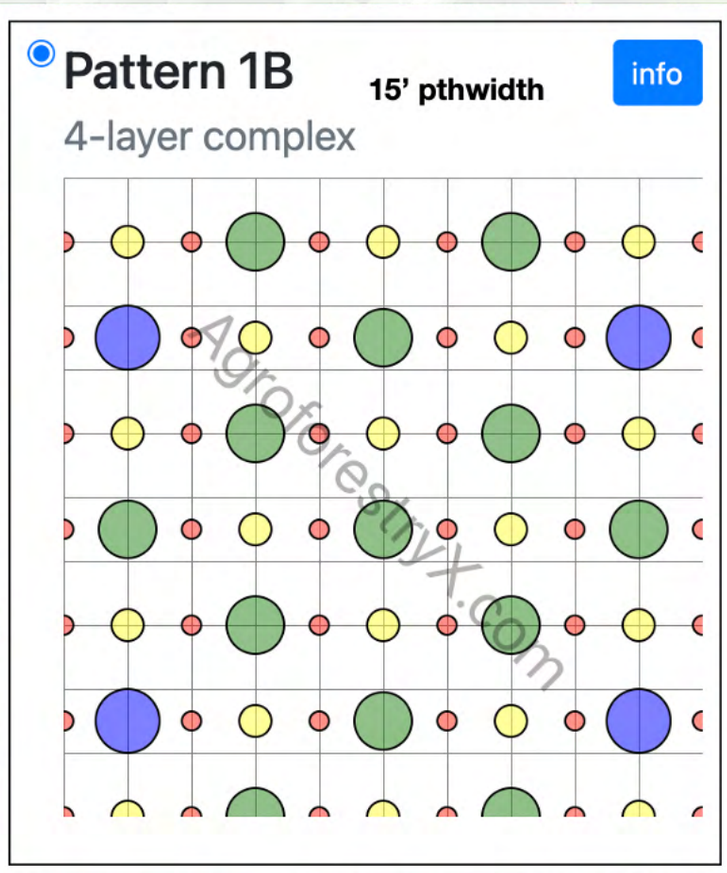
Transform agroforestry vision into design for food, timber, native habitat restoration and more

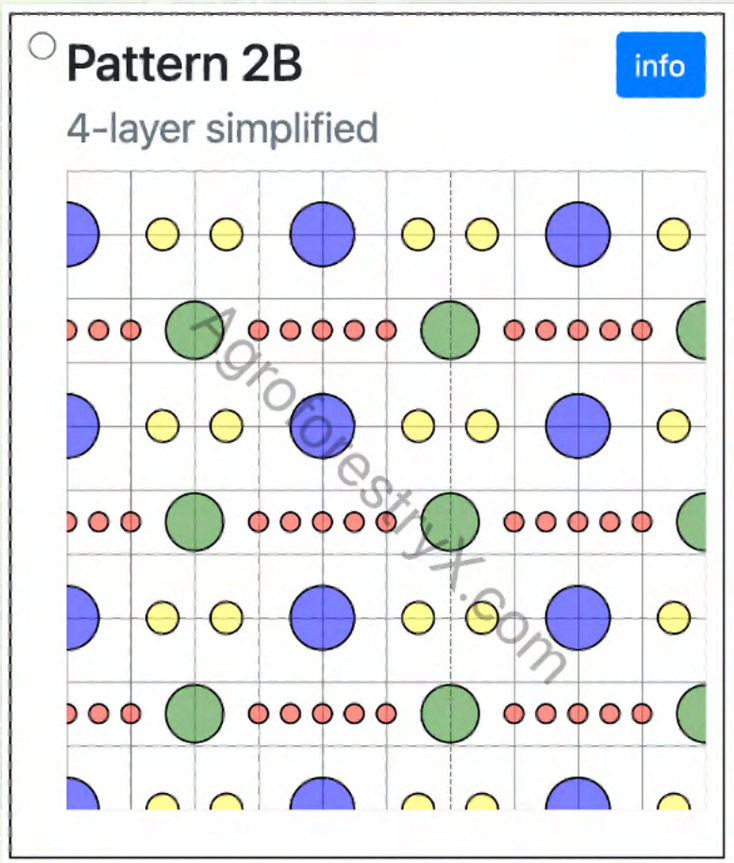


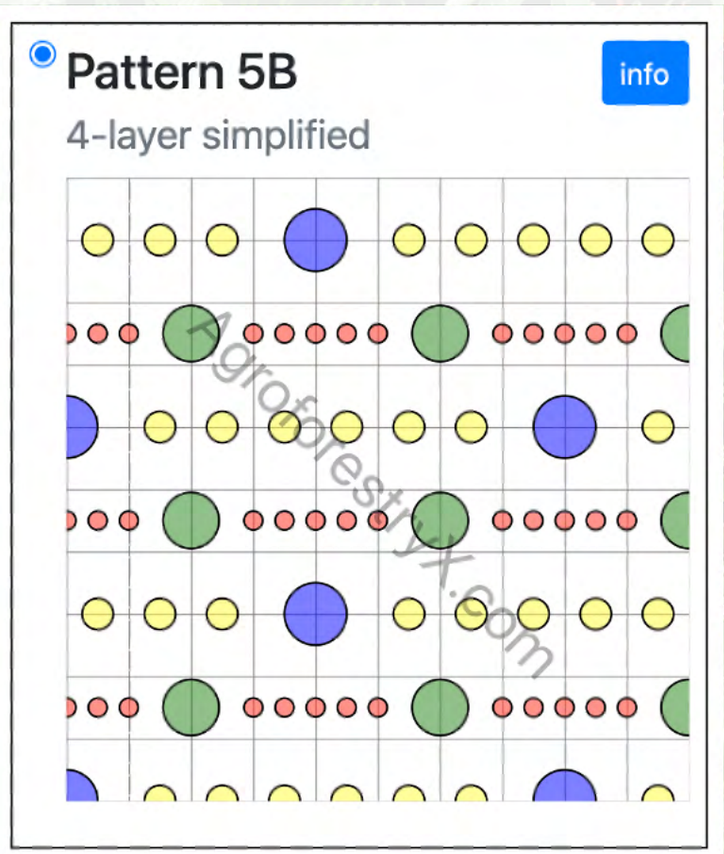
agroforestryX.com
info@agroforestry.com

AgroforestryX Tool Use Analysis

- 2000+ total projects created, Jan. 2021 - Jan. 2023
- Most projects < 2.5 acres
- Designs cover ~ 8.5+ M acres
- Most projects created outside US-Affiliated Pacific Islands
- Patterns 1B, 2B, and 5B are most popular, all 15’ pathwidth







Benefits of Regenerative Multi-story Agroforestry

Regenerate soils with minimal inputs

Increased biodiversity & food security

Diversified production

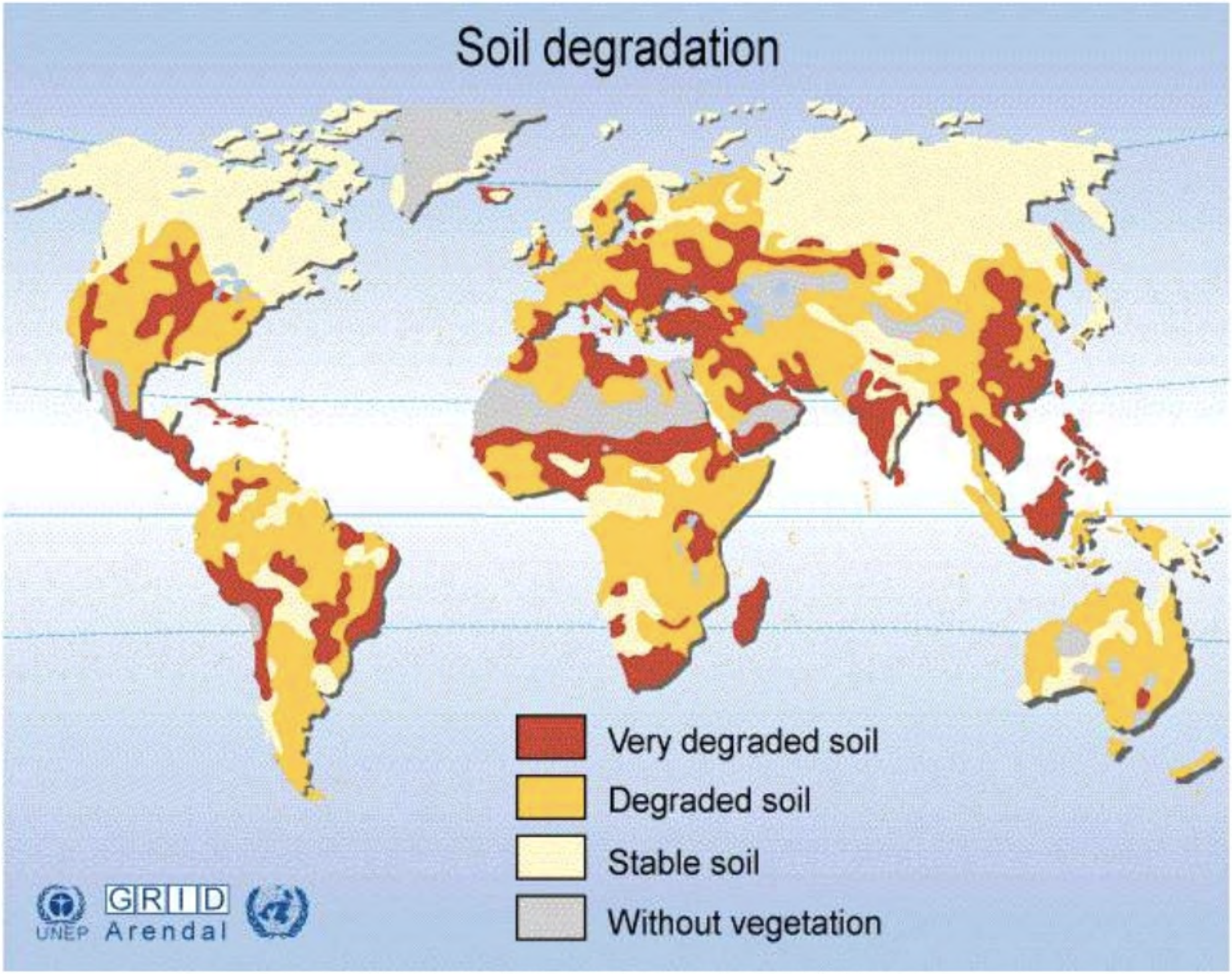
Improved climate resiliency

Improved ground water infiltration & storage

Increased soil organic matter

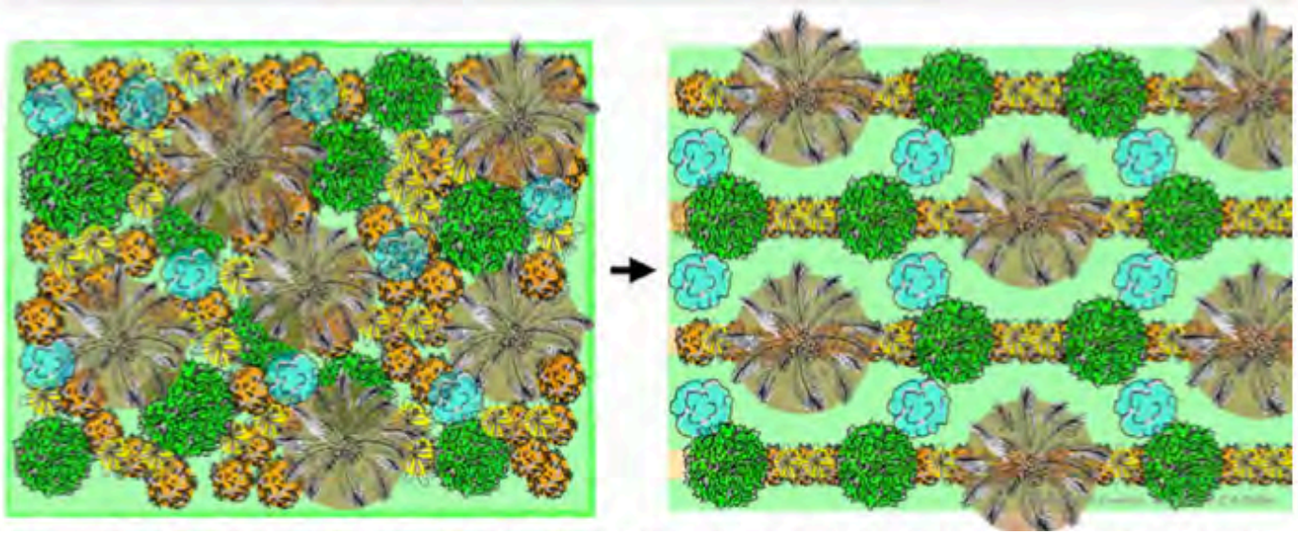
Reduced costs of conservation & habitat restoration

