

Virtual Environments for Communicating Changing Forests

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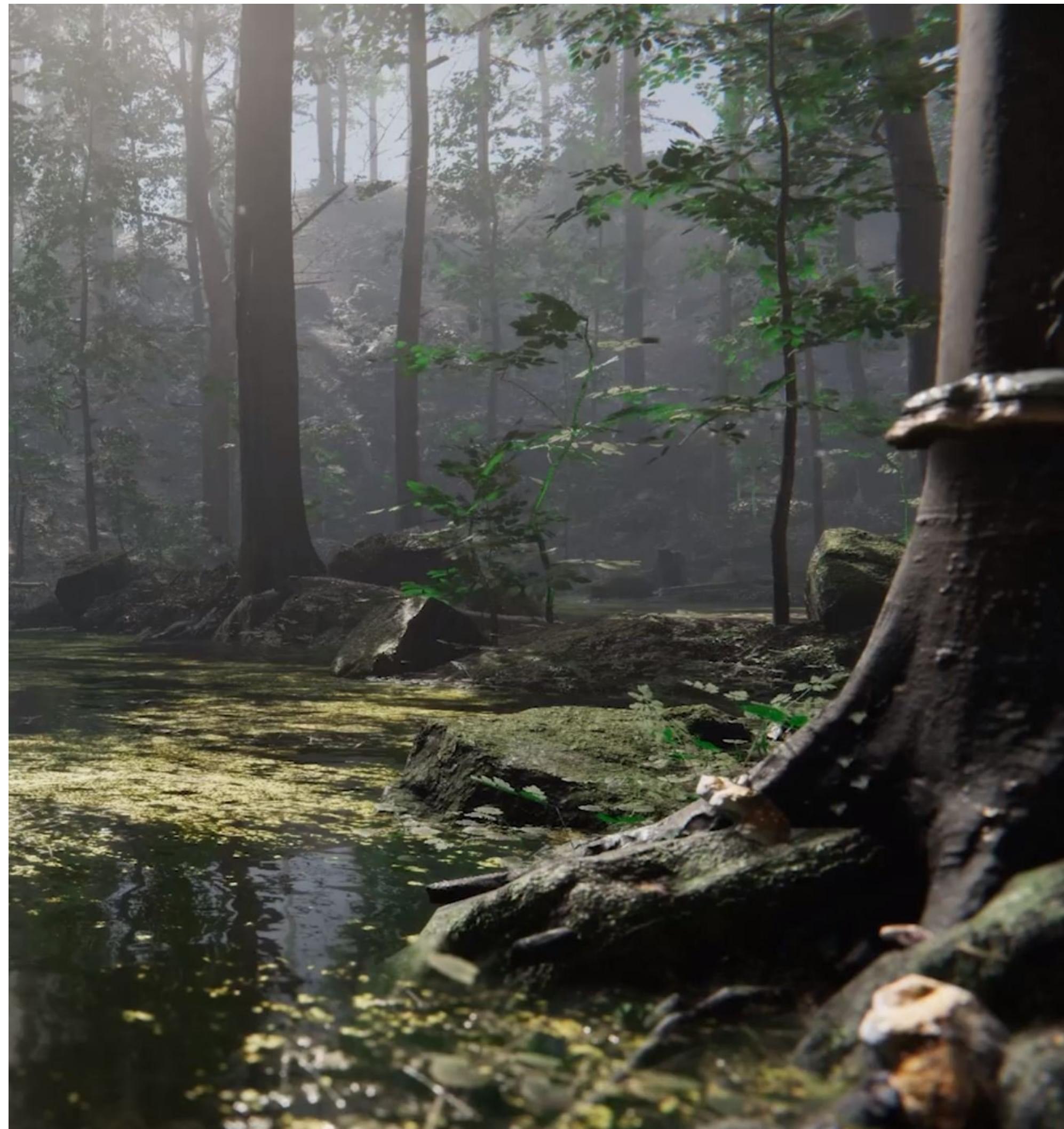
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About Me

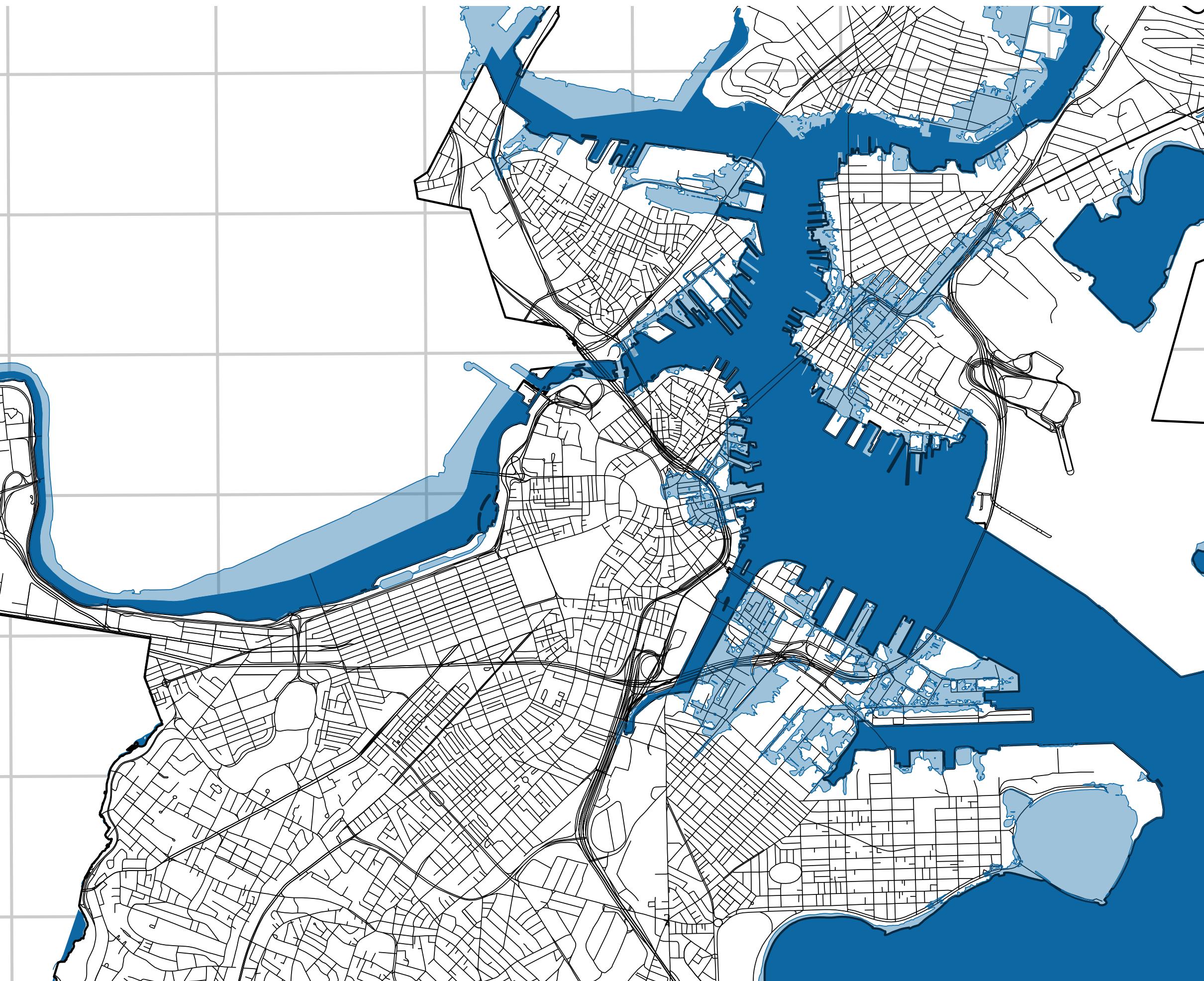
- Mike Mahoney
- PhD Candidate at SUNY-ESF
- Focusing on visualization, VR and ML as ways to think about large-scale systems
- These slides:
mm218.dev/femc2022



