

# Landscaper v1.2.0



Unity Editor Extension by  
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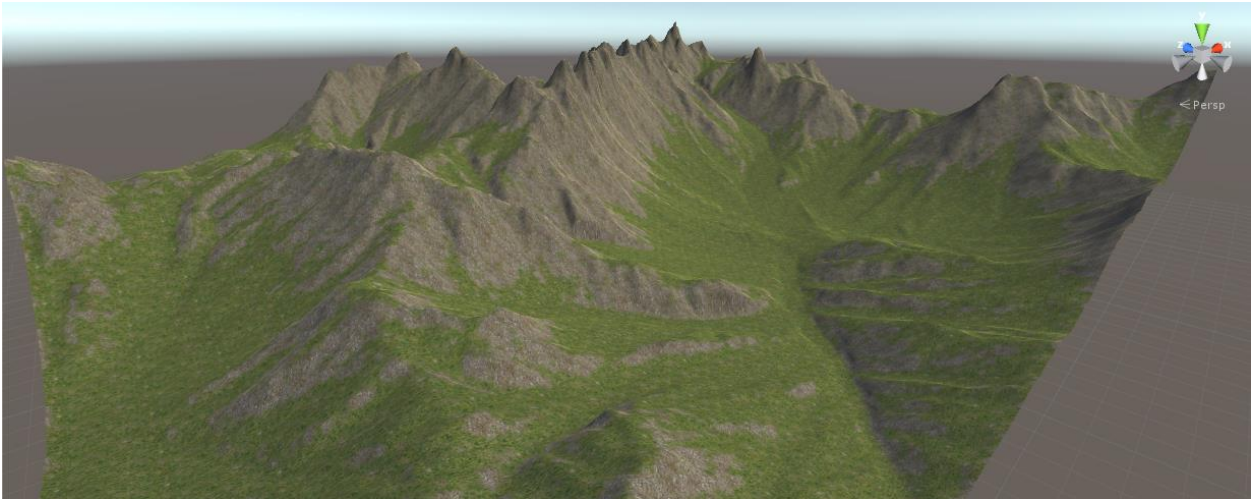
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## Quick Start

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1. First, we'll need to make a terrain or other surface for Landscaper to plant our foliage on



2. Next, we need a prefab that will represent a single instance of our foliage. For this example, we'll use one of the tree meshes from the standard assets included in Unity.

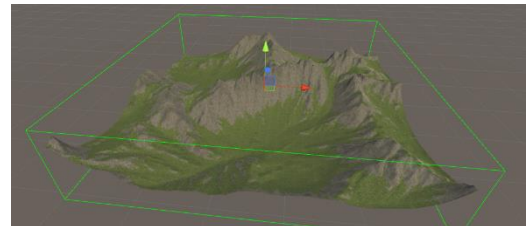


3. We then need to make a new "Species" asset which will provide all of the information for how our new foliage should be placed. In the menu, go to "Assets > Create > Landscaper > Species" to create a new species of foliage.

4. Our newly created species has a lot of parameters that can be tweaked which we'll go into in detail in a later section; for now though, there's only one field we're interested in. Press the "+" button to add a new archetype, and set the prefab field to the prefab we created in step 2.

5. There's one more asset we need to make before we can start placing foliage into the world; we need a Biome to describe which types of foliage can appear in an area. Go to "Assets > Create > Landscaper > Biome" to create one. In the settings for this new biome, press the "+" button to add a new species to the list, select the species asset we just created.

6. Now we need to add a Foliage Area to the scene, you can do this from the menu under "GameObject > Landscaper > Foliage Area". The green bounding box represents the area in which foliage instances will be placed, by default, the new volume will encompass all geometry in the scene, but you can move/scale the GameObject to your liking. The larger the area, the more foliage instances will be generated and the longer the process will take, so you might want to start with a smaller area to begin with.



7. With our foliage area selected, we need to set the Biome field in the inspector to the Biome asset we created in step 5. Press "Simulate" and your scene should be filled with foliage!