AgroforestryX

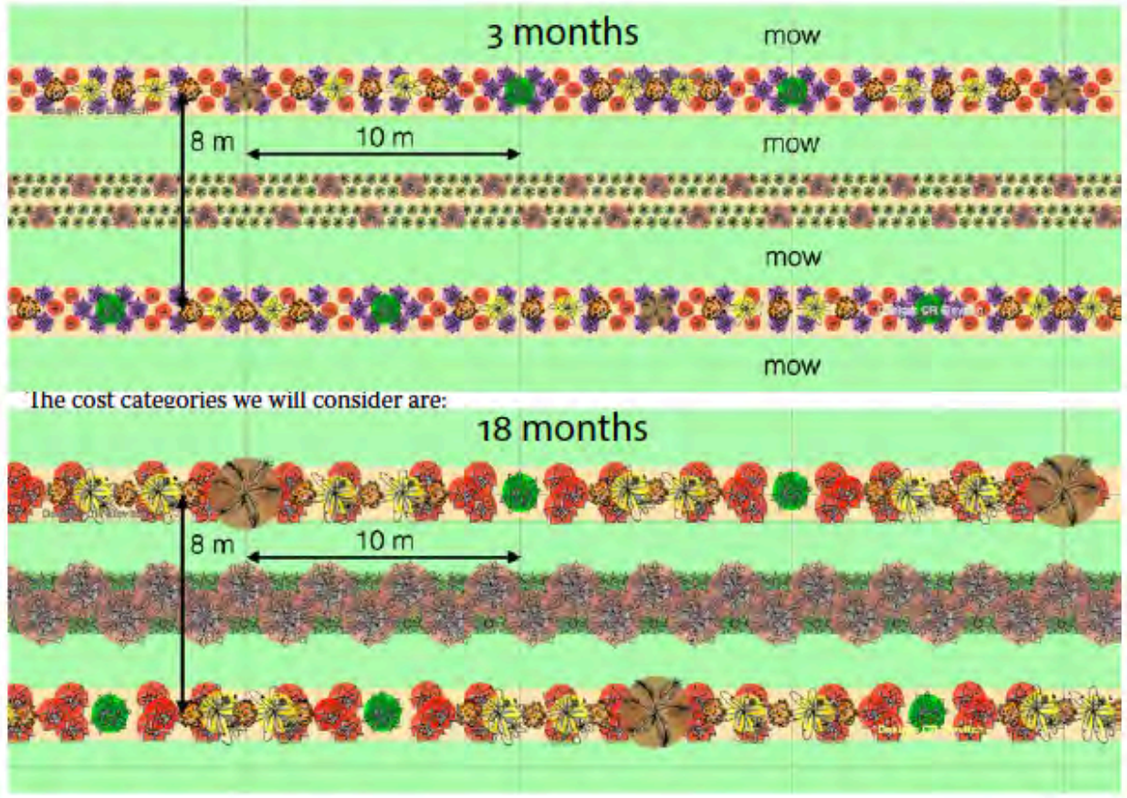


dr-david-montgomery-from-dirt-to-regenerating-our-soils-2-1024.jpeg

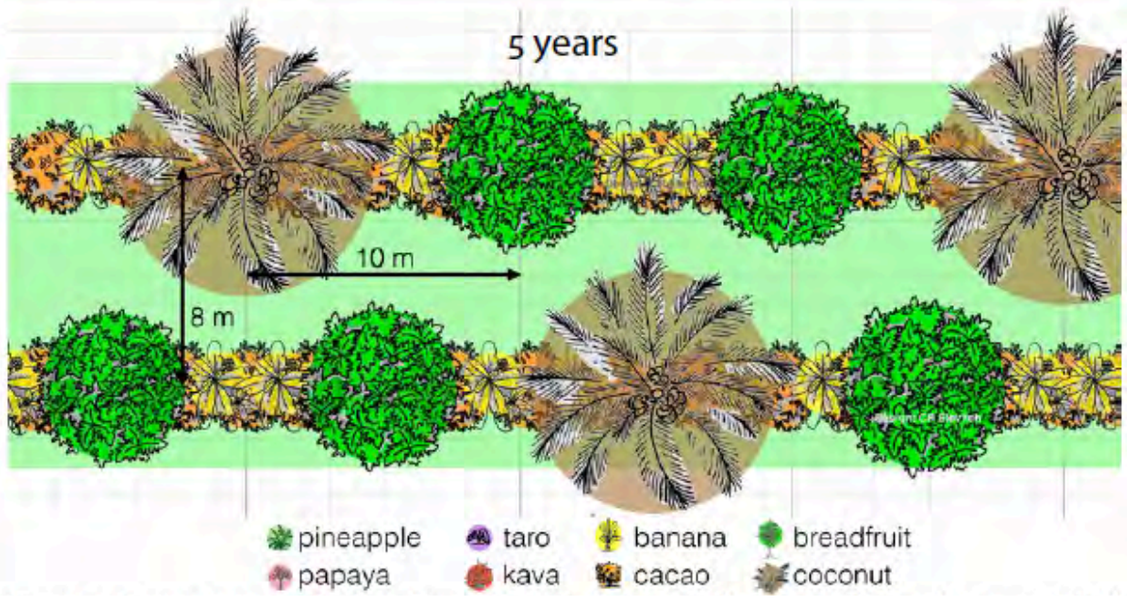
Optimize System Design - Spatial Relationships



Organizing the species into rows allows for systemic planning, management, and access pathways. (illustrations: C. Elevitch)



The cost categories we will consider are:



An 8-crop example planting layout illustrated at 3 months, 18 months, and 5 years. (illustrations: C. Elevitch)

AgroforestryX

Multistory Stratification Concept

Imperial Units

Layers of the multistory agroforest design.

Standard Dimensions

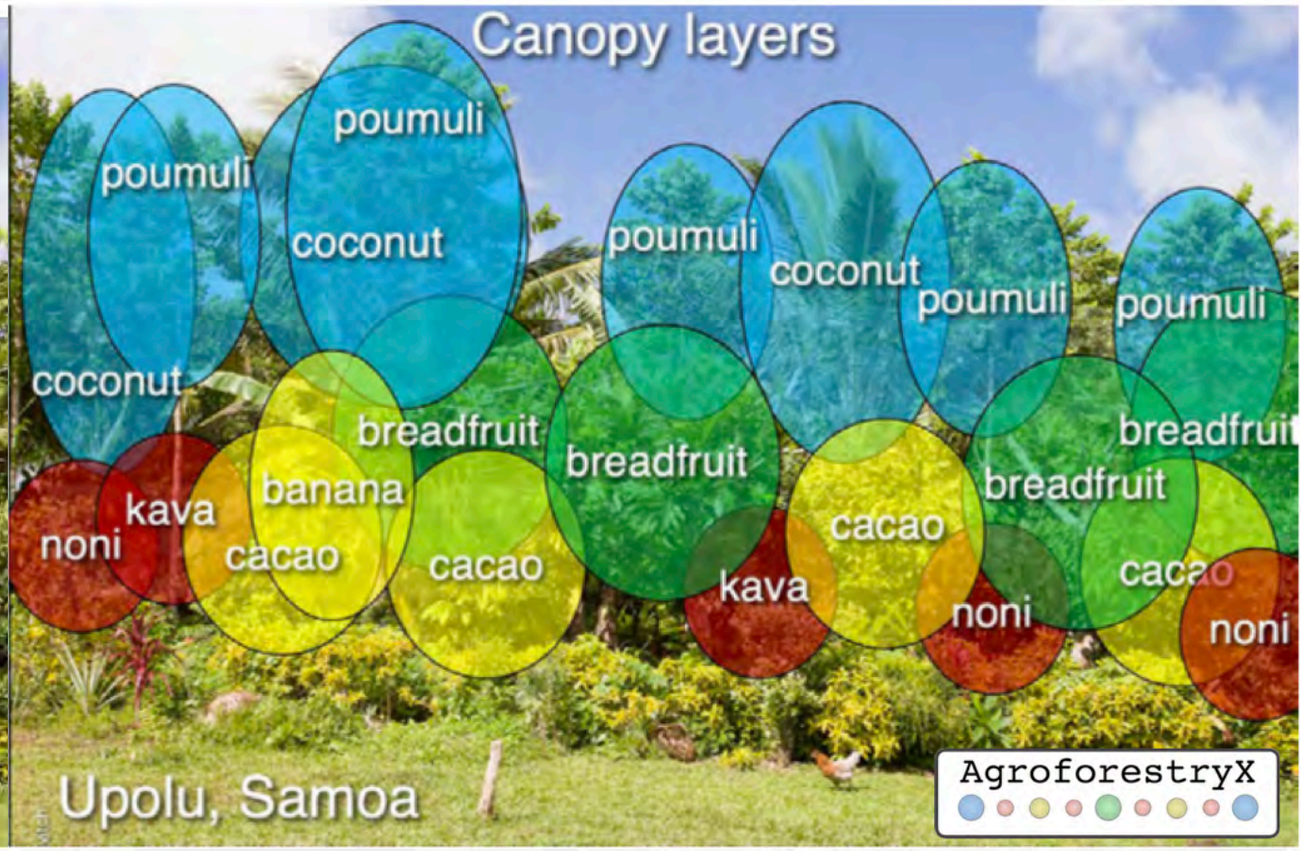
Height ranges of the various layers and their icon colors illustrated in the planting patterns in this tool.

Stratum (layer height class)	Icon color	Light requirements	Long-term species (4+ years)	Medium-term species (0–4 years)	Short-term species (0–2 years)
			L	M	S
Emergent		Full sun	40+ ft	12+ ft	not illustrated
High		≈80% sunlight	≈18-40 ft	≈6–12 ft	not illustrated
Medium		≈60% sunlight	≈10-20 ft	≈4–8 ft	not illustrated
Low		≈40% sunlight	≈2-12 ft	≈2–6 ft	not illustrated
Ground	not illustrated	20-80% depending on location relative to trees	—	—	—

AgroforestryX

Stratification of Canopy Layers

This indigenous multistory agroforestry system is representative of traditional systems throughout the Pacific Islands.



The AgroforestryX design tool uses such systems as models for planning modern agroforestry.

AgroforestryX

Benefits of AgroforestryX Design Tool

- Simplified installation protocol
- Expedite project development
- Match species with environment
- Design for regenerative outcome
- Schedule canopy stratification management
- Visualize project in 2D & 3D over 15 years
- Print project summary PDF, XLS

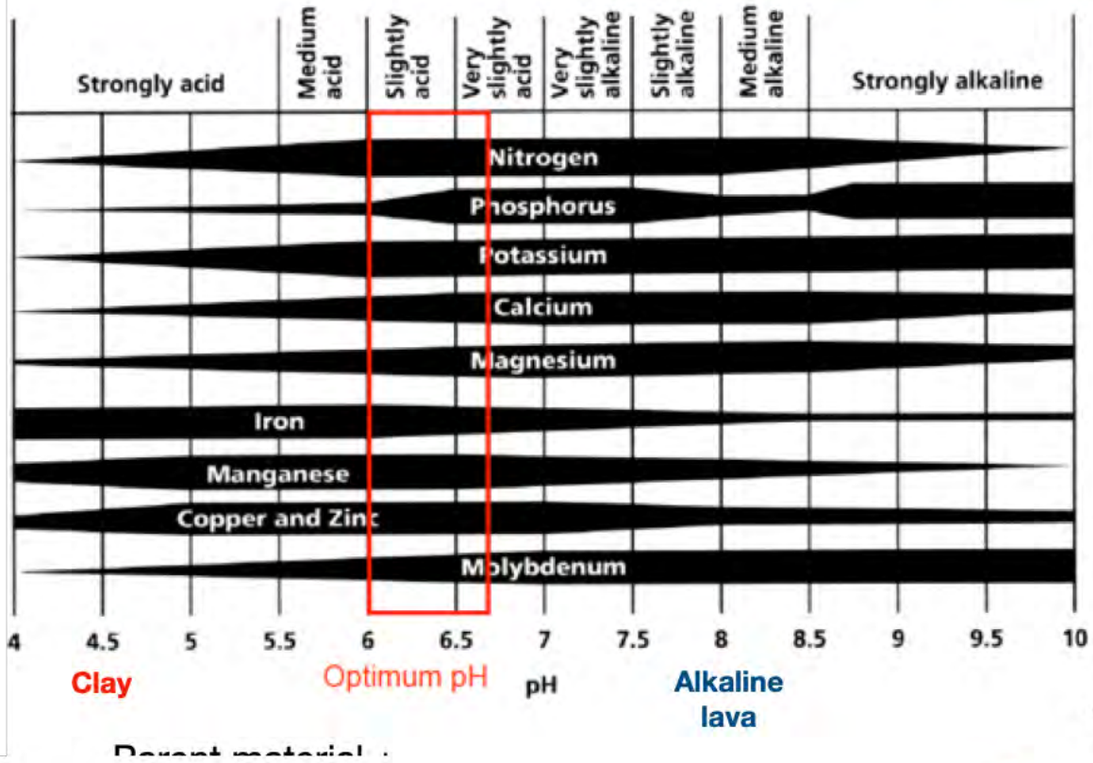
AgroforestryX

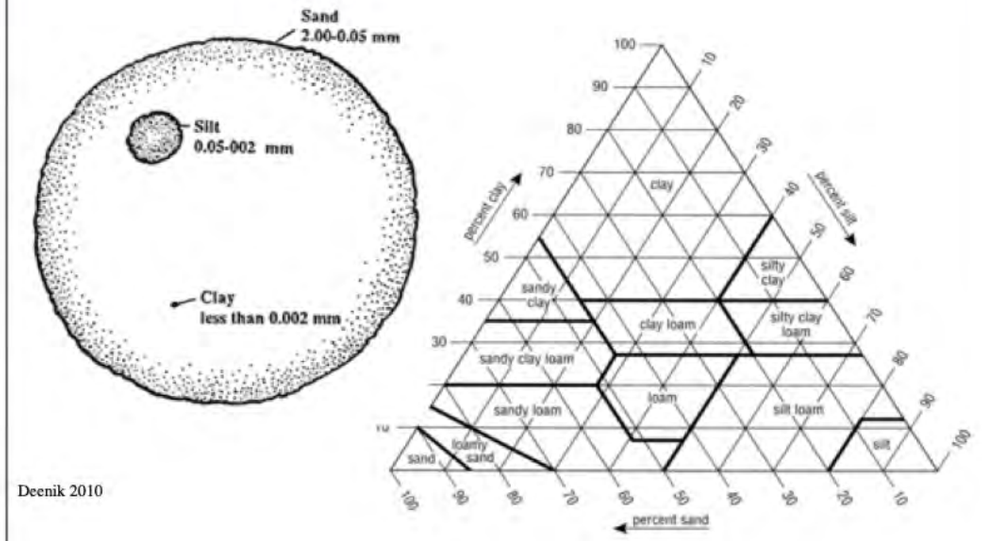
AgroforestryX Design Tool Workflow

AgroforestryX

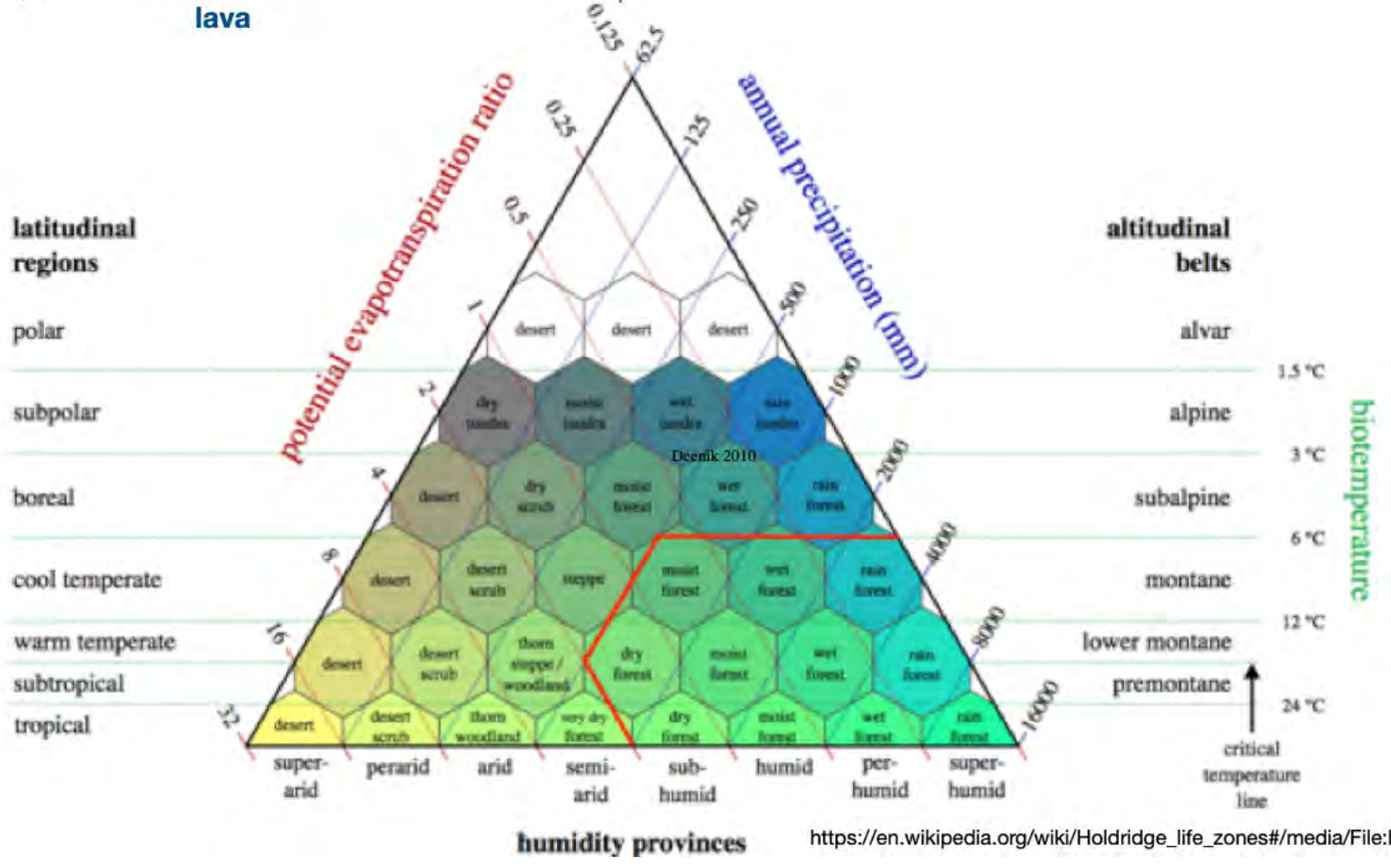
AgroforestryX – PRVI Conservation Agroforestry Project