What's a virtual environment?



Virtual Environments for Communicating Changing Forests - <https://mm218.dev/femc2022>



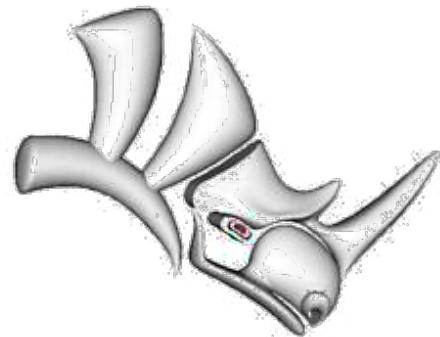




Using Tree Modeling Applications and Game Design Software to Simulate Tree Growth, Mortality, and Community Interaction

Ackerman et al. 2021 J. Digit. Landsc. Archit.

What's the problem?



**UNREAL
ENGINE**



Unity®



LUMION

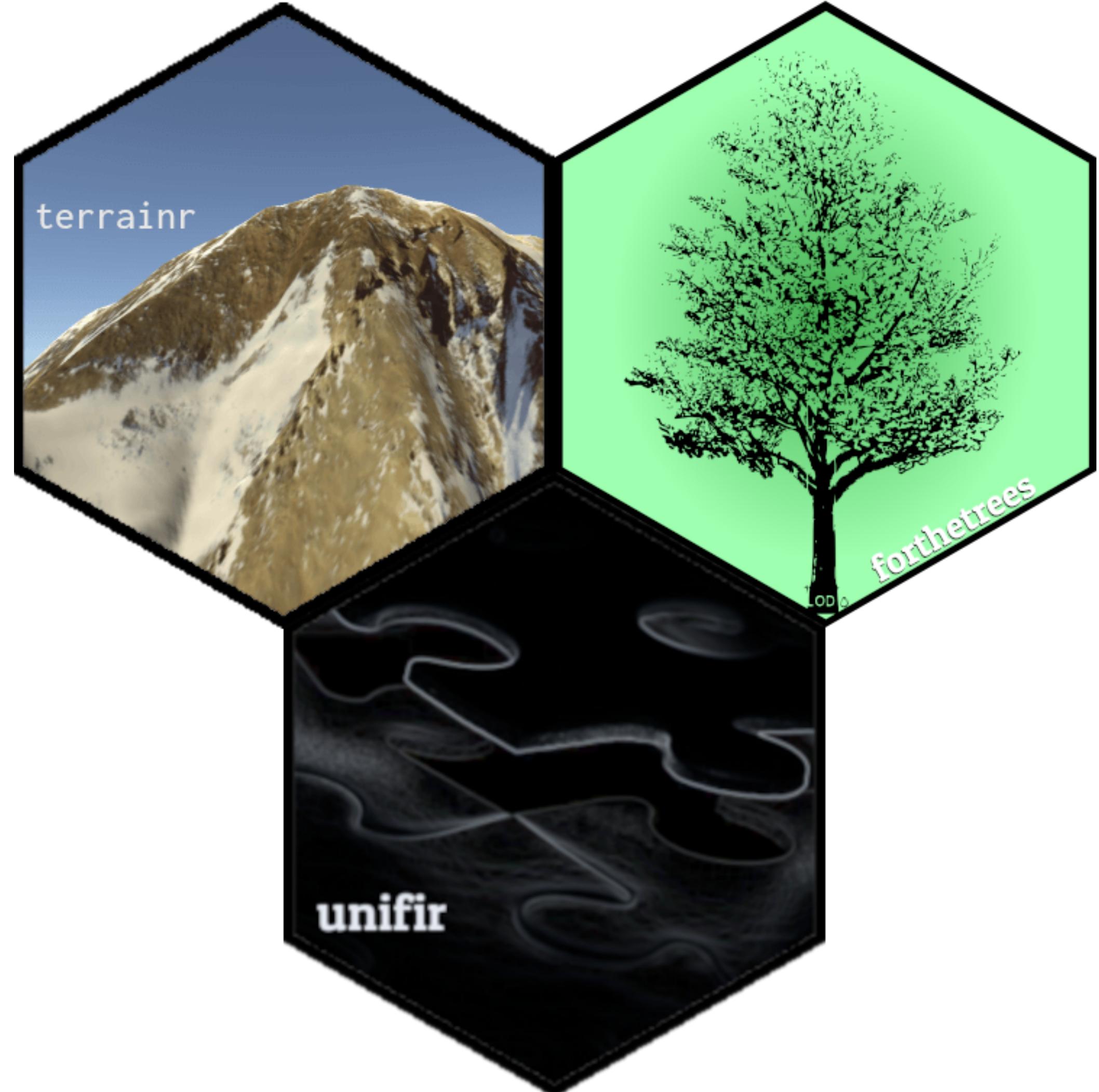
 **AUTODESK**



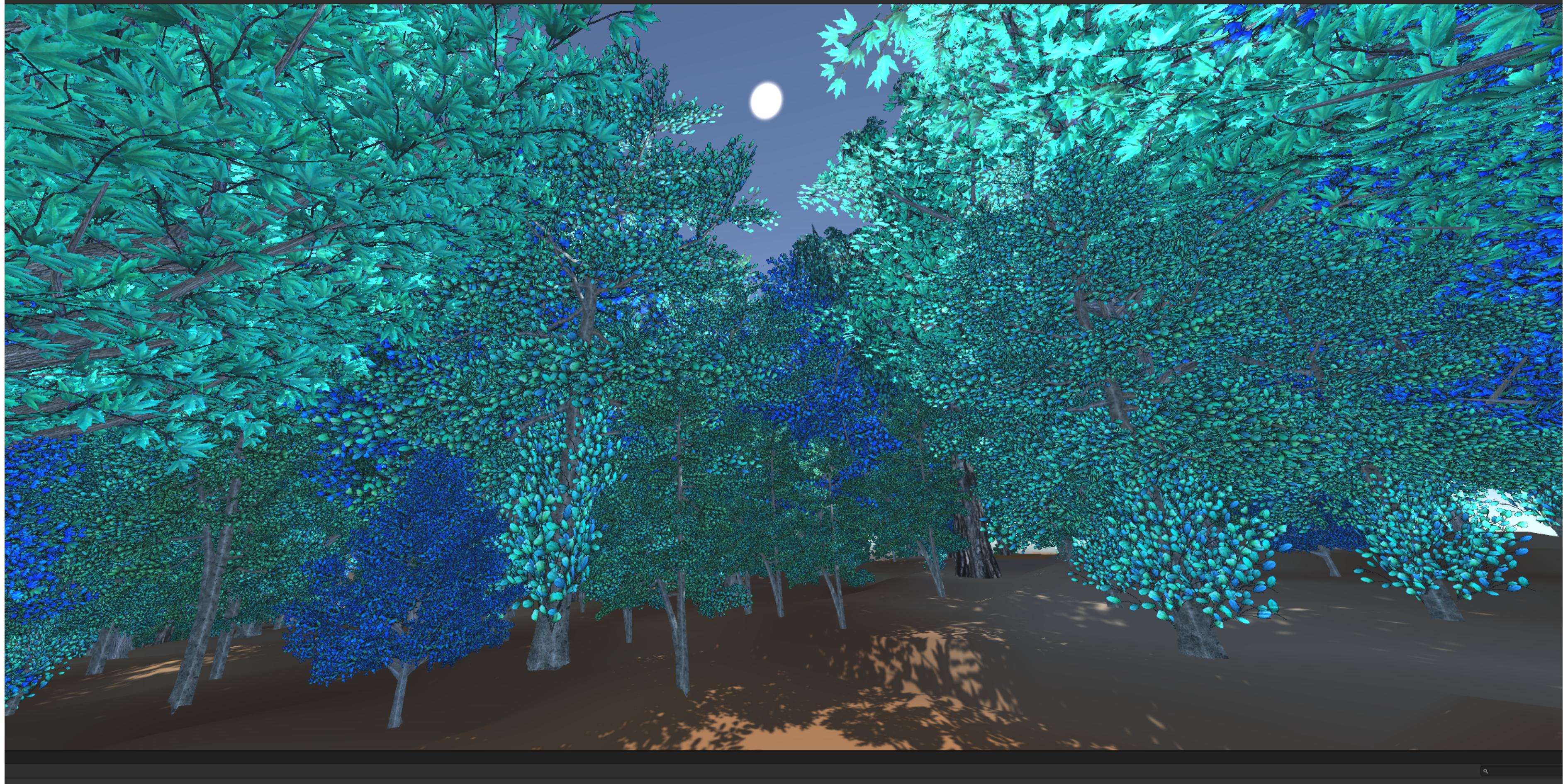
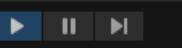
Missing elements:

- 1. Reusability**
- 2. Reproducibility**
- 3. Replicability**

What are we doing about it?



```
1 library(sf)
2 library(unifir)
3 library(terrainr)
4 first_run ← make_unity(
5   "ifs_scene",
6   "elev.tif",
7   "texture.png",
8   side_length = 257,
9   scene_name = "first",
10  action = FALSE
11 )
12
13 first_run ▷
14   import_asset("anim") ▷
15   instantiate_prefab(
16     scene_name = "first",
17     prefab_path = file.path("Assets", first_trees$model),
18     x_position = first_trees$X,
19     y_position = first_trees$lyr.1,
20     z_position = first_trees$Y,
21     x_scale = first_trees$scale,
22     y_scale = first_trees$scale,
23     z_scale = first_trees$scale
24   ) ▷
25   add_default_player(
26     scene_name = "first",
27     x_position = 245,
28     y_position = 535,
29     z_position = 32
30   ) ▷
31   save_scene(scene_name = "first") ▷
32   set_active_scene(scene_name = "first") ▷
33   action()
34 |
```