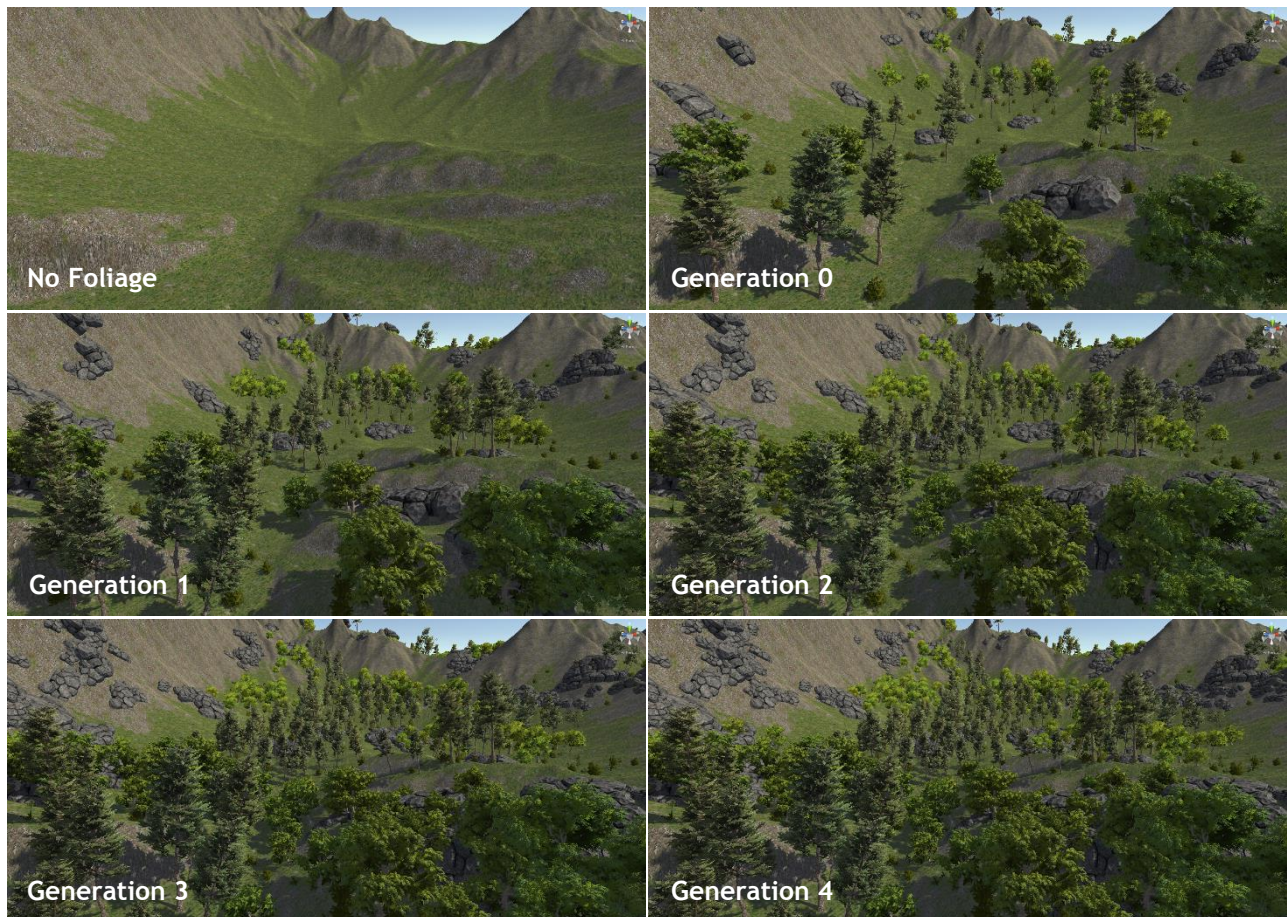
## The Process

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It's important to understand how Landscaper does what it does in order to make the best use of the settings available. Here's a brief overview of how the process works:

For each species, Landscaper plants a number of seeds at random in the foliage area. This number is based on the size of the volume and the "Initial Seed Density" parameter of the foliage species. Checks are performed to make sure the seed is in a valid place (again, according to the parameters in the species asset). This is the initial set or "generation 0".

For each foliage instance placed in the previous step, a number of seeds are released which travel a certain distance before creating new foliage instances themselves. This process is repeated and each new set of foliage created in this manner is considered a different generation. This allows for foliage to spread in a more natural fashion.



Note that Landscaper can be used to place other types of object such as the rocks in the above example.

## Settings & Details

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### Species

A species in Landscaper acts as a single distinct “type” of foliage. The species controls which prefab is used to represent an instance of the foliage, where the instances can be placed, and how it interacts with other foliage in the scene.

#### Archetypes

Archetypes are a combination of a prefab, and some settings to describe how Landscaper should use that prefab. An archetype makes up the physical/visual representation of a single foliage instance in the world. Each planted instance will pick an archetype from the list at random to represent itself.