Determining Species Assemblage: Rock Composition Particle Size, and Geolocation





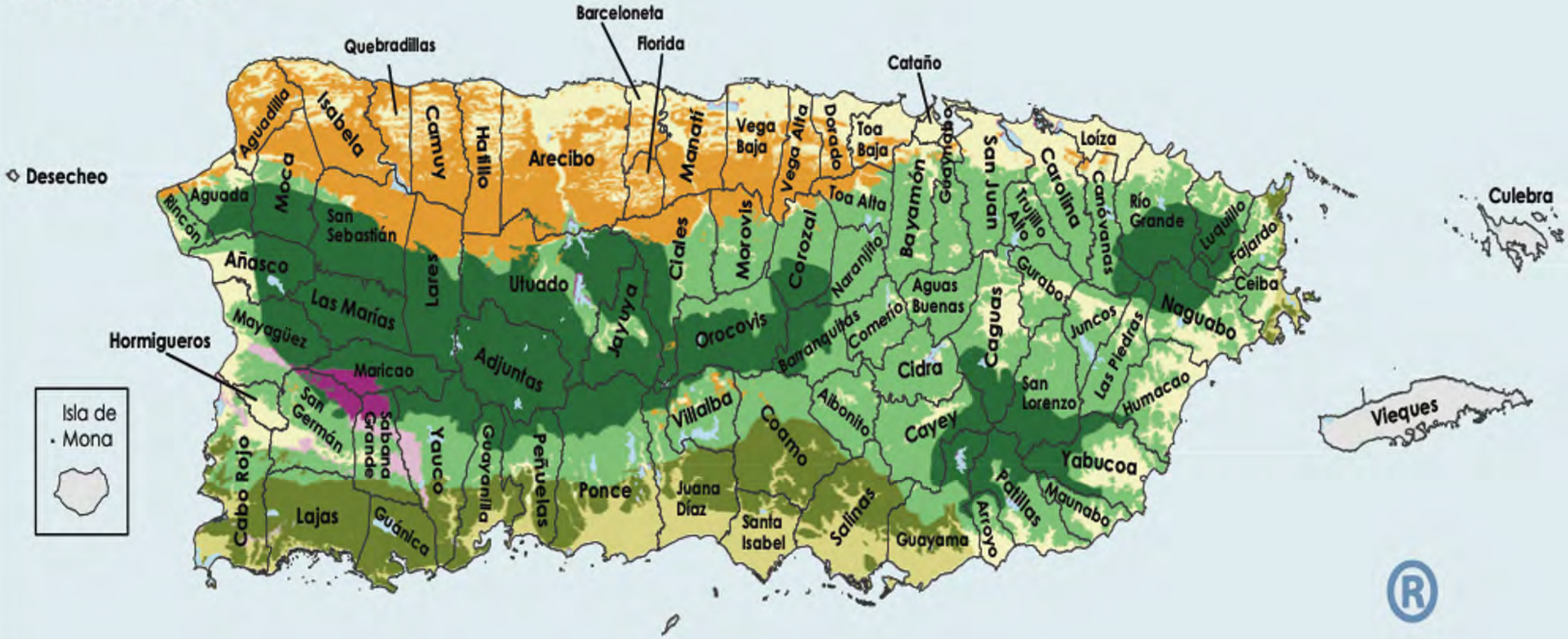
Deenik 2010



Deenik 2010

https://en.wikipedia.org/wiki/Holdridge_life_zones#/media/File:Lifezones_Pengo.svg

Puerto Rico



Zonas de Vida y Aspectos Geomorfológicos de Puerto Rico (Helmer, 2002)

- Aluvial—seco
- Caliza/Sedimentaria/Volcánica—seco
- Serpentina—seco/húmedo
- Aluvial—húmedo
- Caliza del Norte—húmedo/muy húmedo
- Sedimentaria/Volcánica—húmedo
- Serpentina—muy húmedo/pluvial montano bajo
- Volcánica/Sedimentaria/Aluvial—Muy Húmedo/pluvial montano bajo
- No data
- Cuerpos de agua y embalses
- Municipios

Puerto Rico

Océano Atlántico

Desecheo

Barceloneta
Florida
Quebradillas
Cataño
Aguadilla
Isabela
Camuy
Hatillo
Arecibo
Manatí
Vega Baja
Vega Alta
Dorado
Toa Baja
San Juan
Loíza
Carolina
Canóvanas
Río Grande
Luquillo
Fajardo
Ceiba
Naguabo
Culebra
Aguada
Rincón
Moca
San Sebastián
Añasco
Lares
Las Marías
Mayagüez
Hormigueros
Maricao
 Utuado
Jayuya
Ciales
Morovis
Corozal
Toa Alta
Naranjito
Bayamón
Guaynabo
Trujillo Alto
Gurabo
Aguas Buenas
Caguas
Juncos
Las Piedras
Humacao
Comerío
Barranquitas
Orocovis
Adjuntas
Cidra
San Lorenzo
Yabucoa
Maunabo
Vieques
Isla de Mona
San Germán
Sabana Grande
Yauco
Guayanilla
Peñuelas
Ponce
Villalba
Coamo
Juana Díaz
Santa Isabel
Salinas
Guayama
Arroyo
Patillas
Albonito
Cayey
Cabo Rojo
Lajas
Guánica

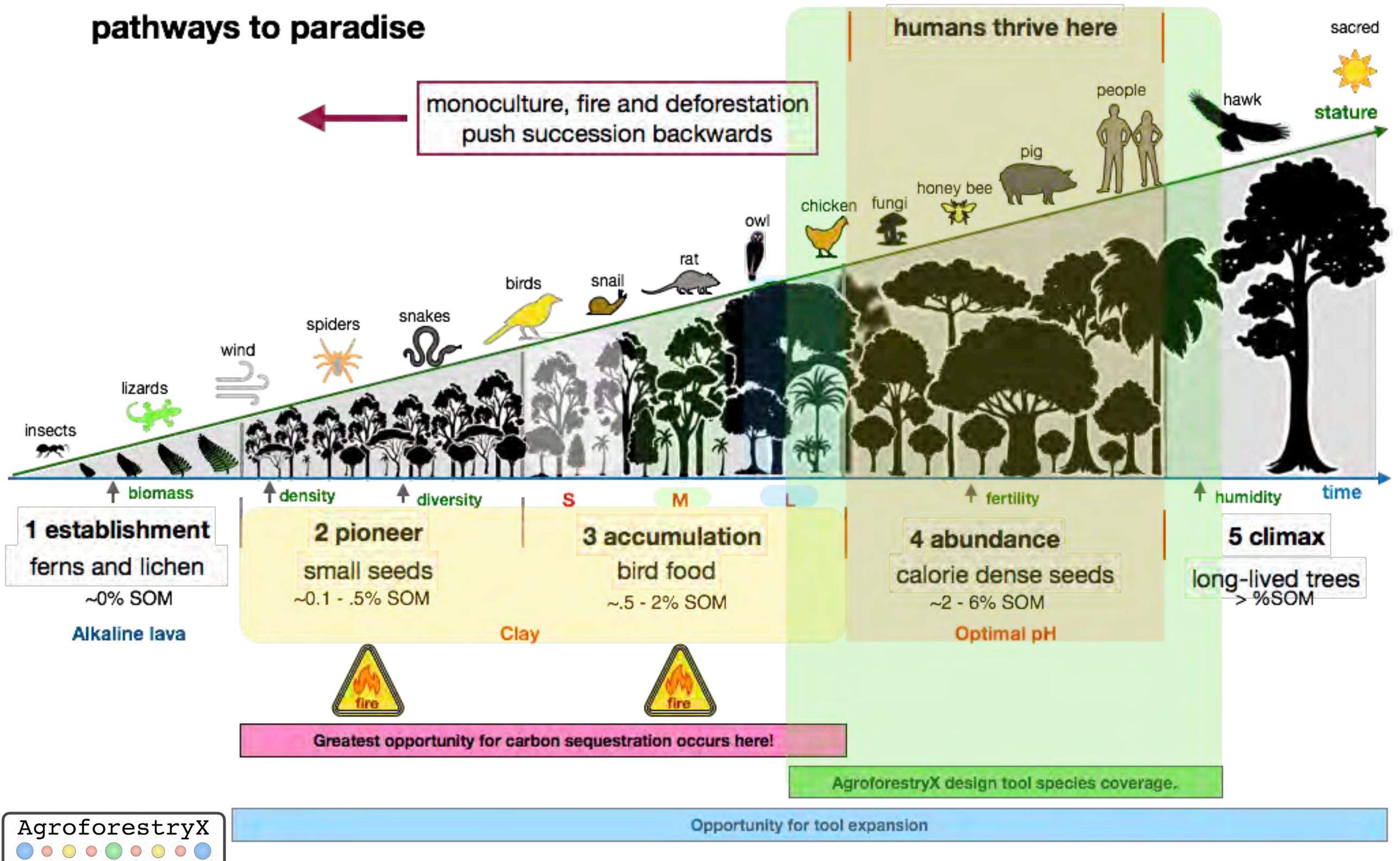
Mar Caribe

Zonas de vida

0 10 20 40
km

- Bosque seco subtropical
- Bosque húmedo subtropical
- Bosque muy húmedo subtropical
- Bosque muy húmedo montano bajo
- Bosque pluvial subtropical
- Bosque pluvial montano bajo
- Municipios

Species Succession in the Agroecosystem



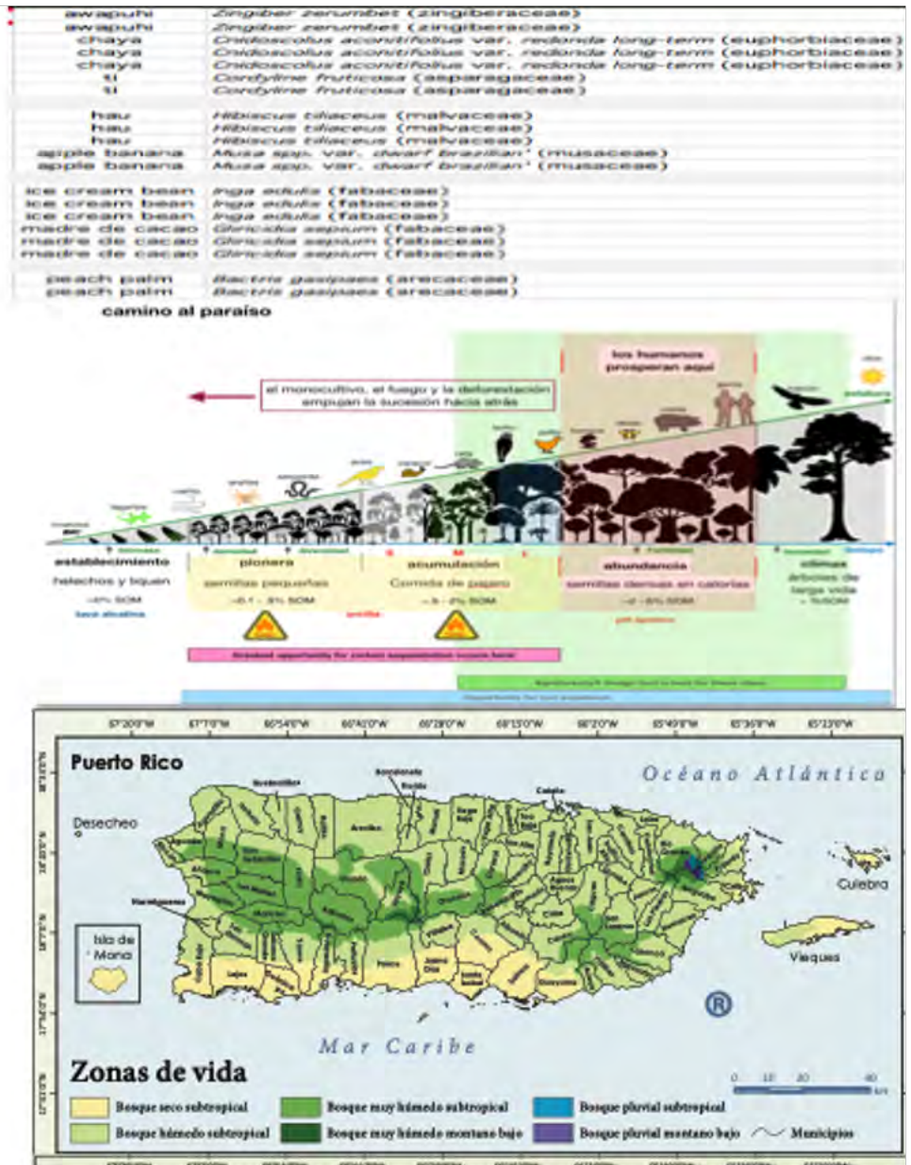
Steps to Building the Conservation Agroforestry Dataset

Conservation of target fauna + tree species assemblage

Step in succession analog agro-ecosystem

Biome (plant community/life zone)

Geomorphology, parent material (soil composition)



AgroforestryX

Initiating Projects with AgroforestryX

Enter your project details

Project Details | Pattern | Species | Pruning | Visualization | Animations | Summary

What would you like to call your project?

My Project

Enter a descriptive name for your project.

Where is your project occuring?

If located in the U.S-affiliated Pacific Island, select the island from the drop-down list. If located elsewhere, select "Any" from the drop-down list and you will be presented with a general list of species found in most tropical areas.

Any

How much rain falls each year?

90 in/year

Note that average rainfall should be entered. Select inches or millimeters per year.

How well does the soil in the project area drain?

This choice allows you to narrow your species search by how well drained your field is.

Medium

Select "Well" for freely draining soils, "Medium" for slowly draining soils, "Poor" for poorly draining soils, and "Any" to allow species for all different soil drainage qualities.

What is the topography of the project area?

This choice allows you to narrow your species search by the topography of your field. Please consult with experts on species choice for highly sloped and erodible lands.

Flat to gently sloped (0-10%)

Select "Rise" for hilltops and ridges that water sheds away from, "Basin" for valleys where water drains to, "Flat to gently sloped (0-10%)" for relatively flat areas, "Sloped (10-20%)" for steeper slopes, and "Any" to allow species for all different topographies.

At what elevation is your project?

1100 ft

Enter elevation above sea level. Select feet or meters.

How big is your project?

1 acres

Enter project size (minimum 10,000 sq. ft., 0.23 acre, or 0.093 hectare).

Standards compliance checker

- (•) No restrictions
- ( ) Assists with USDA NRCS-PIA "Mixed Agroforest" specification compliance. ?
- ( ) Assists with regenerative standard compliance (checks for minimum species diversity) ?

Assistance meeting regenerative standards

Proceed

For further information on the regenerative standard, please see Elevitch, Craig, D. Mazaroli, and Diane Ragone. 2018. "Agroforestry Standards for Regenerative Agriculture." Sustainability 10 (9): 3337. doi:10.3390/su10093337.