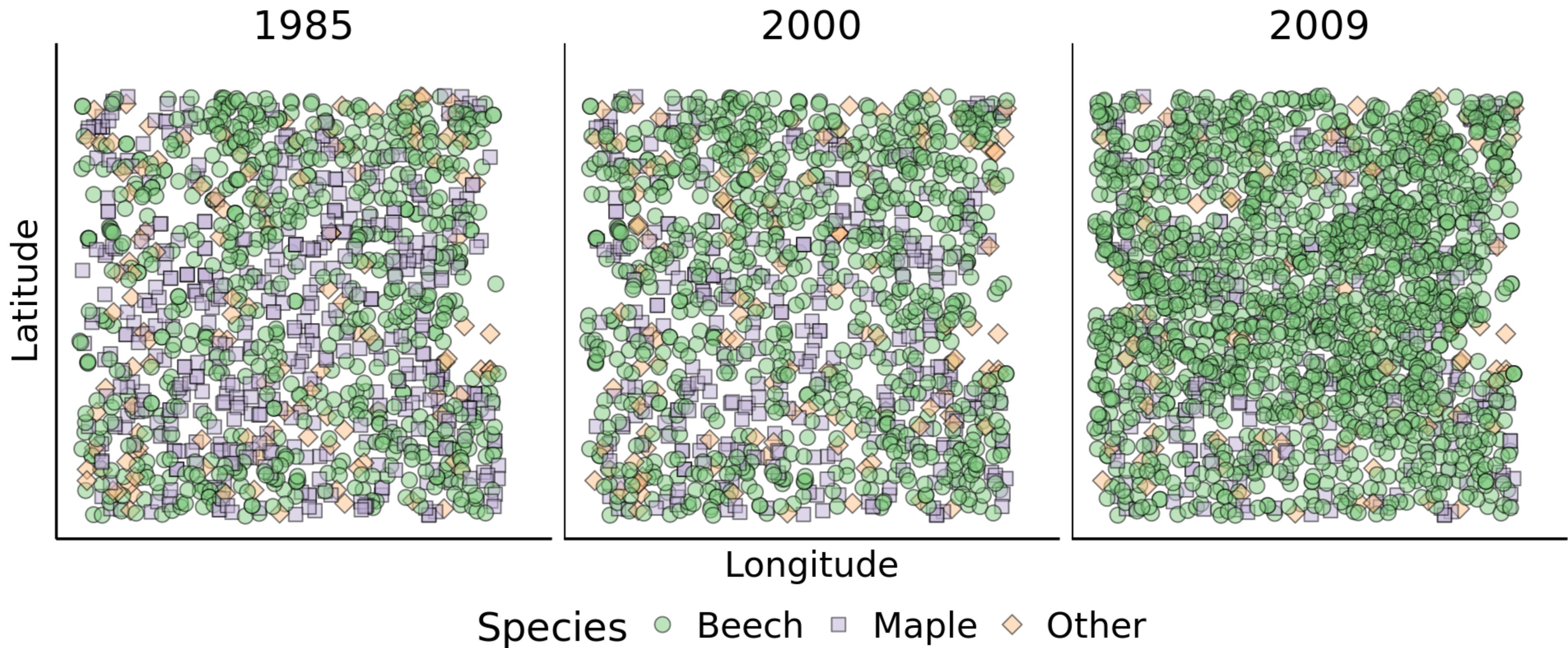


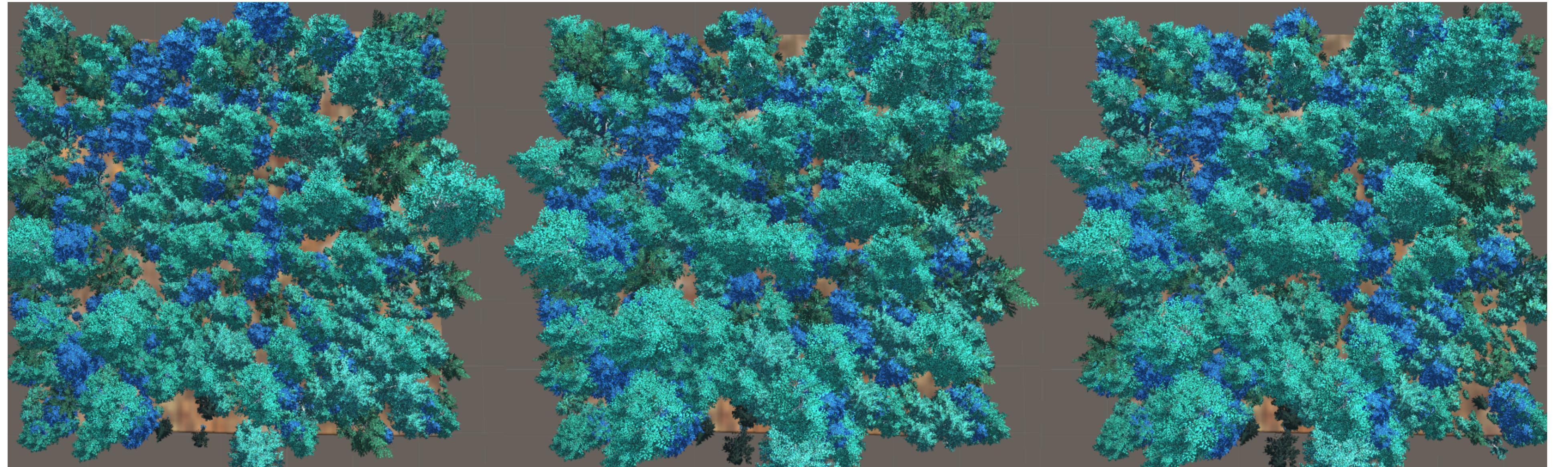
Beech bark disease: spatial patterns of thicket formation and disease spread in an aftermath forest in the northeastern United States