Prefab	The prefab to place
Placement Mode	<p>Defines how this archetype should be placed in the world. “GameObject” mode will always be used when an instance is placed on a non-terrain surface.</p> <p><u>Terrain Tree</u></p> <ul style="list-style-type: none"><li>- More performant</li><li>- Used for species that must have many instances placed</li></ul> <p><u>Game Object</u></p> <ul style="list-style-type: none"><li>- Can align to the surface normal</li><li>- Can make full use of foliage created through the tree creator</li><li>- Can contain scripts (could be used for interactable objects, for example)</li></ul>
Size by Generation	<p>A range for the scale of an instance of this archetype. Younger (newer) generations will take their scale from the lower portion of the slider. This allows you to smoothly scale generations without having to specify generation overrides.</p>
Colour Variation	<p>Specifies how much a foliage instance can be darkened to add variation.</p>

<b>Align to Surface?</b>	If true, foliage instances be rotated to be perpendicular to the surface they were planted on, otherwise, they will point directly upwards. Only works when using the “GameObject” placement method.
<b>Initial Seed Density</b>	How tightly-packed the initial set of foliage instances will be. The actual number of instances is also dependent on the volume of the bounding box for the foliage area used to spawn them
<b>Seed Travel Range</b>	How far away a child instance can spawn from its parent
<b>Child Count (Min - Max)</b>	How many children each instance of the foliage can have
<b>Collision Range</b>	The collision radius for an instance of this species. No other foliage instances can be placed within this range
<b>Shade Range</b>	The radius of the shadow that would be cast by an instance of this species. This is used to prevent other foliage instances from being planted within this radius (unless that particular species can grow in the shade)
<b>Can Grow In Shade?</b>	Can this species grow in the shade of another foliage instance?
<b>Scale Variation (Min - Max)</b>	The minimum and maximum scale multipliers that can be applied as random variation to each foliage instance, this is applied in addition to any generation-specific scale overrides
<b>Slope Angle (Min - Max)</b>	The range of surface slope angles that an instance of this species can be planted on. Used to prevent instances from being placed on surfaces that are too steep, for example
<b>Altitude (Min - Max)</b>	The range of altitudes this species can grow at. This is expressed as Y position in world-space
<b>Generations</b>	<p>A list of generation-specific settings. The first element in this list represents “generation 0” (or the initial set), each element after that represents the generation created by the previous.</p> <p>These settings are optional; if unspecified, the foliage instances will use default settings. You also don’t need an entry for every generation you will have, any generation beyond the number in this list will be clamped to use the last element. <i>E.g. With a list of 4 generations, the 5<sup>th</sup> generation will use the settings for generation 4.</i></p> <p>Generations will not be used if their checkbox is not selected, this allows you to override generation 1, but not generation 0, for example.</p>
<b>Terrain Texture Masks</b>	The terrain textures that instances of this species are allowed to grow on. If empty, instances can grow anywhere. Has no effect when planting on non-terrain GameObjects.

## Biome

A Biome in Landscaper acts as a way of grouping types of foliage that should inhabit an area. Each element in the list of species has two options: the species, and the weight. The species is just a Species asset as described above. The weight is a way to determine how many instances of that particular species of foliage are planted relative to the other species in the list. The value itself is not important (as long as it's greater than 0), what matters is how that value compares to the weights of the other species used by the biome.

## Foliage Area

A Foliage Area is used to place instances of foliage from a chosen Biome into the scene. With all of the settings filled out, you can press the “Simulate” button in the inspector to generate instances of foliage in the world. The “Clear” button can be used to remove all of the created GameObjects.

**Seed** The initial seed passed to the random number generator. This allows you to re-generate the same batch of foliage twice; it also means that if we don’t like how the foliage was generated the first time, we can change the seed and re-simulate for a different result (while still using the same settings for Species’ and the Biome)

<b>Generations Count</b>	Indicates how many times the previous generation should spawn a new set of children. If set to 1, only the initial seeds will be planted. The larger this value, the more filled-out the area will become. Note that increasing the generations count exponentially increases the amount of foliage generated (thus, increasing the generation time).  It’s best to start with a fairly low number while testing & tweaking Species/Biome settings and then increase this value when generating the final set of foliage
<b>Bounds</b>	The unscaled axis-aligned bounding box (AABB) that represents where foliage can be placed. This is translated and scaled according to the owning GameObject’s Transform component
<b>Foliage Layer</b>	The layer to place new foliage instances on. While placing instances, Landscaper will use the “Ignore Raycast” layer for placing foliage GameObjects. Once finished, these will all be moved to the layer of your choosing
<b>Biome</b>	The biome settings to use for this particular foliage area
<b>Place Foliage On</b>	These are the layers Landscaper can plant foliage instances on, any objects not on one of these layers will be ignored when placing foliage.
<b>Max Tile Size</b>	If the Foliage Area (green box) is larger than this size, it will be split into multiple smaller volumes (yellow boxes) to improve generation speed.



## Runtime Use

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Landscaper *can* be used to generate foliage at runtime by calling the Foliage Area component's Simulate() function after having set all of the settings. Note that foliage simulation takes a little while to process (largely dependent on your settings) so there may be several seconds of delay before the foliage instances are placed. One other possible concern with runtime-generated foliage is that it won't benefit from static batching, resulting in more draw calls (and possibly worse performance) than would otherwise be the case if the same Biome was used to generate foliage in-editor.