Manage many projects

Agroforestry Design Tool

agrcforestryx.com/projects

AgroforestryX | Home | Projects | Support | Logged in as Fluffy | Log out

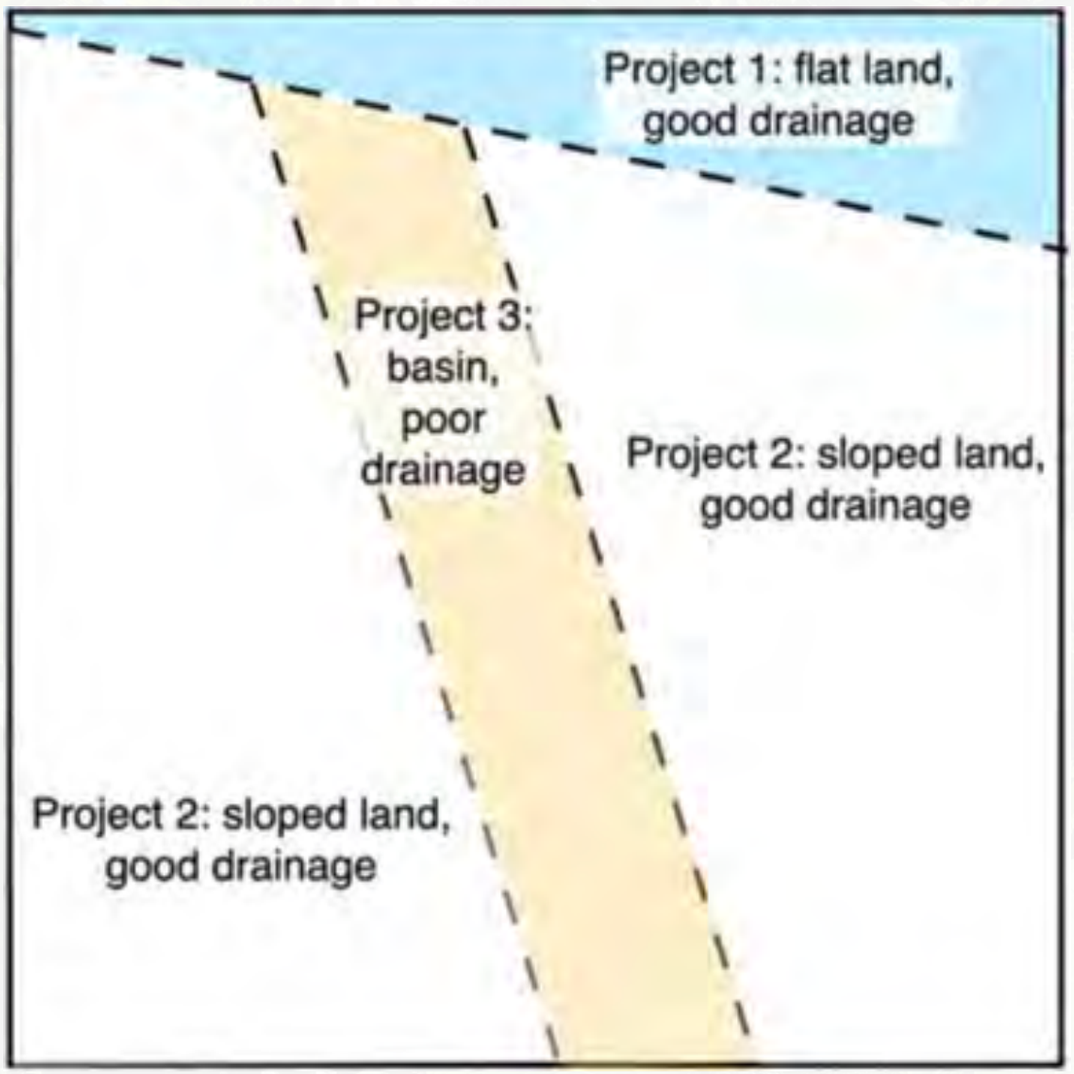
Projects

Name	Area (acres)	Location	Template	
Test1	2	Chuuk	Pattern 1B	Edit Delete
Demo	2.47	Any	Pattern 5B	Edit Delete
AfXDemoVid_1	10	Any	Pattern 1B	Edit Delete
Your Choice Test	1	Any	Pattern 1A	Edit Delete
Workshop 1	0.5	Hawaii	Pattern 5B	Edit Delete
USDA NRCS	1	Hawaii	Pattern 2B	Edit Delete
Workshop 2	1	Kauai	Pattern 1B	Edit Delete

New project

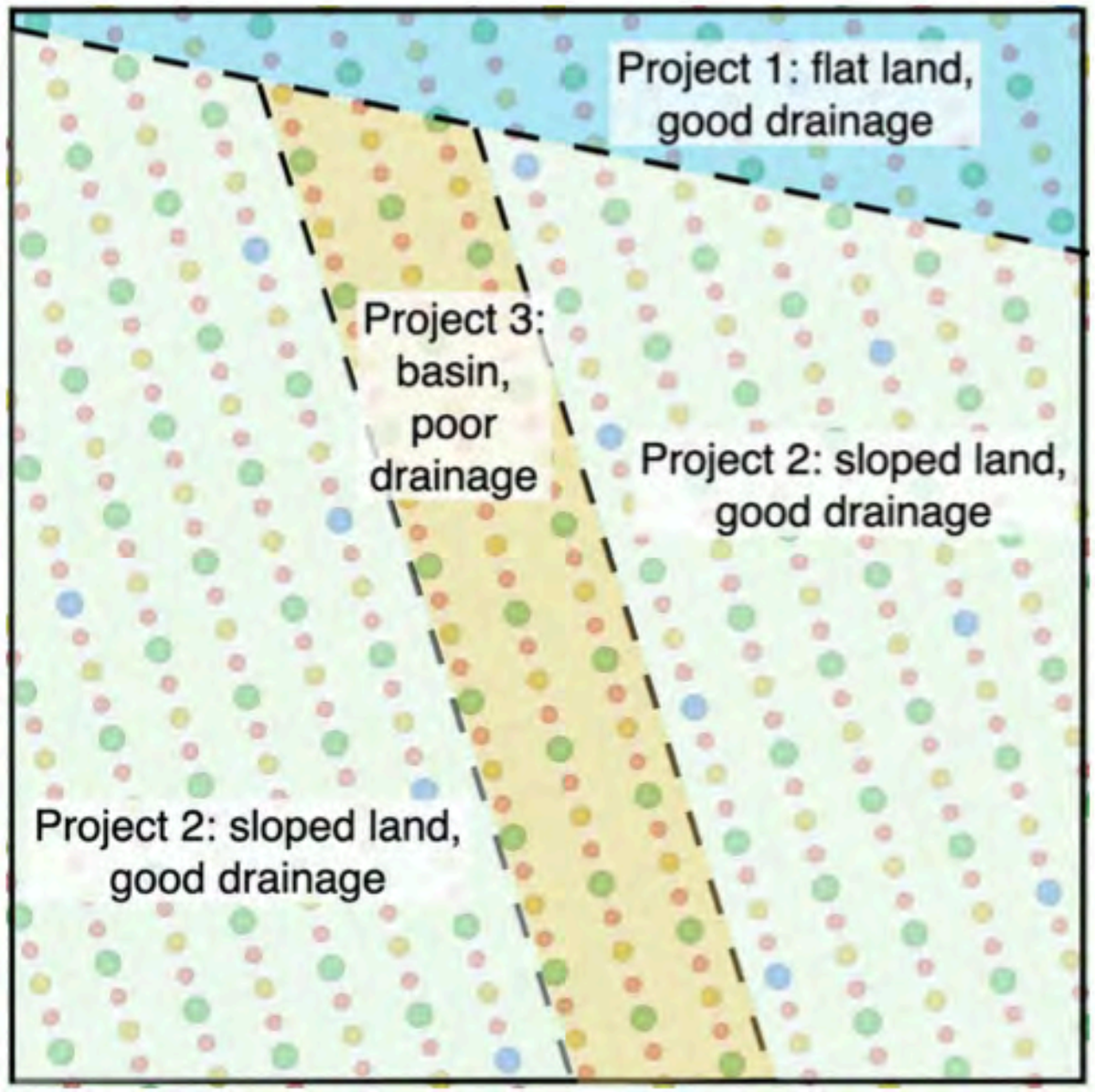
AgroforestryX

Customize for Site Conditions



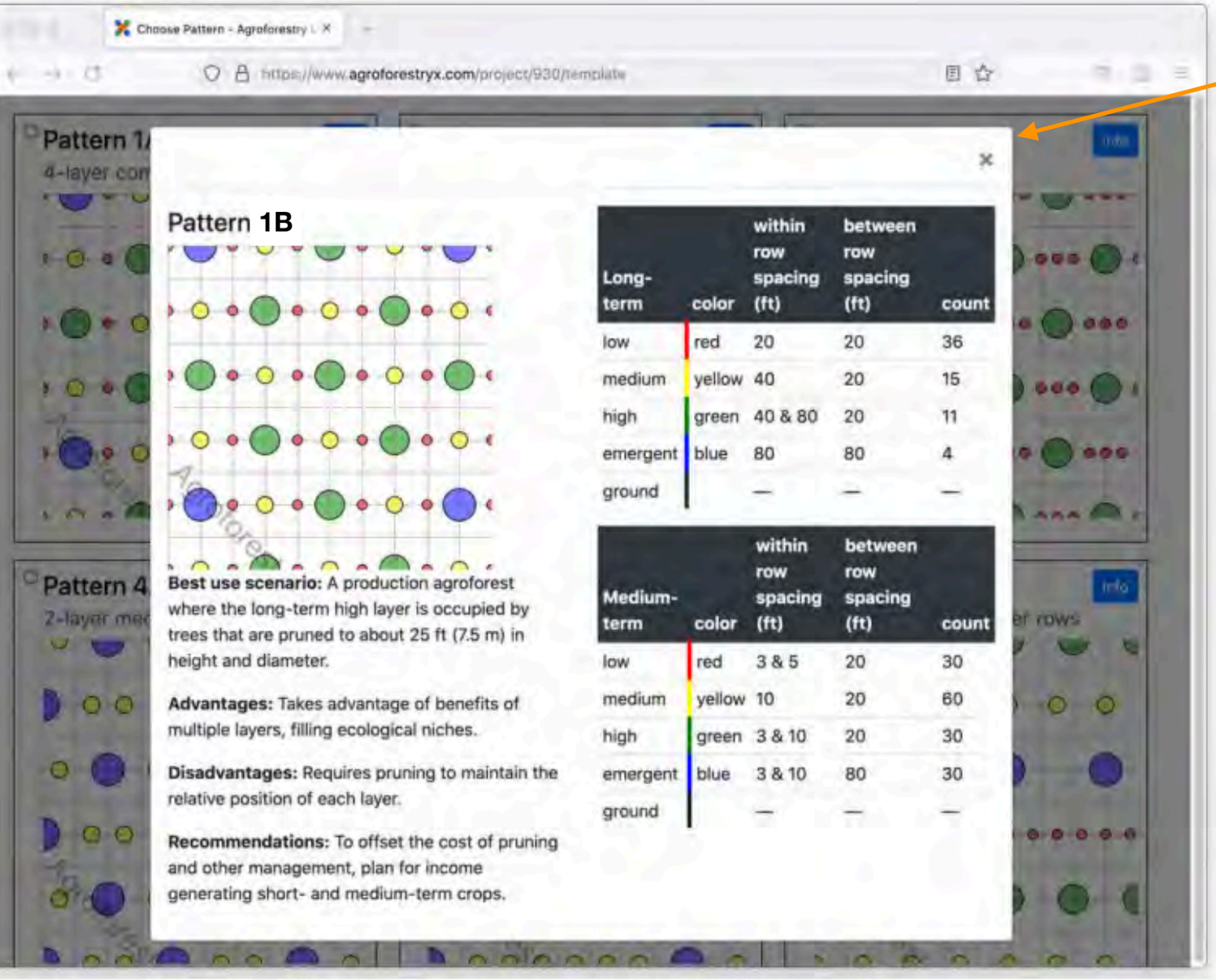
Project site topography and soil drainage

Project site topography with AgroforestryX design tool pattern applied.

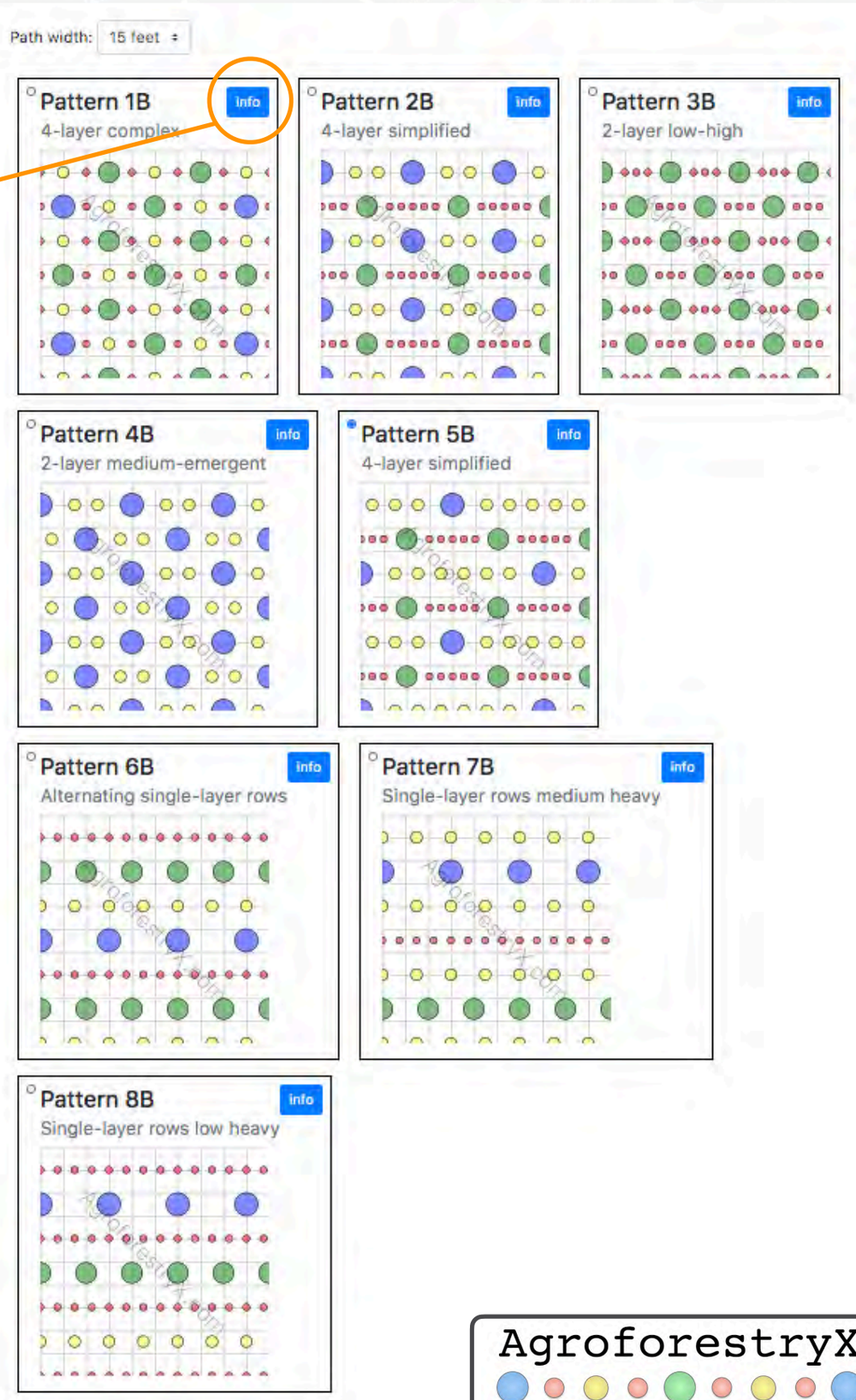


AgroforestryX

Selection of Planting Pattern & Spacing



Description of pattern selection



AgroforestryX

Selection of Species

From lists tailored to your project's unique parameters

Long-term species (4+ years)