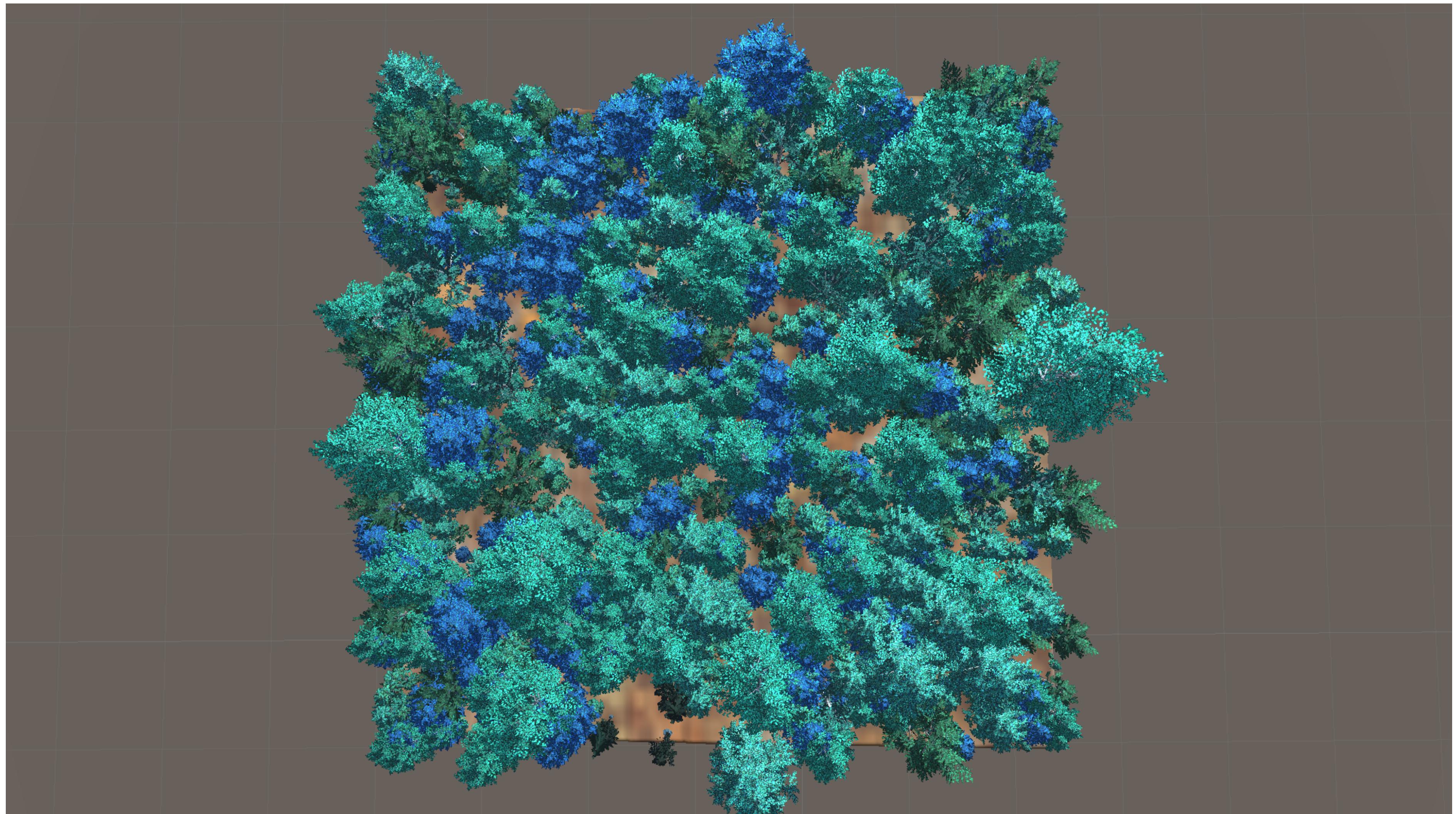
Lisa M. Giencke, Martin Dovčiak, Giorgos Mountrakis, Jonathan A. Cale, and Myron J. Mitchell

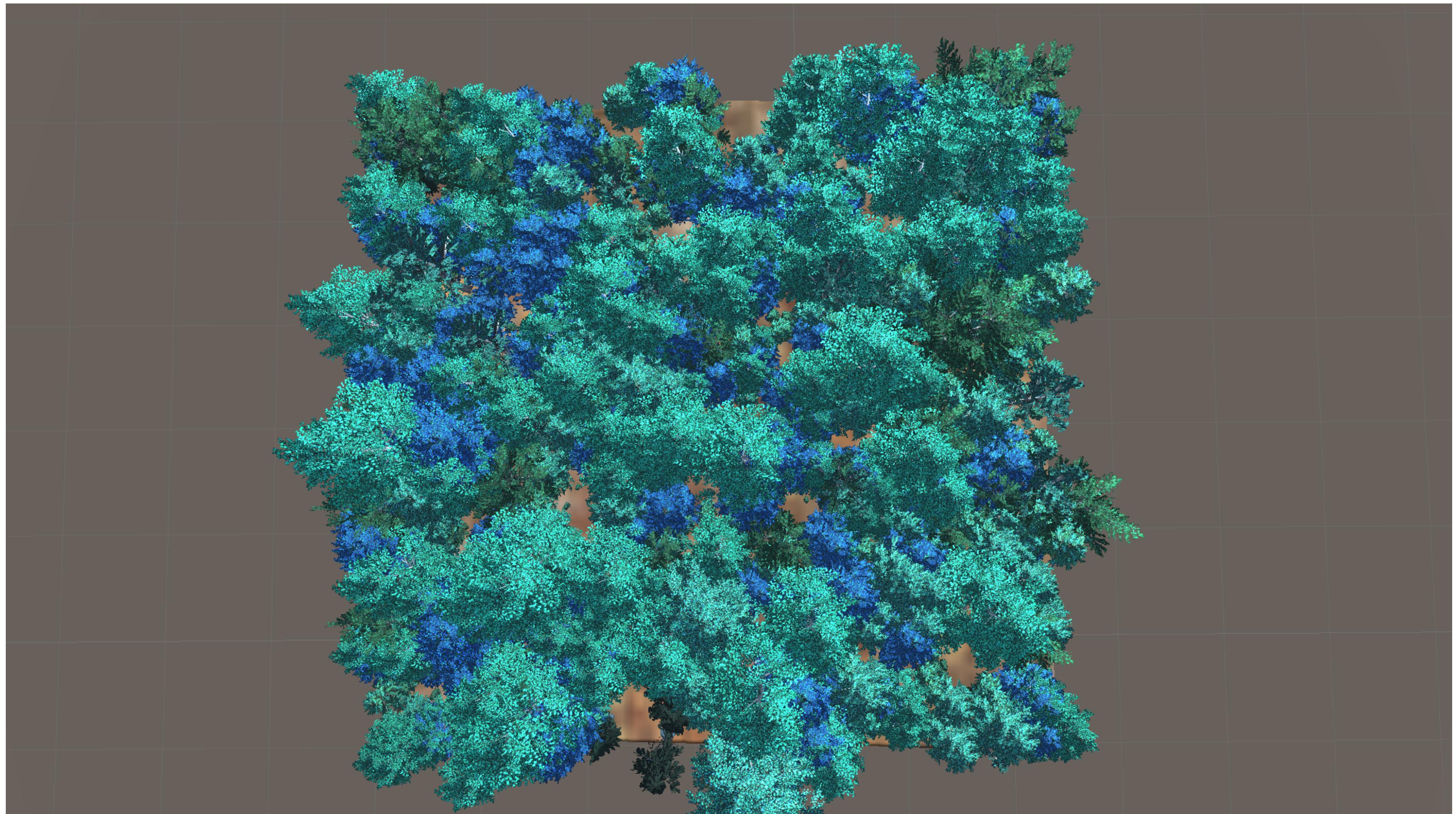
```
1 read.csv("~/data/ifs_all_data.csv") |> head()
```

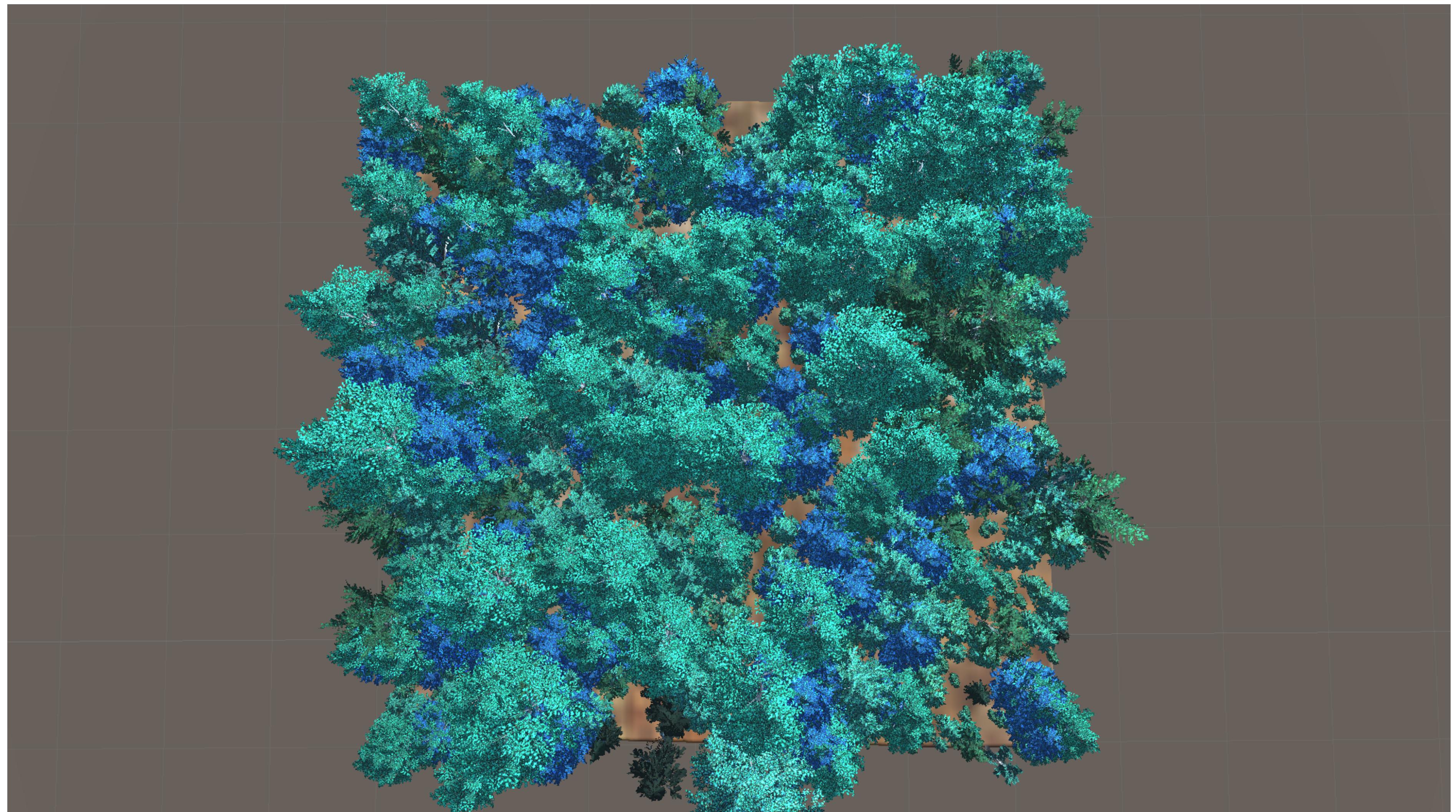
	Tag	Aspect	BLK	EAST	NORTH	ELEV	REL..ELEV	INTERPRETED.ELEV.	DBH85
1	1760		1	135.184	137.296	541.87	15.248	541.519	11.5
2	NA		1	127.491	139.673	541.54	NA	541.538	7.9
3	1768		1	120.338	139.649	540.59	NA	540.593	5.8
4	NA		1	121.828	139.959	540.56	NA	540.563	7.2
5	NA		1	124.514	137.519	540.93	NA	540.929	27.4
6	1764		1	130.178	137.482	541.96	NA	541.965	25.3
DBH00	DBH09	SPECIES	CODE85	CODE00	CODE09	CANKER00	SCALE00	CANKER09	SCALE09
1	15.7	18.3	1	1	1	1	25	25	5