Long-term low (≈2–12 ft) You may select up to 39 species. Expand Organisms

Long-term medium (≈10–20 ft) You may select up to 30 species. Expand Organisms

Long-term high (≈18–40 ft) You may select up to 9 species. Expand Organisms

Long-term emergent (40+ ft) You may select up to 6 species. Collapse Organisms

		Common name	Scientific name and family	Habit	Time to removal (years)	Propagation method	Uses
☐		african mahogany	*Khaya senegalensis* (Meliaceae)	Tree	75	seed, suckers	medicine, timber, oil
☑		australian red cedar	*Toona ciliata* var. *australis* (Meliaceae)	Tree	100	seed	timber
☐		betel-nut, betel-nut palm	*Areca catechu* (Arecaceae)	Palm	60	seed	medicinal
☐		blue marble	*Elaeocarpus angustifolius* (Elaeocarpaceae)	Tree	100	seed	timber

Medium-term species (up to 4 years)

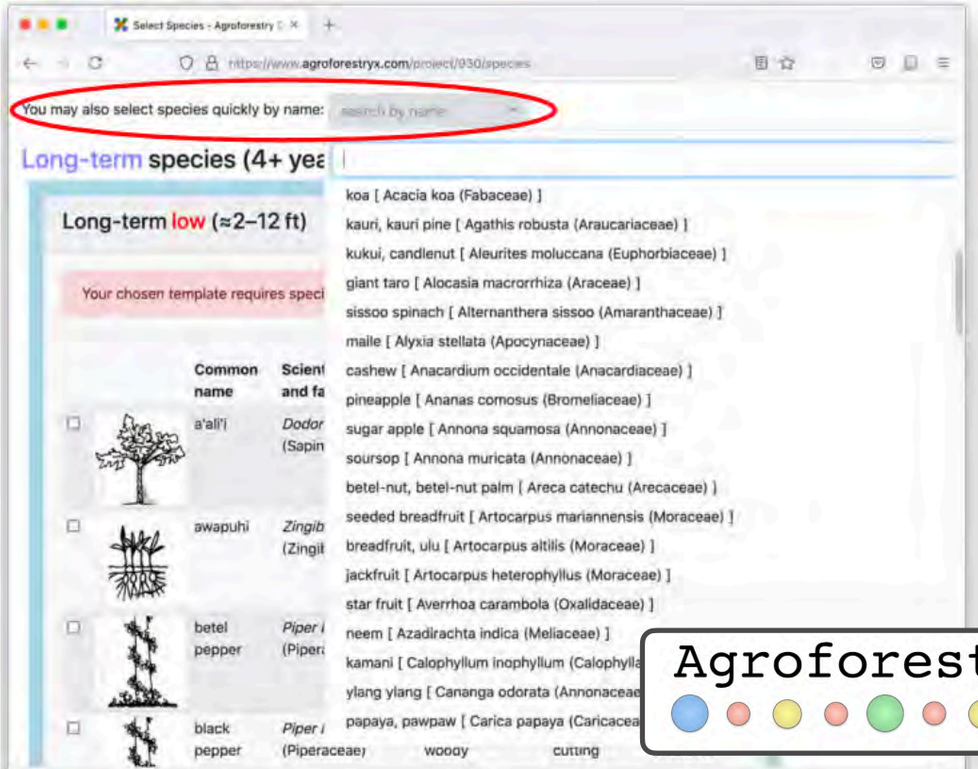
Medium-term low (≈2–6 ft)

Your chosen template does not utilize species in this term/stratum combination.

Medium-term medium (≈4–8 ft) You may select up to 10 species. Expand Organisms

Medium-term high (≈6–12 ft) You may select up to 38 species. Expand Organisms

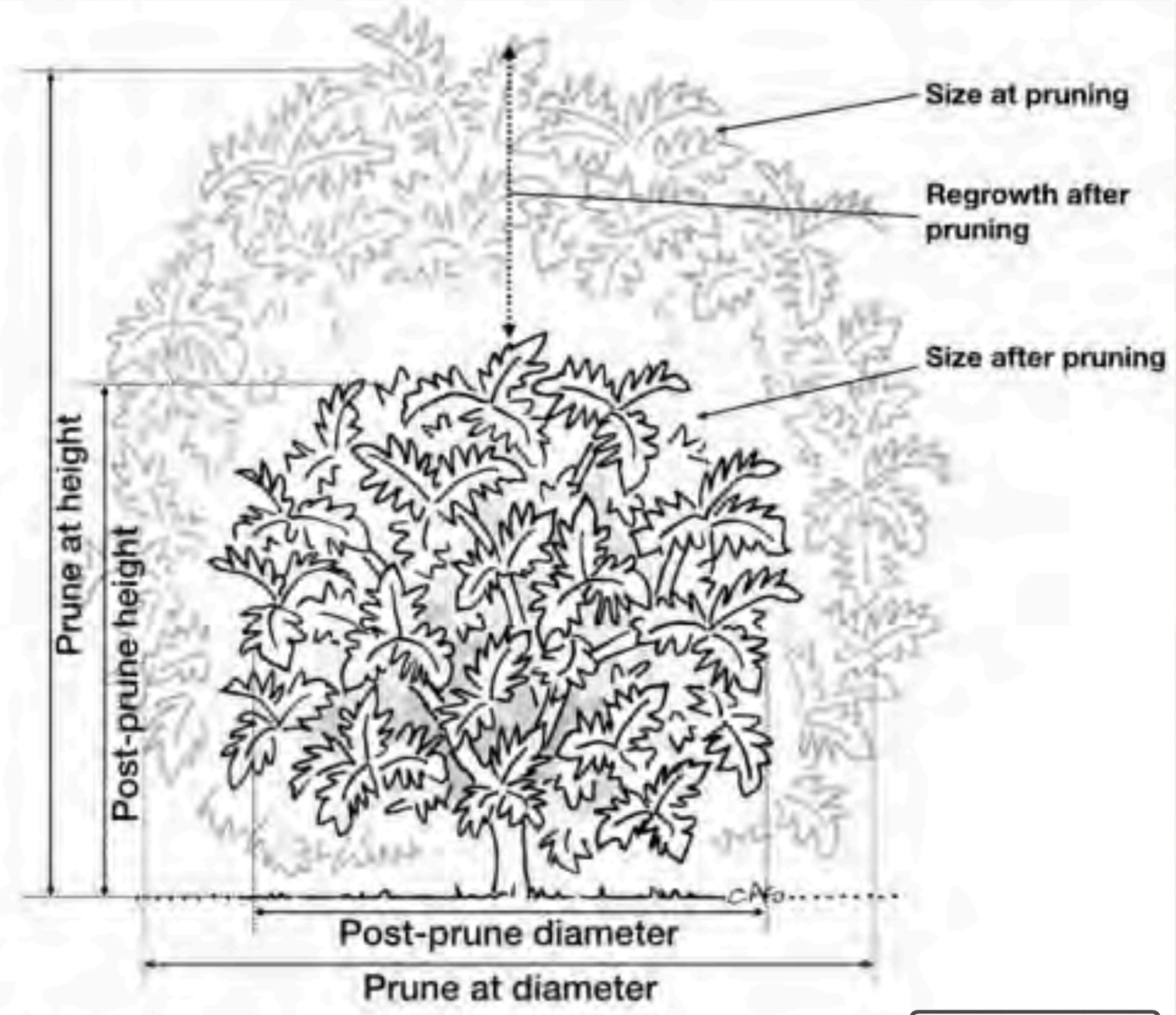
Medium-term emergent (12+ ft) You may select up to 15 species. Expand Organisms



AgroforestryX

Canopy Stratification Management Through Time

Optimize pruning dimensions



Guidance on pruning size parameters.

AgroforestryX

Pruning

Selected species for Long-term (4+ years)

Long-term low stratum (≈2–12 ft) (maximum 39 slots)

Name	Productive Lifespan (years)	Prune at height (feet)	Post-prune height (feet)	Prune at diameter (feet)	Post-prune diameter (feet)	# per 100ft×100ft
coffee *Coffea arabica*	100	12	6	6.25	3	39

Long-term medium stratum (≈10–20 ft) (maximum 30 slots)

Name	Productive Lifespan (years)	Prune at height (feet)	Post-prune height (feet)	Prune at diameter (feet)	Post-prune diameter (feet)	# per 100ft×100ft
cacao, cocoa *Theobroma cacao*	70	10	6	12.5	8	30

Long-term high stratum (≈18–40 ft) (maximum 9 slots)

Name	Productive Lifespan (years)	Prune at height (feet)	Post-prune height (feet)	Prune at diameter (feet)	Post-prune diameter (feet)	# per 100ft×100ft
breadfruit, ulu *Artocarpus altilis*	70	24	16	24	18	9

Long-term emergent stratum (40+ ft) (maximum 6 slots)

Name	Productive Lifespan (years)	Prune at height (feet)	Post-prune height (feet)	Prune at diameter (feet)	Post-prune diameter (feet)	# per 100ft×100ft
coconut (tall), niu *Cocos nucifera*	70	—	—	29.5	15	6

AgroforestryX

Visualize Canopy Changes

Initial Planting View | 3-Year View | 3-Year Side View | 10-Year View

Long-term plants

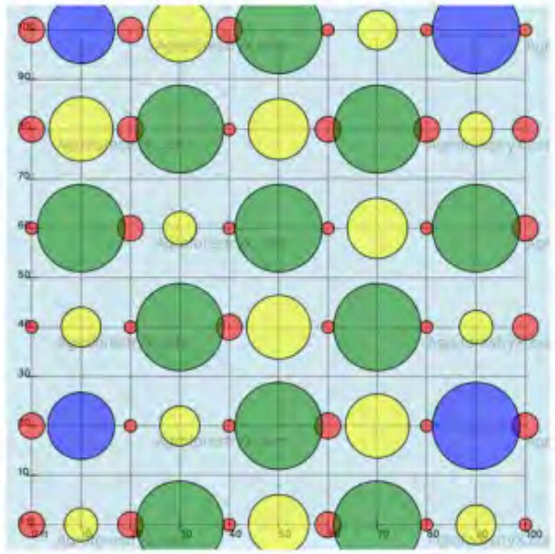
Stratum	% Cover Long-term
Low	3
Medium	10
High	23
Emergent	6
Total	43

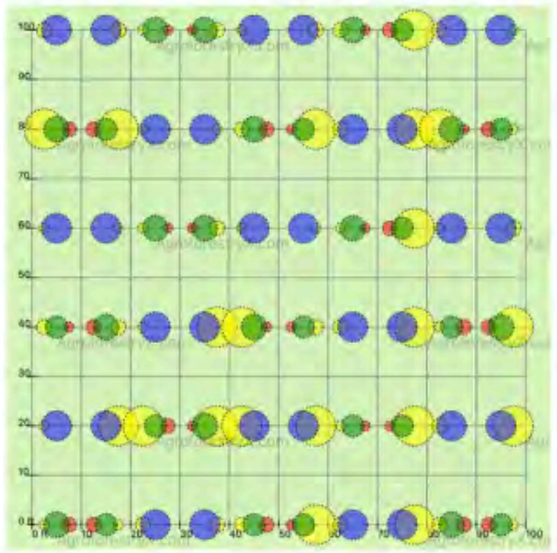
	color	in row spacing (ft)	between row spacing (ft)
low	red	20	20
medium	yellow	40	20
high	green	40 & 80	20
emergent	blue	80	80

Medium-term plants

Stratum	% Cover Medium-term
Low	1
Medium	11
High	5
Emergent	7
Total	24

	color	in row spacing (ft)	between row spacing (ft)
low	red	3 & 5	20
medium	yellow	10	20
high	green	3 & 10	20
emergent	blue	3 & 10	80





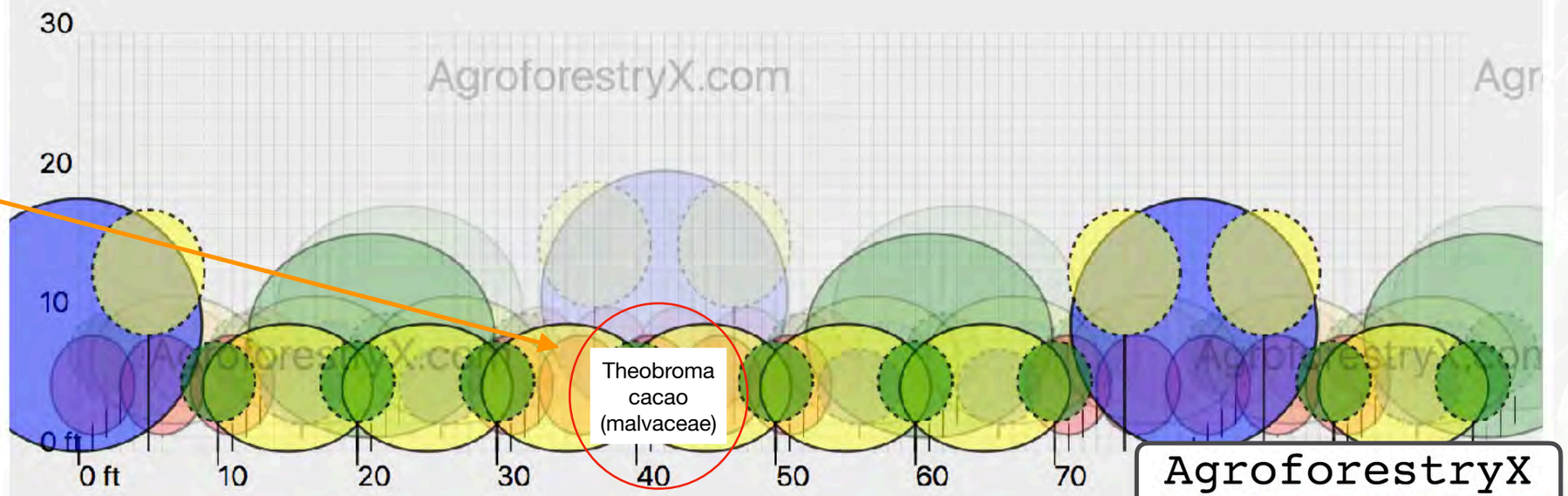
Track canopy coverage through time

b_sideview

planting pattern you have chosen at initial planting and at 3 and 10 years of age. Select a colored bar at the top to toggle between the initial
s.

Initial Planting View | 3-Year View | 3-Year Side View | 10-Year View

Species and Family appear upon cursor roll over



Proceed to animations

AgroforestryX

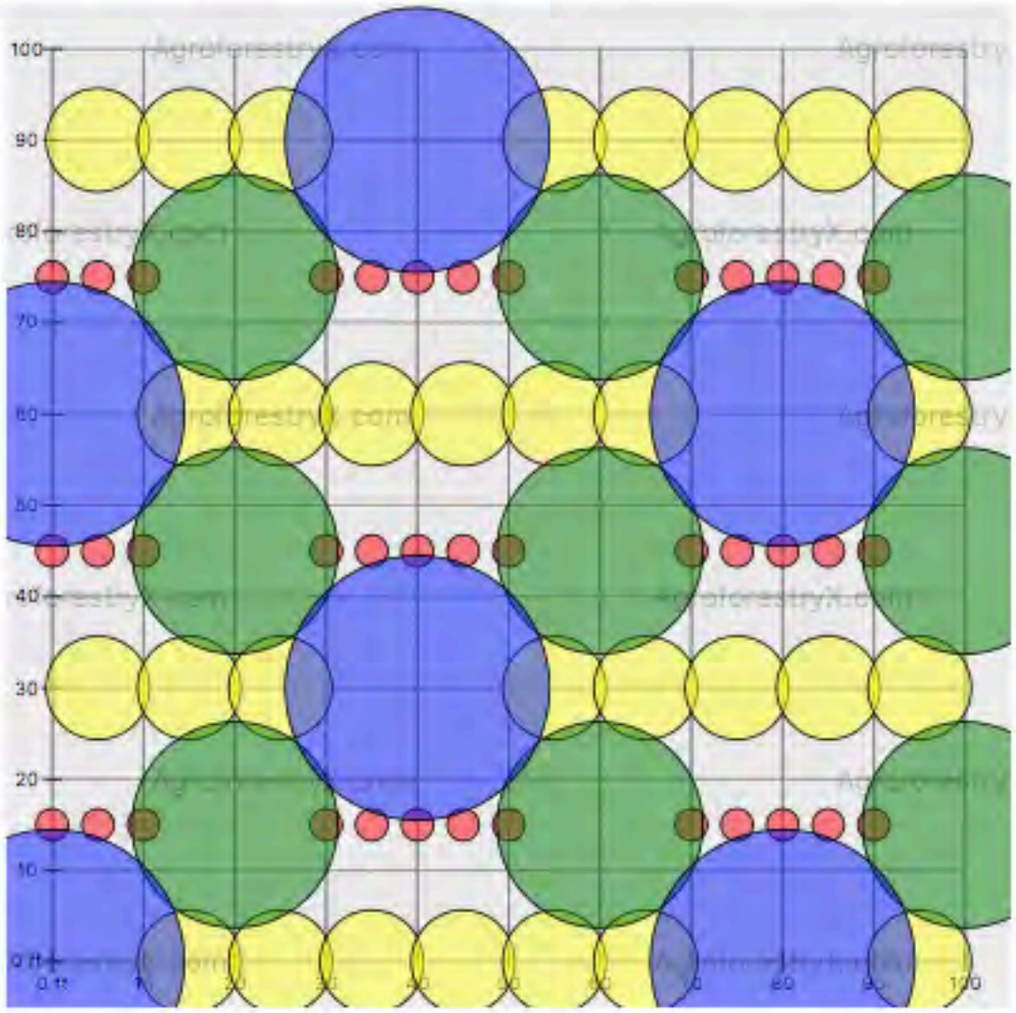
Project Animation: 2D

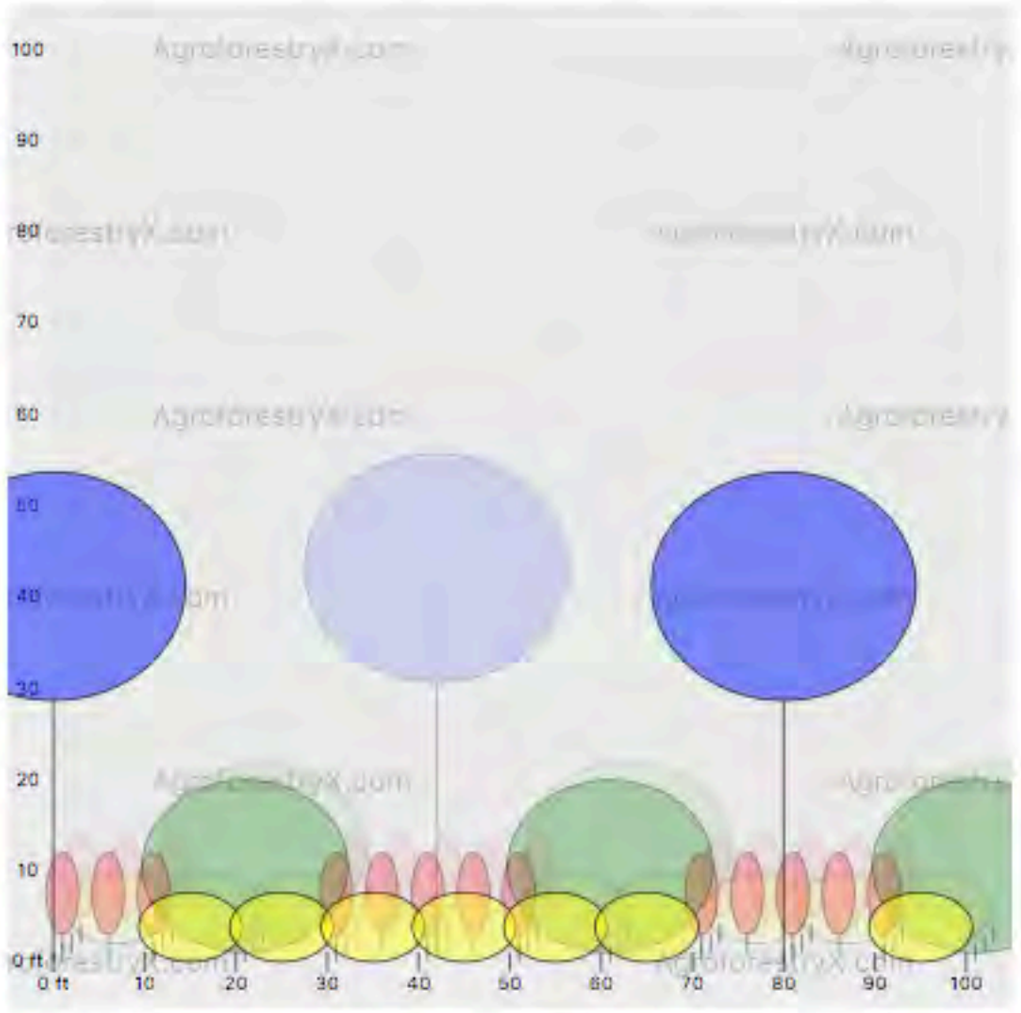
Project Details Pattern Species Pruning Visualization Animations Summary

Animations

Project Name: My Project
Location: Any
Rainfall: 90 inches/year
Drainage: Medium
Topography: Flat to gently sloped (0-10%)
Elevation: 1100 feet
Project size: 1 acres
Pattern: 5B (4-layer simplified)

The animation below shows estimated growth of your selected planting pattern and species over 15 years. This should be seen as a rough estimate of growth, as weather and other environmental factors will influence growth significantly.



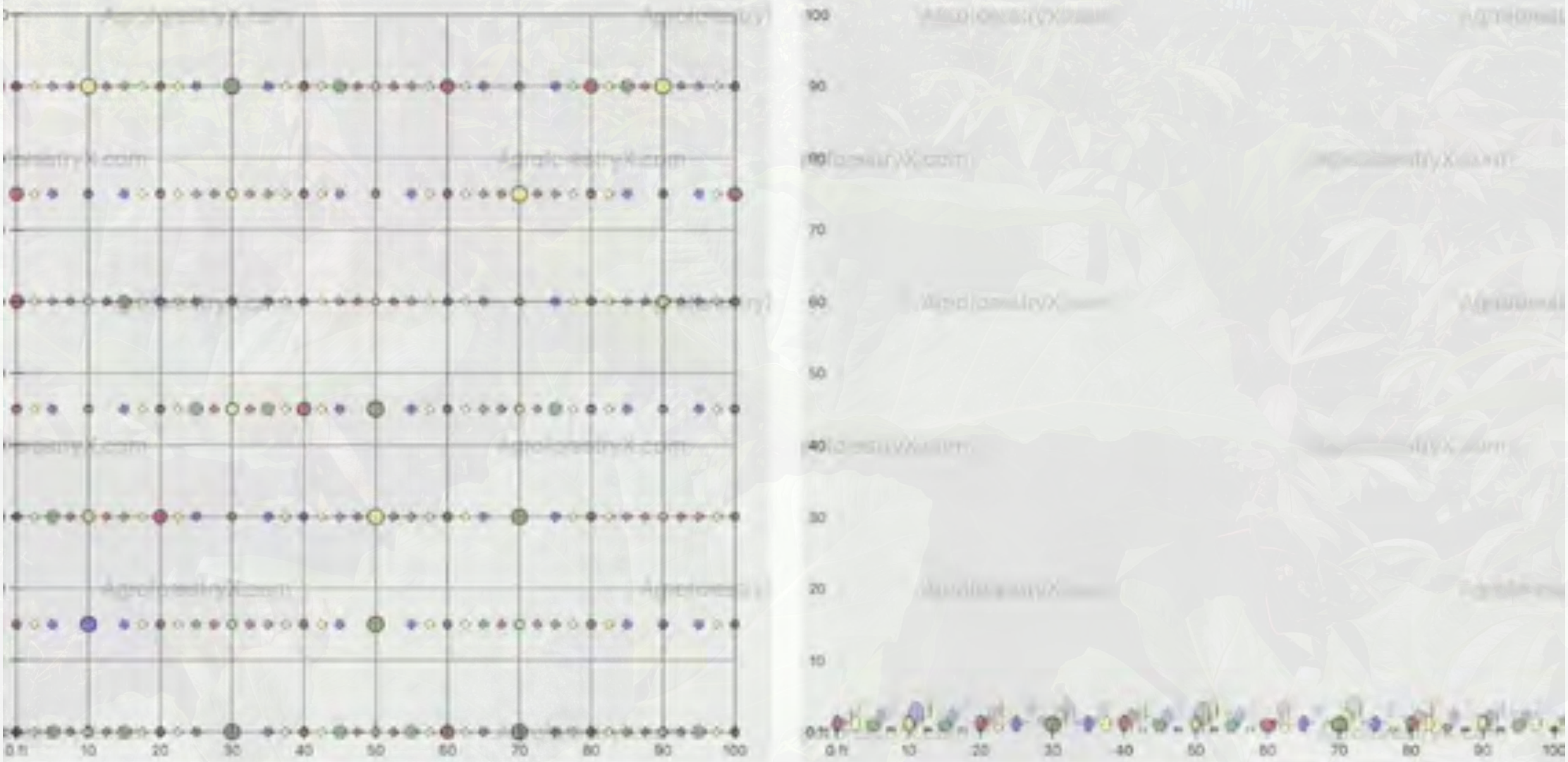


14.8 years

▶

AgroforestryX

Project Animation: Live Sample 2D & 3D



0.0 years

AgroforestryX

Pruning Orchestrates Production in Agroforestry

"For the greatest gains: cut everything!"
- Ernst Gostch

https://discoveryorchestra.org/conductor-humor/

Role of Plant Hormones in Growth & Development

Pruning:

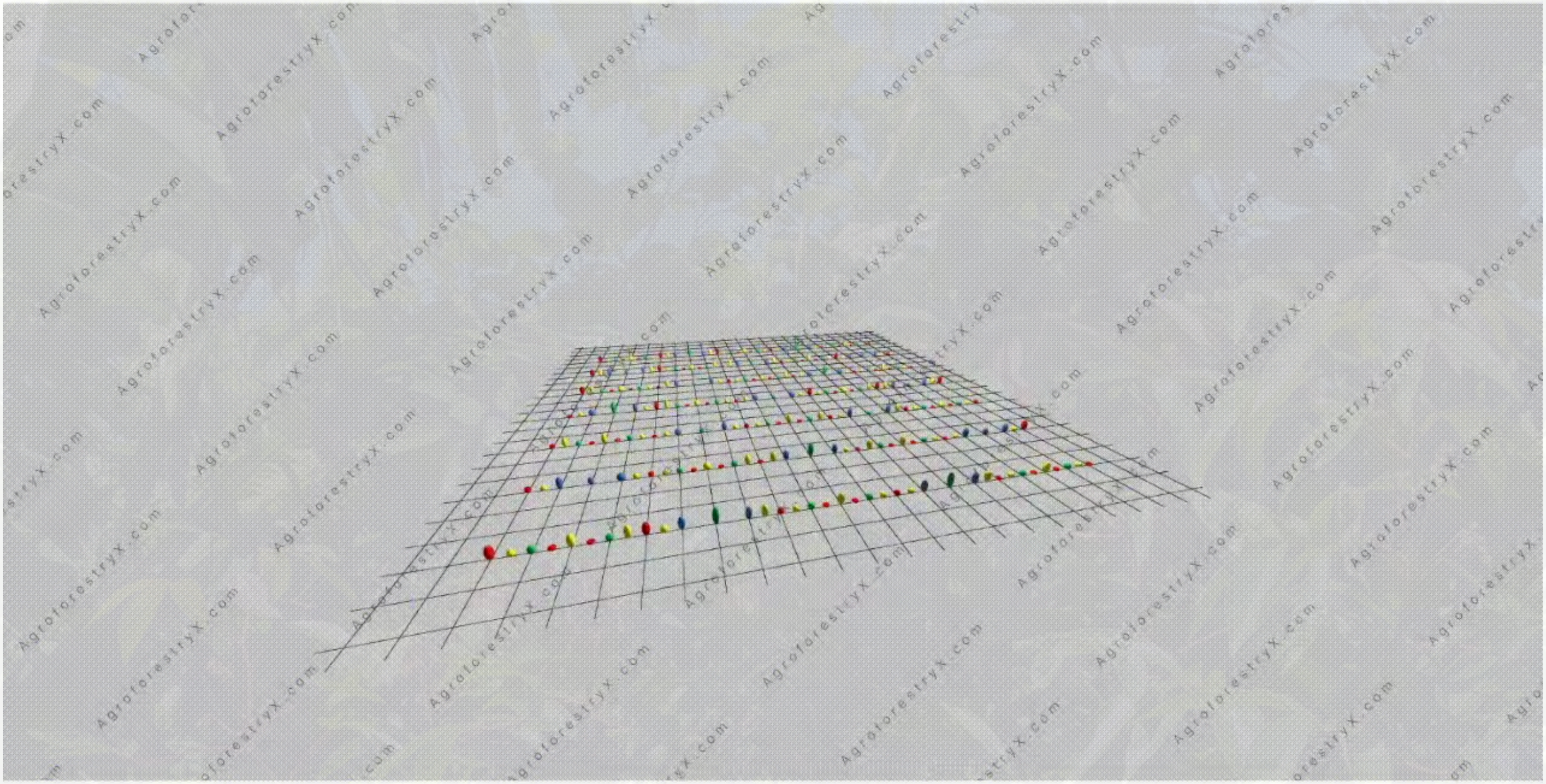
- Removes dead/diseased material
- Recycles nutrition
- Stimulates growth
- Creates coarse woody debris that drives production

Germination | **Growth to Maturity** | **Flowering** | **Fruit Development** | **Abscission** | **Seed Dormancy**

Gibberellin						
Auxin						
Cytokinins						
Ethylene						
ABA						

http://www.vce.bioninja.com.au/aos-2-detecting-and-respond/coordination--regulation/plant-hormones.html

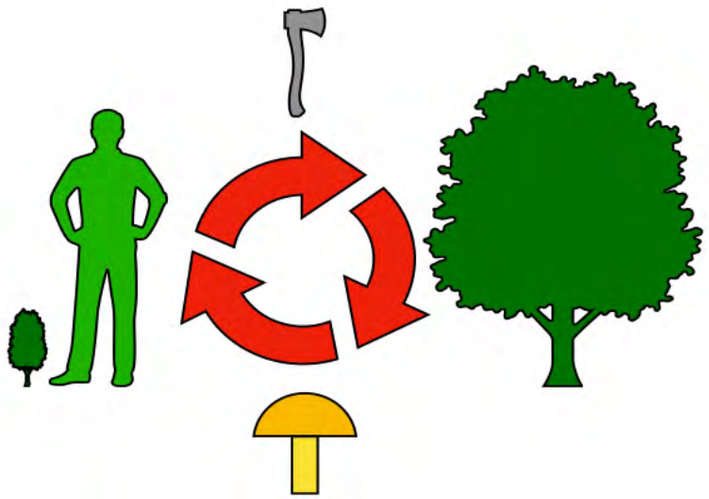
Project Animation: Live Sample 2D & 3D



0.0 yr

How to Ensure Abundance?

Credit: N. Logan 2016

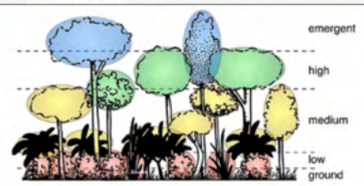


AgroforestryX

Pruning Schedules: Production, Standard & Natural

Metric

Production Dimensions



Layers of the multistory agroforest design.