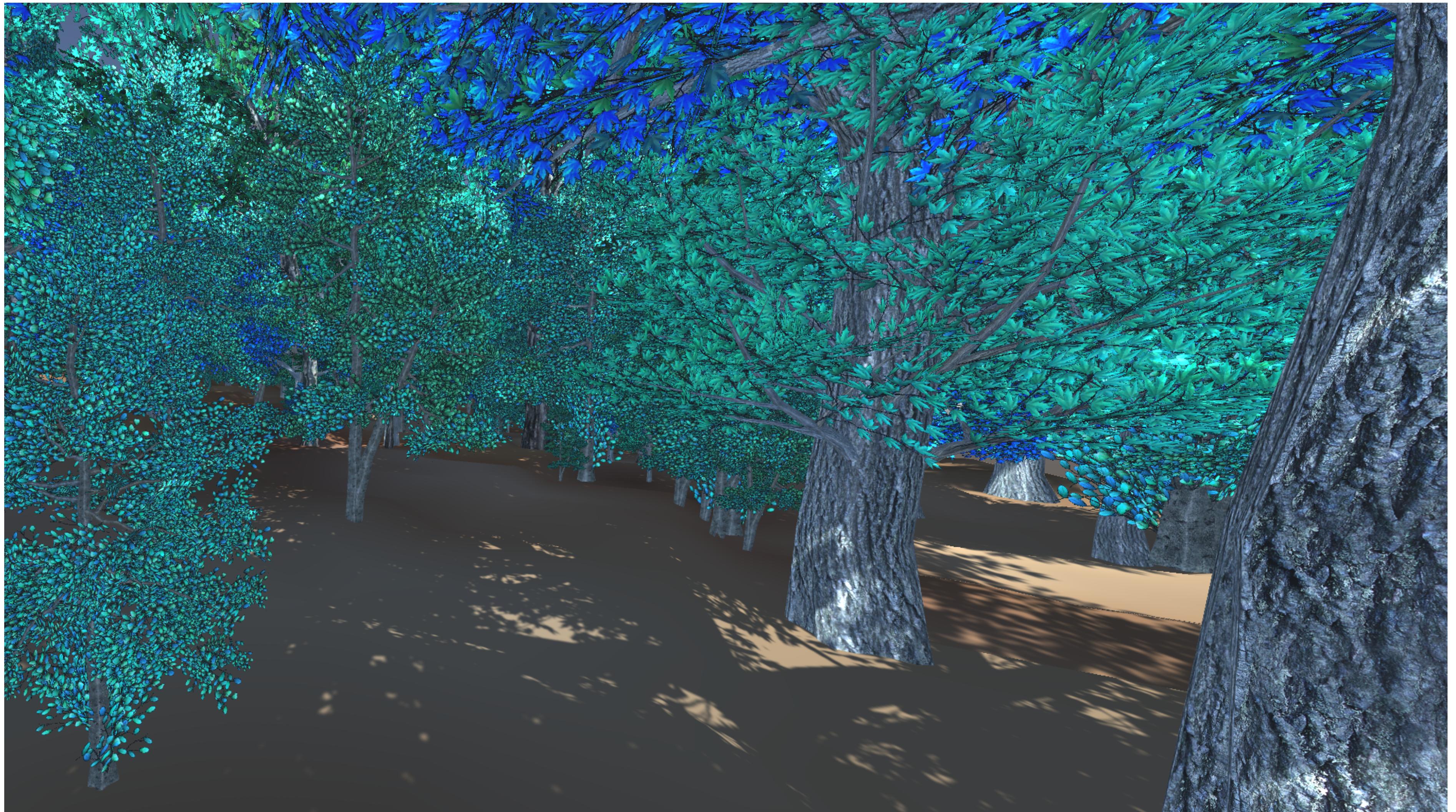


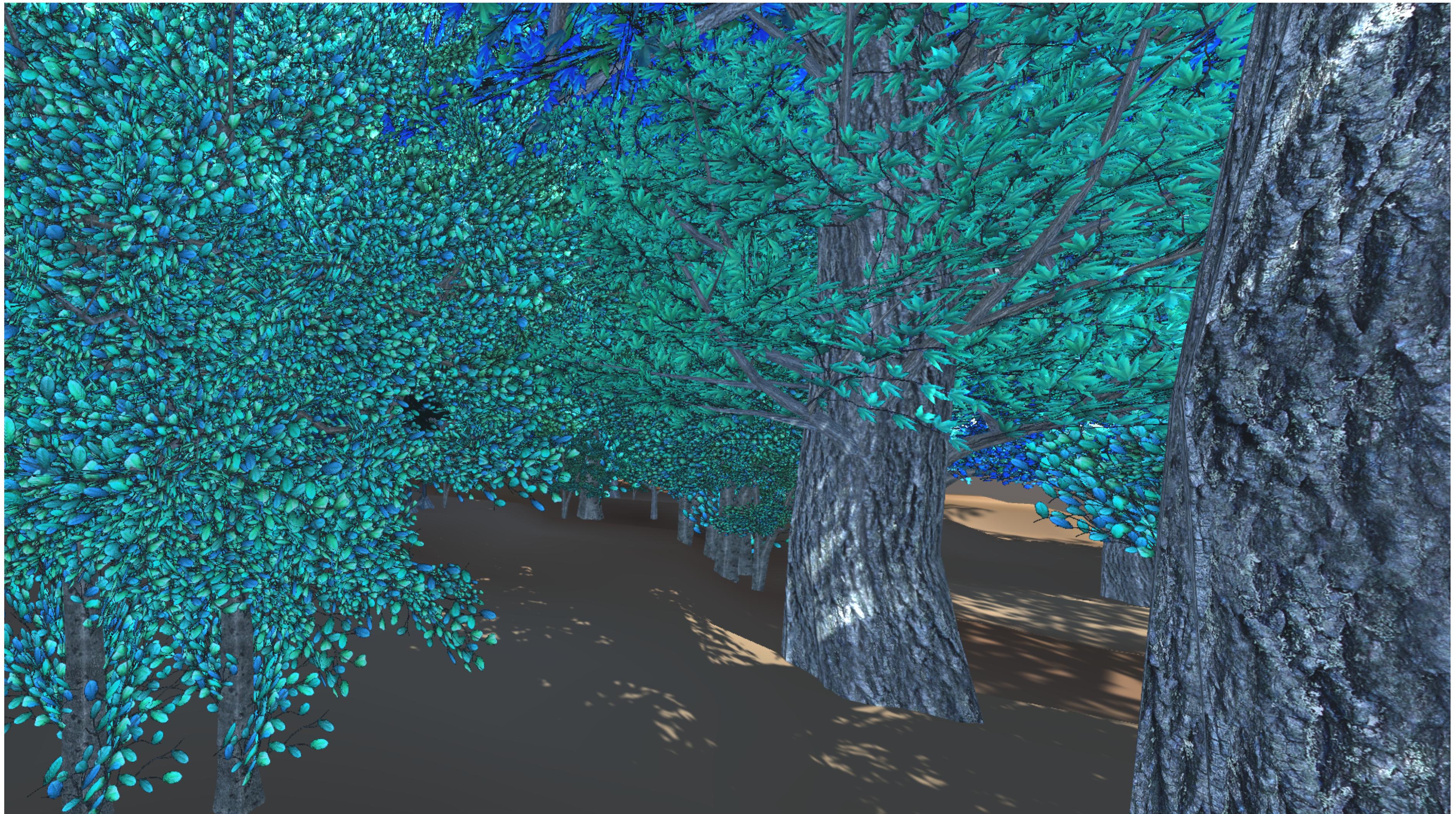


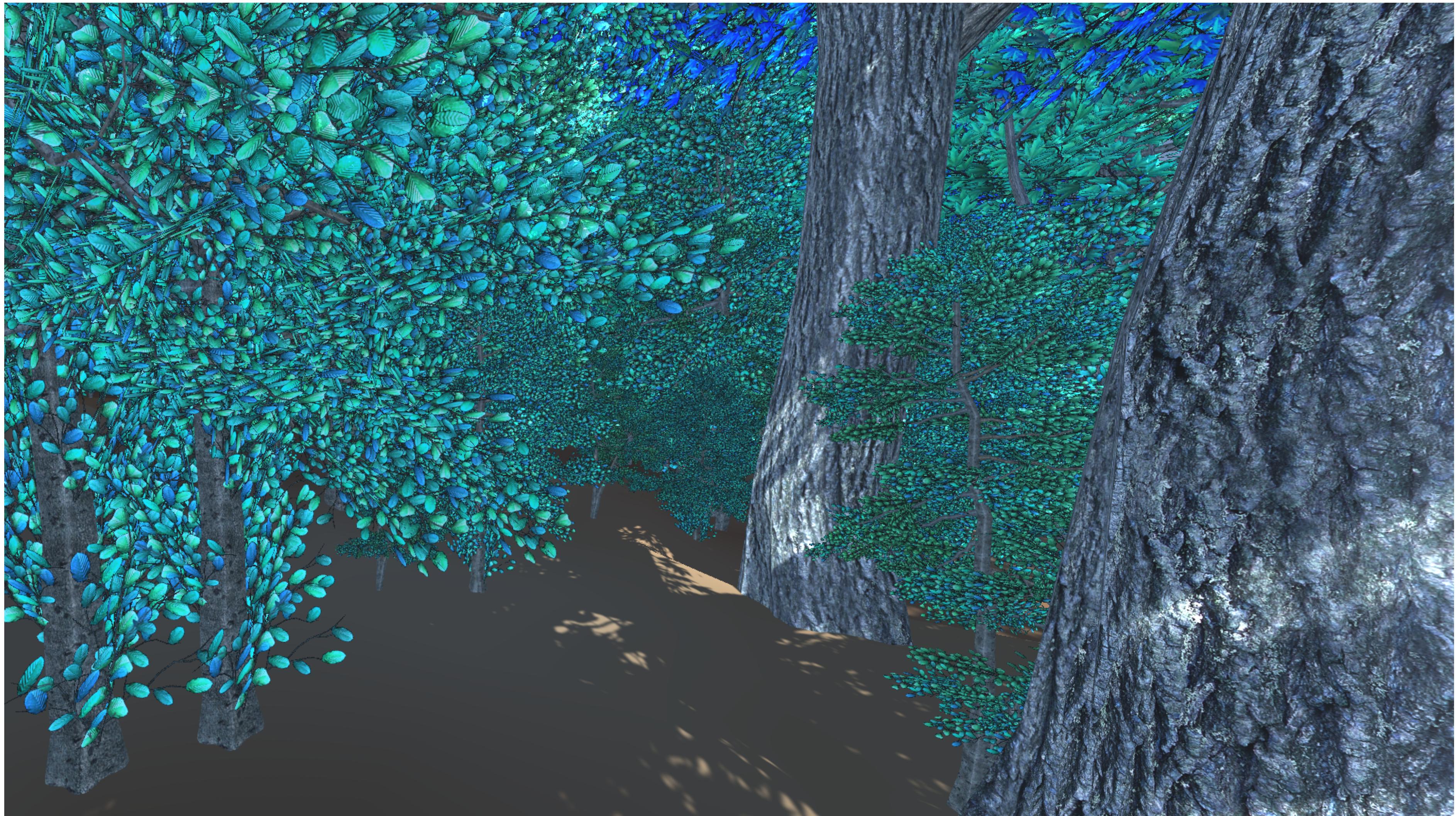












Thank you!

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Find me online:

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Slides available at mm218.dev/femc2022