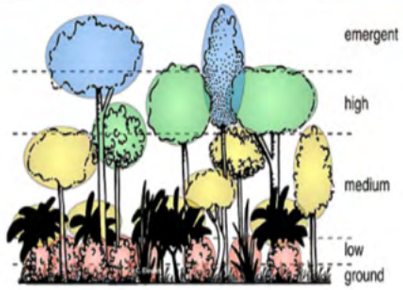
Height ranges of the various layers and their icon colors illustrated in the planting patterns in this tool.

Stratum (layer height class)	Icon color	Light requirements	Long-term species (4+ years) L	Medium-term species (0–4 years) M	Short-term species (0–2 years) S
Emergent		Full sun	6+ m	2+ m	not illustrated
High		≈80% sunlight	3-6 m	1.5-3 m	not illustrated
Medium		≈60% sunlight	1.5-3 m	.75–2 m	not illustrated
Low		≈40% sunlight	.6-1.75 m	.5-1 m	not illustrated
Ground	not illustrated	20-80% depending on location relative to trees	—	—	—

Production
Maximum pruning

Metric

Standard Dimensions



Layers of the multistory agroforest design.

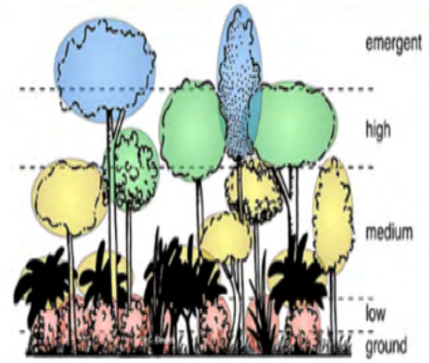
Height ranges of the various layers and their icon colors illustrated in the planting patterns in this tool.

Stratum (layer height class)	Icon color	Light requirements	Long-term species (4+ years) L	Medium-term species (0–4 years) M	Short-term species (0–2 years) S
Emergent		Full sun	12+ m	4+ m	not illustrated
High		≈80% sunlight	5-12 m	2-4 m	not illustrated
Medium		≈60% sunlight	3-6 m	3-6 m	not illustrated
Low		≈40% sunlight	1-4 m	1-2 m	not illustrated
Ground	not illustrated	20-80% depending on location relative to trees	—	—	—

Standard
Medium pruning

Metric

Natural Dimensions



Layers of the multistory agroforest design.

Height ranges of the various layers and their icon colors illustrated in the planting patterns in this tool.

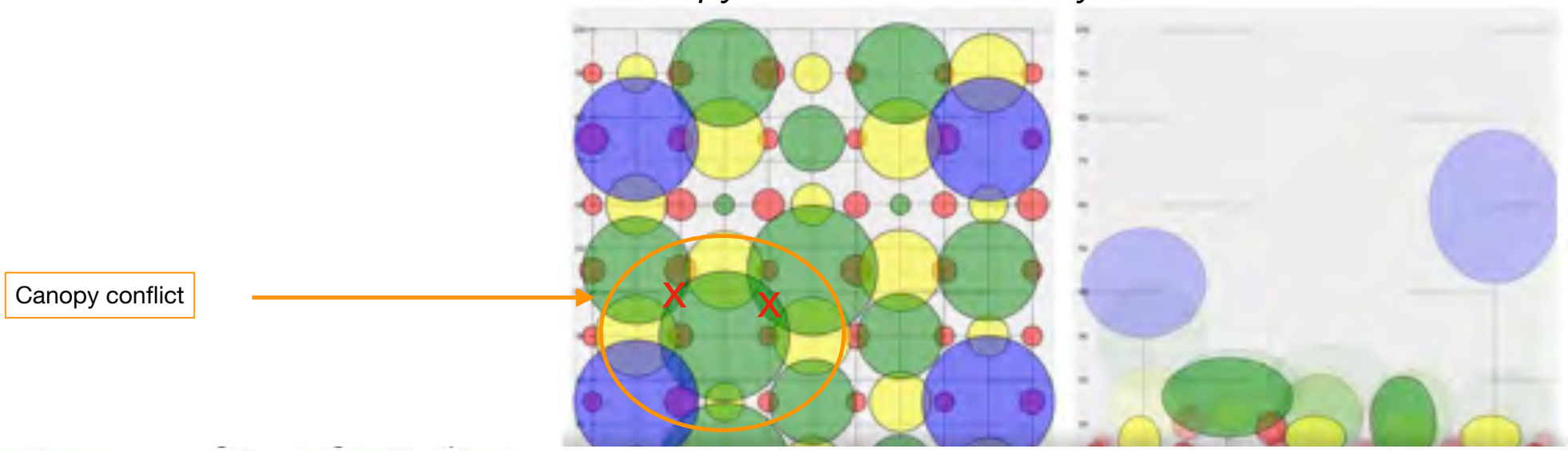
Stratum (layer height class)	Icon color	Light requirements	Long-term species (4+ years) L	Medium-term species (0–4 years) M	Short-term species (0–2 years) S
Emergent		Full sun	18-26+ m	7+ m	not illustrated
High		≈80% sunlight	14-18 m	4-7 m	not illustrated
Medium		≈60% sunlight	8-14 m	2-4 m	not illustrated
Low		≈40% sunlight	1-10 m	1-2 m	not illustrated
Ground	not illustrated	20-80% depending on location relative to trees	—	—	—

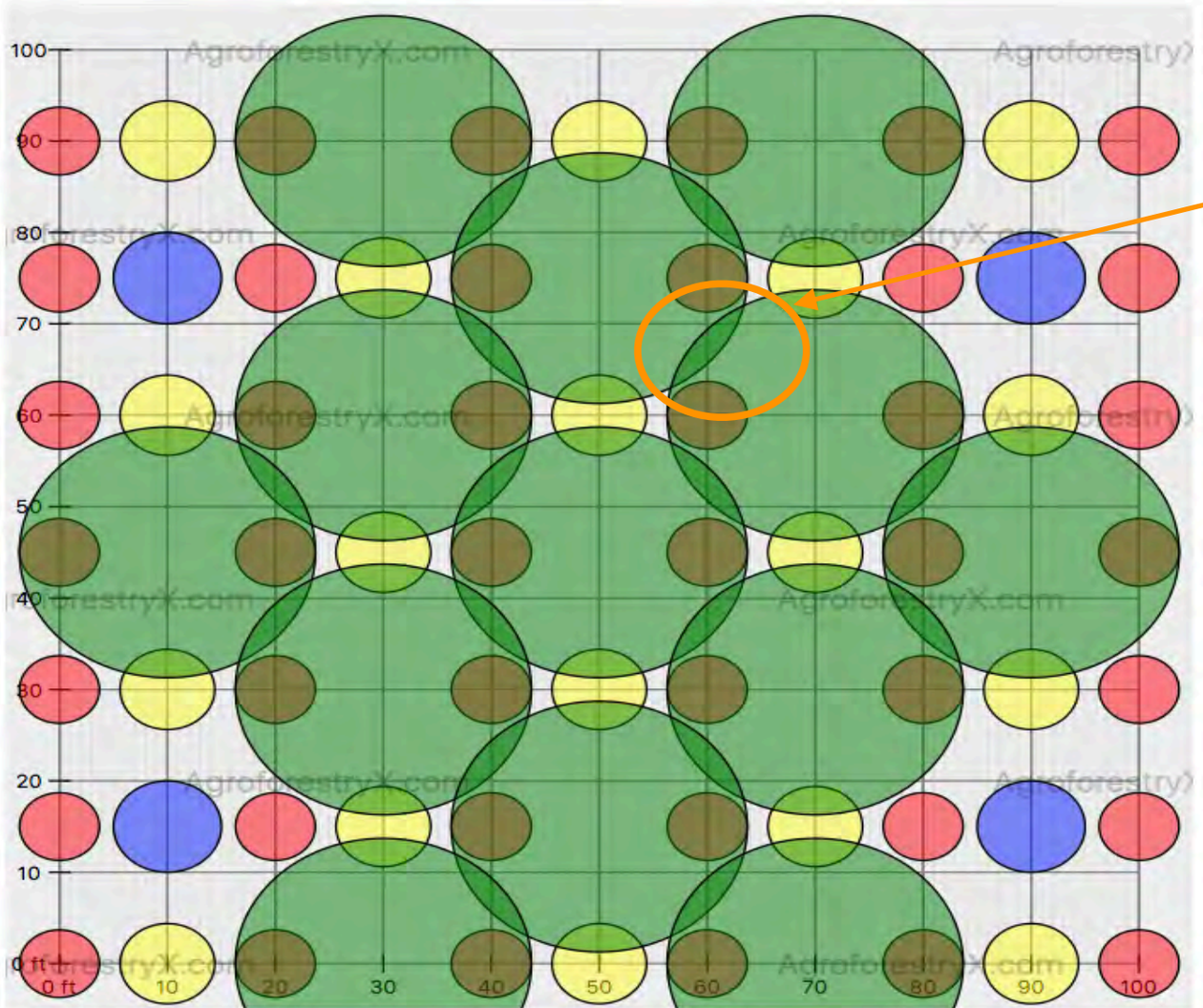
Natural
Minimum pruning

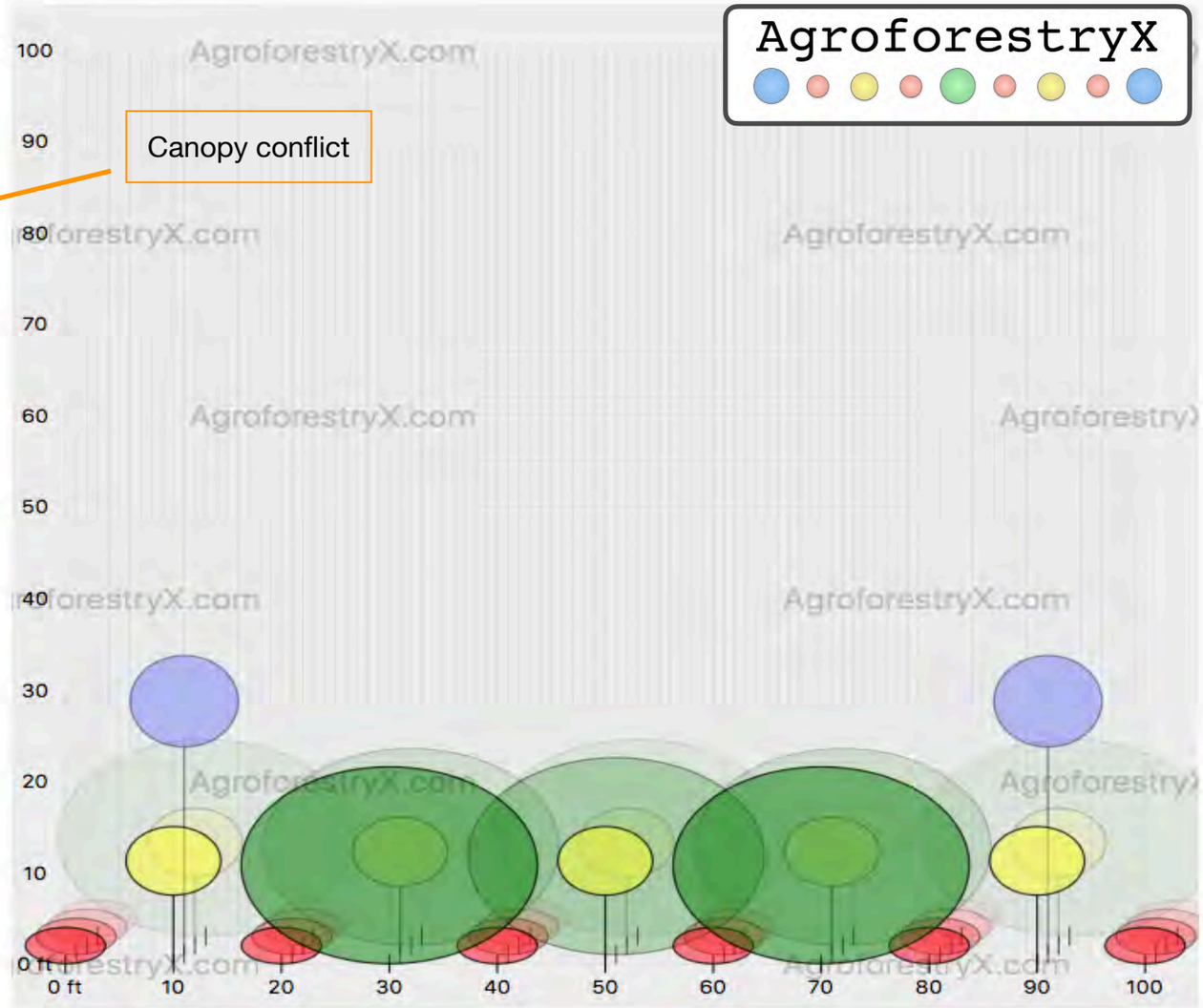
AgroforestryX

Visualize Projects Over Time

Detect and eliminate canopy conflicts before they occur







Project Summary & Detailed Reports

Project Summary

A brief overview of your completed project is presented below. You can use the navigation bar above to go back to any step and revise your project at any time. For your full project information, including additional information on the species you selected plus ground covers and short-term crops, please download the full summary report as a pdf file:

Download PDF report | Download species spreadsheet

Project

Project Name: My Project
Location: Any
Rainfall: 90 inches/year
Drainage: Medium
Topography: Flat to gently sloped (0-10%)
Elevation: 1100 feet
Project size: 1 acres
Pattern: 5B (4-layer simplified)

Species

Long-term low species

	est # in project	Common name	Scientific name and family	Habit	Productive lifespan (years)	Propagation method	Uses	Prune at height (feet)	Prune at diameter (feet)	Post-prune height (feet)	Post-prune diameter (feet)
	170	coffee	*Coffea arabica* (Rubiaceae)	Tree	100	seed	beverage, medicinal	12	6.25	6	3

Long-term medium species

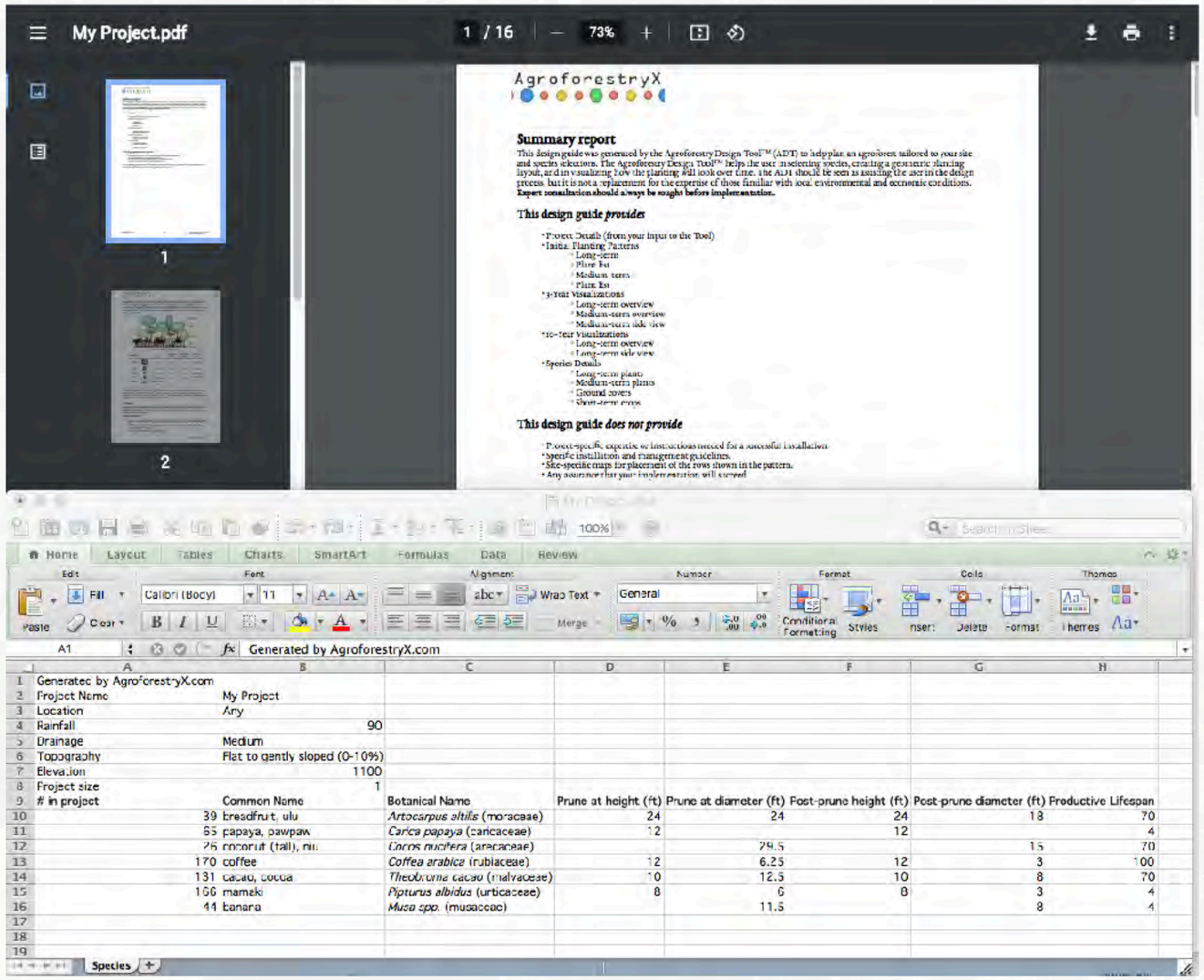
	est # in project	Common name	Scientific name and family	Habit	Productive lifespan (years)	Propagation method	Uses	Prune at height (feet)	Prune at diameter (feet)	Post-prune height (feet)	Post-prune diameter (feet)
	131	cacao, cocoa	*Theobroma cacao* (Malvaceae)	Tree	70	seed, grafting	fruit, medicinal	10	12.5	6	8

Long-term high species

	est # in project	Common name	Scientific name and family	Habit	Productive lifespan (years)	Propagation method	Uses	Prune at height (feet)	Prune at diameter (feet)	Post-prune height (feet)	Post-prune diameter (feet)
	39	breadfruit, ulu	*Artocarpus altilis* (Moraceae)	Tree	70	seed, sucker, root cutting	fruit, nut, staple food	24	24	16	18

Long-term emergent species

	est # in project	Common name	Scientific name and family	Habit	Productive lifespan (years)	Propagation method	Uses	Prune at height (feet)	Prune at diameter (feet)	Post-prune height (feet)	Post-prune diameter (feet)
	26	coconut (tall), niu	*Cocos nucifera* (Arecaceae)	Palm	70	seed	nut, seed oil, beverage, fiber, bee forage		29.5		15

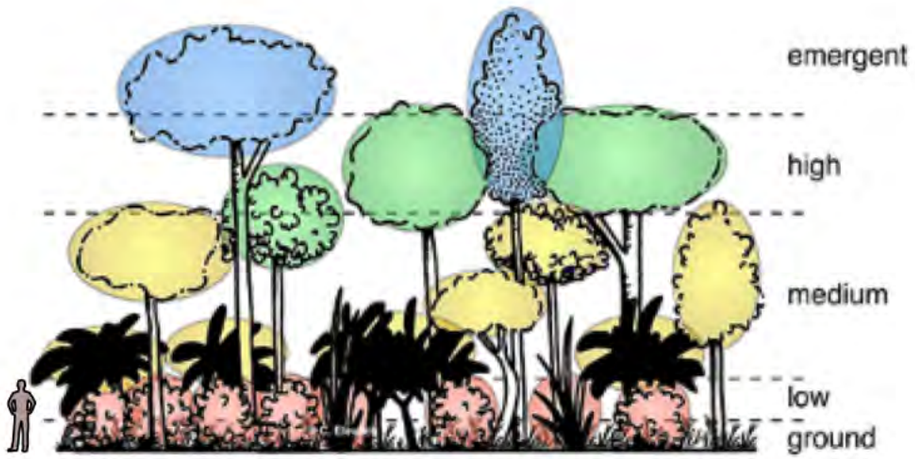


AgroforestryX

Bamboo Stratification Guide

For Pruning & Stratification Management

AgroforestryX

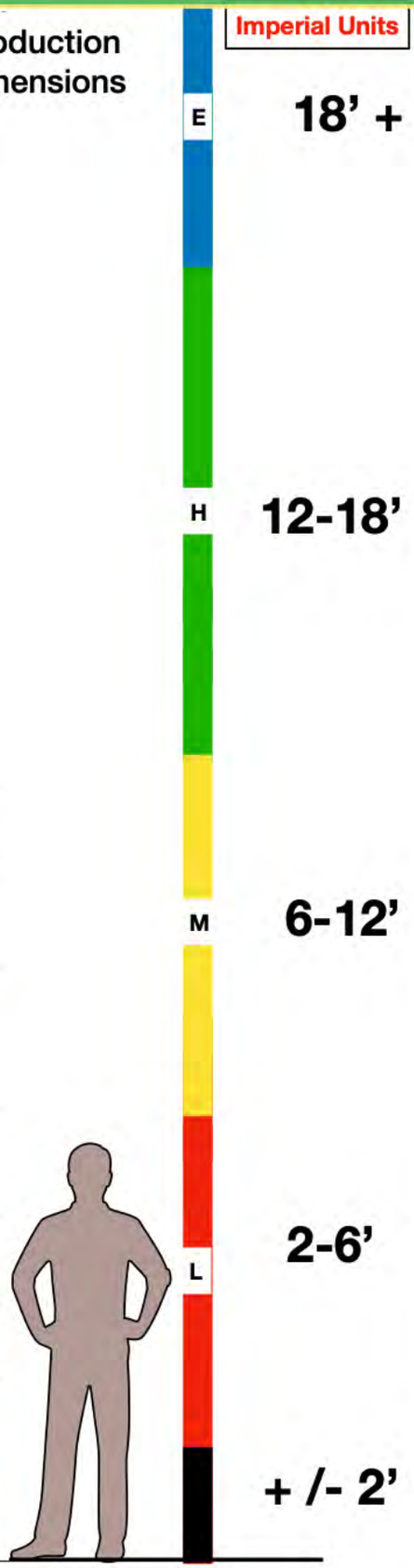


Layers of the multistory agroforest design.

Height ranges of the various layers and their icon colors illustrated in the planting patterns in this tool.

Stratum (layer height class)	Icon color	Light requirements	Long-term species (4+ years) L	Medium-term species (0–4 years) M	Short-term species (0–2 years) S
Emergent		Full sun	18+ ft	12+ ft	not illustrated
High		≈80% sunlight	12-18 ft	8-12 ft	not illustrated
Medium		≈60% sunlight	6-12 ft	4-8 ft	not illustrated
Low		≈40% sunlight	2-6 ft	2-4 ft	not illustrated
Ground	not illustrated	20-80% depending on location relative to trees	—	—	—

Production Dimensions

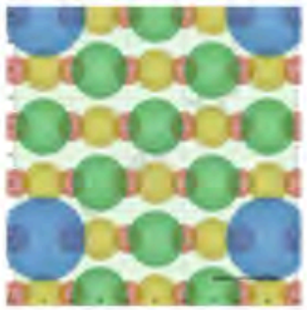


Visit AgroforestryX.com

AgroforestryX Design Tool assists you in transforming regenerative agroforestry vision into design.

Agroforestry vision

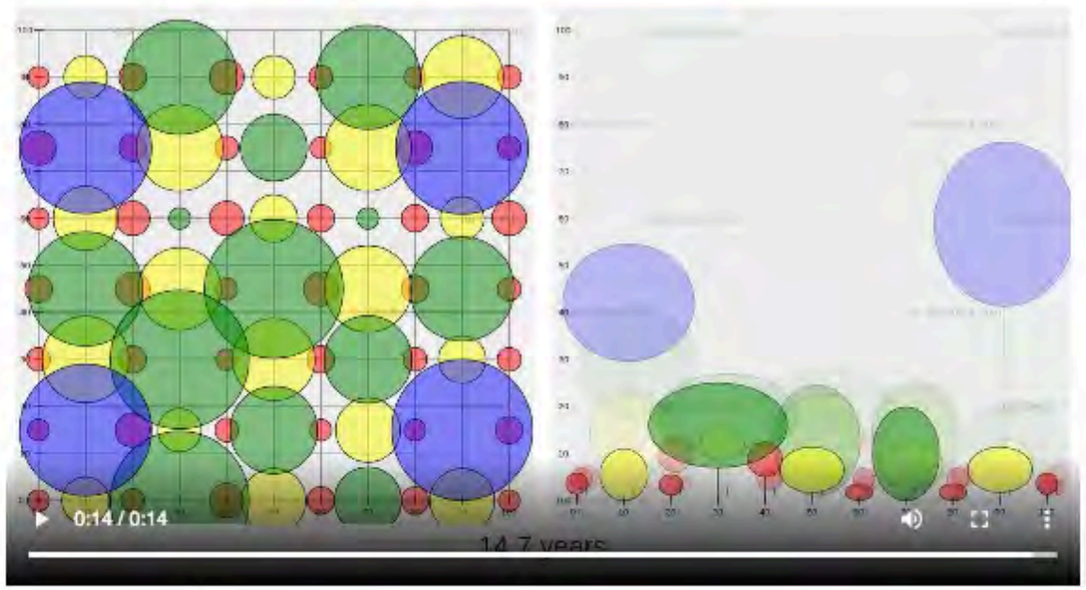
→ Agroforestry Design Tool™ {AgroforestryX.com} →



Agroforestry design

There are no recipes for agroforestry. Each agroforestry project is tailored to site conditions, goals of the project, and personal preferences. This tool provides guidance in designing multistory agroforests which can be applied to food and/or timber production, native habitat restoration, and individual user goals. Multistory agroforests have the potential to regenerate degraded soils, restore biodiversity, sequester carbon, and provide many other ecosystem services while producing abundantly.

Sign Up for Free Webinars

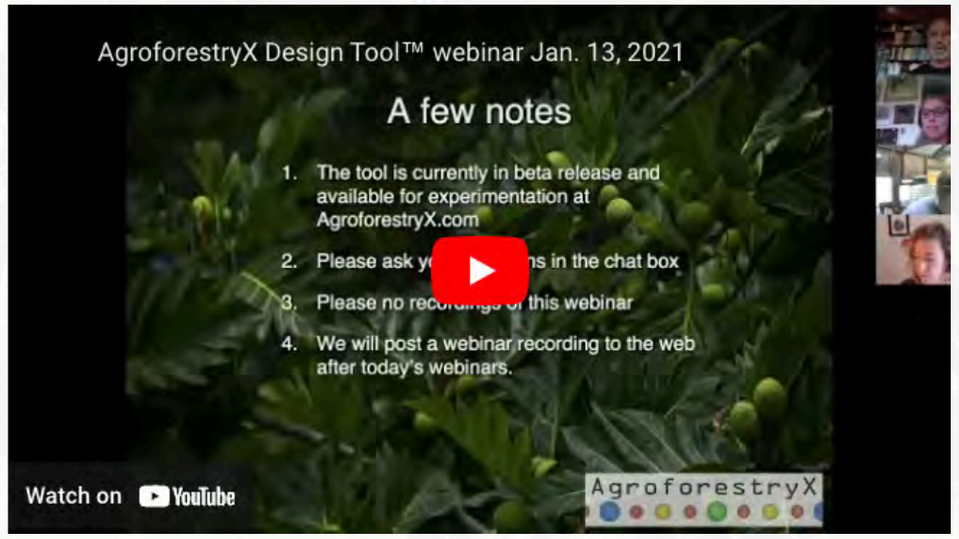


FAQ

https://www.agroforestry.com/support

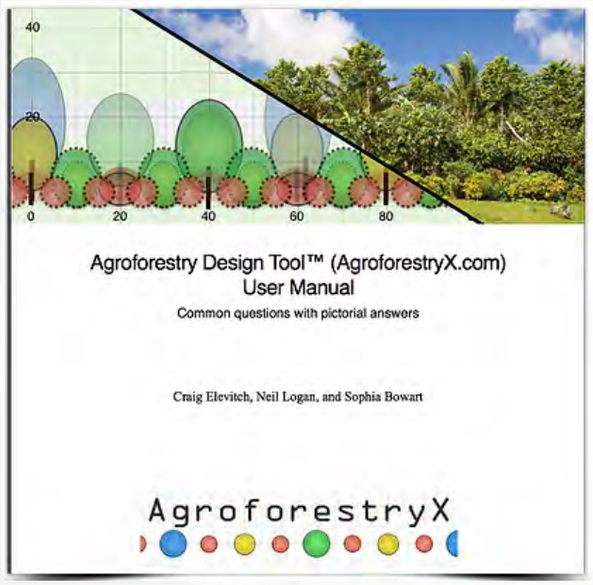
Free Webinar

https://youtu.be/dSgGOZRMthE



User's Manual

https://www.agroforestry.com/afx



AgroforestryX

Project Examples

Project Name: FARM Center - lower orchard
Location: Hawaii
Rainfall: 65 inches/year
Drainage: Medium
Topography: Flat to gently sloped (0-10%)
Elevation: 1700 feet
Project size: 0.25 acres
Pattern: 1B (4-layer complex)

AgroforestryX

AgroforestryX

AgroforestryX


Project Name: SfC - .5-acre sloped side
Location: Hawaii
Rainfall: 55 inches/year
Drainage: Medium
Topography: Sloped (10-20%)
Elevation: 80 feet
Project size: 0.25 acres
Pattern: 5B (4-layer simplified)
AgroforestryX


AgroforestryX


WOMEN'S
MARCH
AgroforestryX


AgroforestryX


AgroforestryX


AgroforestryX

AgroforestryX

Project Name: Aloha Syntropica 1 - flat
Location: Hawaii
Rainfall: 60 inches/year
Drainage: Medium
Topography: Flat to gently sloped (0-10%)
Elevation: 1750 feet
Project size: 0.25 acres
Pattern: 1B (4-layer complex)

AgroforestryX


AgroforestryX

AgroforestryX


AgroforestryX


AgroforestryX

AgroforestryX

Education & Training

www.agroforestry.com/training

AgroforestryX

AgroforestryX

Our Team

Mother Nature

Sophia Bowart
financial analysis &
operations optimization

Neil Logan
agroforestry &
information systems

Craig Elevitch
systems modeling, education
& community outreach

AgroforestryX

Our Services

- Agroforestry planning consultation
- Customized & retrofit designs
- Research trials
- Education & training: onsite and online
- Economic analysis, management & scheduling

We Help Clients To

- Determine plant spacing & management
- Predict costs & revenue
- Simplify species selection
- Estimate harvest yields
- Build soil naturally
- Quantify environmental benefits

AgroforestryX is a consulting company focused on assisting clients with assessment, design, implementation and management of agroforestry projects. More information can be found at agroforestry.com

The AgroforestryX Design Tool was created by the AgroforestryX team. This free online tool is currently in use by NRCS conservation planners and assists users in selecting species, spacing, and visualizing regenerative agroforestry systems through time. More information can be found at agroforestryx.com

Thank You!