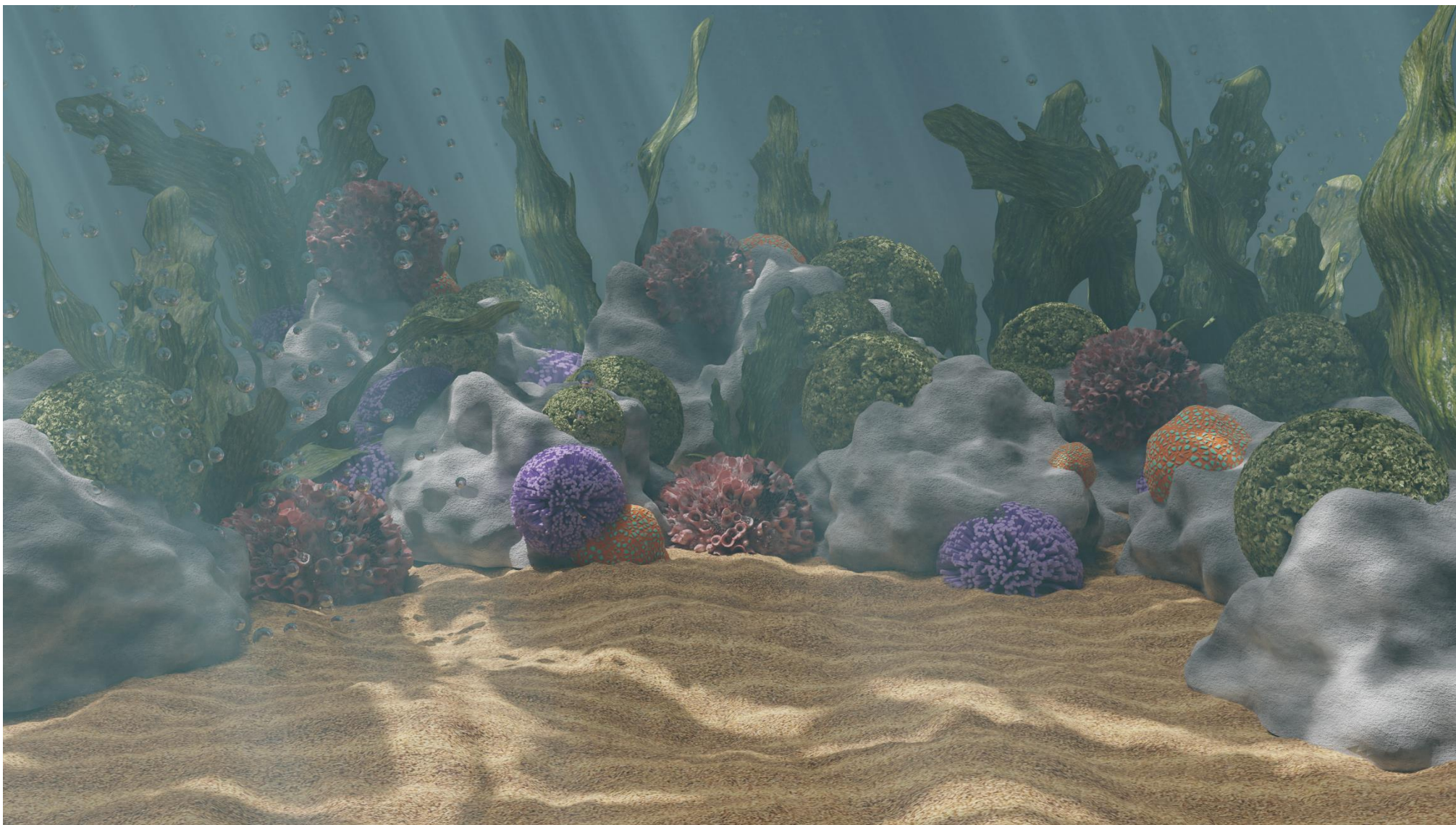


CS148 – Final Project – Fall 2021

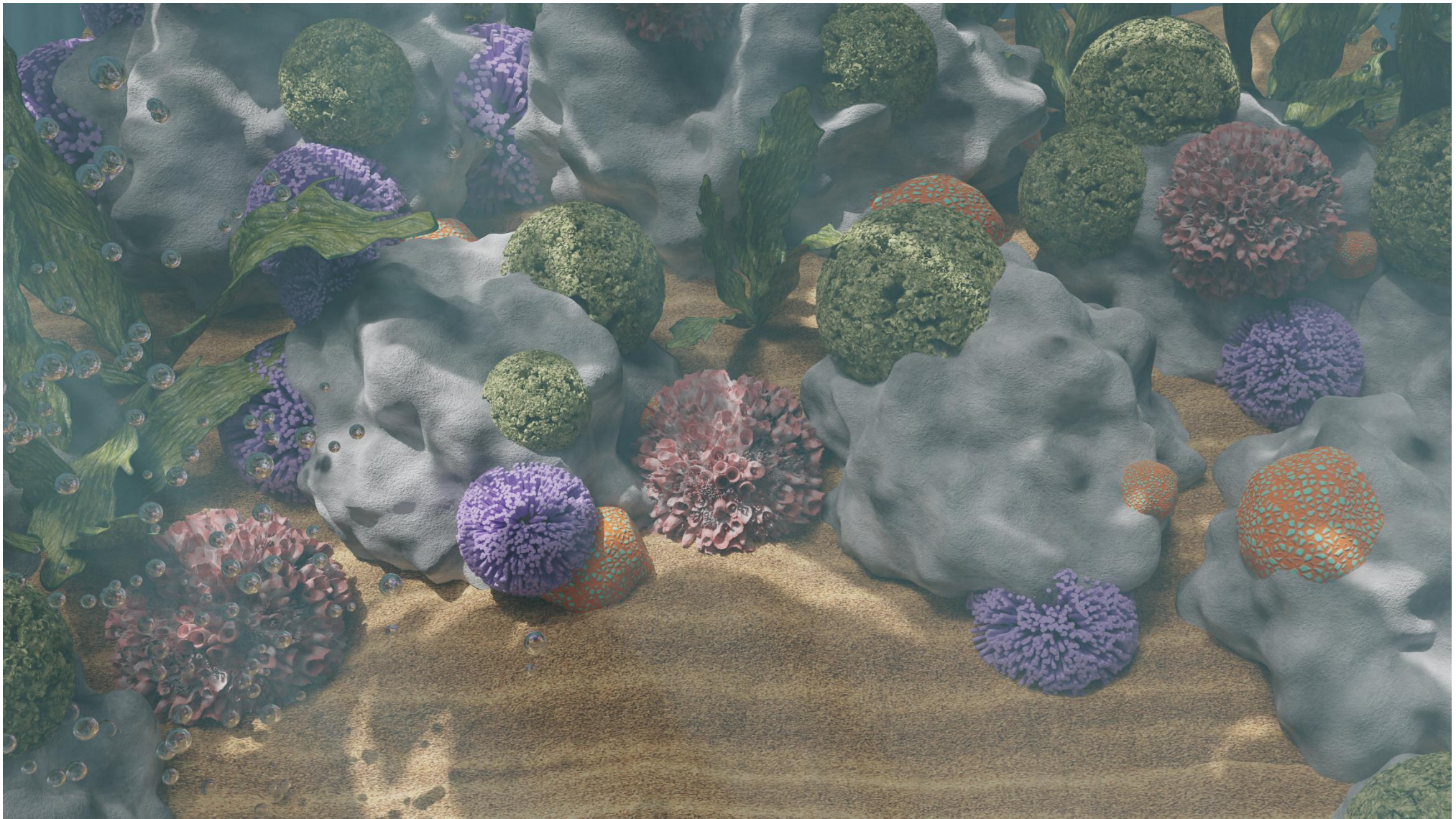
Contributors: Aditya Ramgopal Mundada (amundada@stanford.edu)

FINAL RENDERED IMAGE



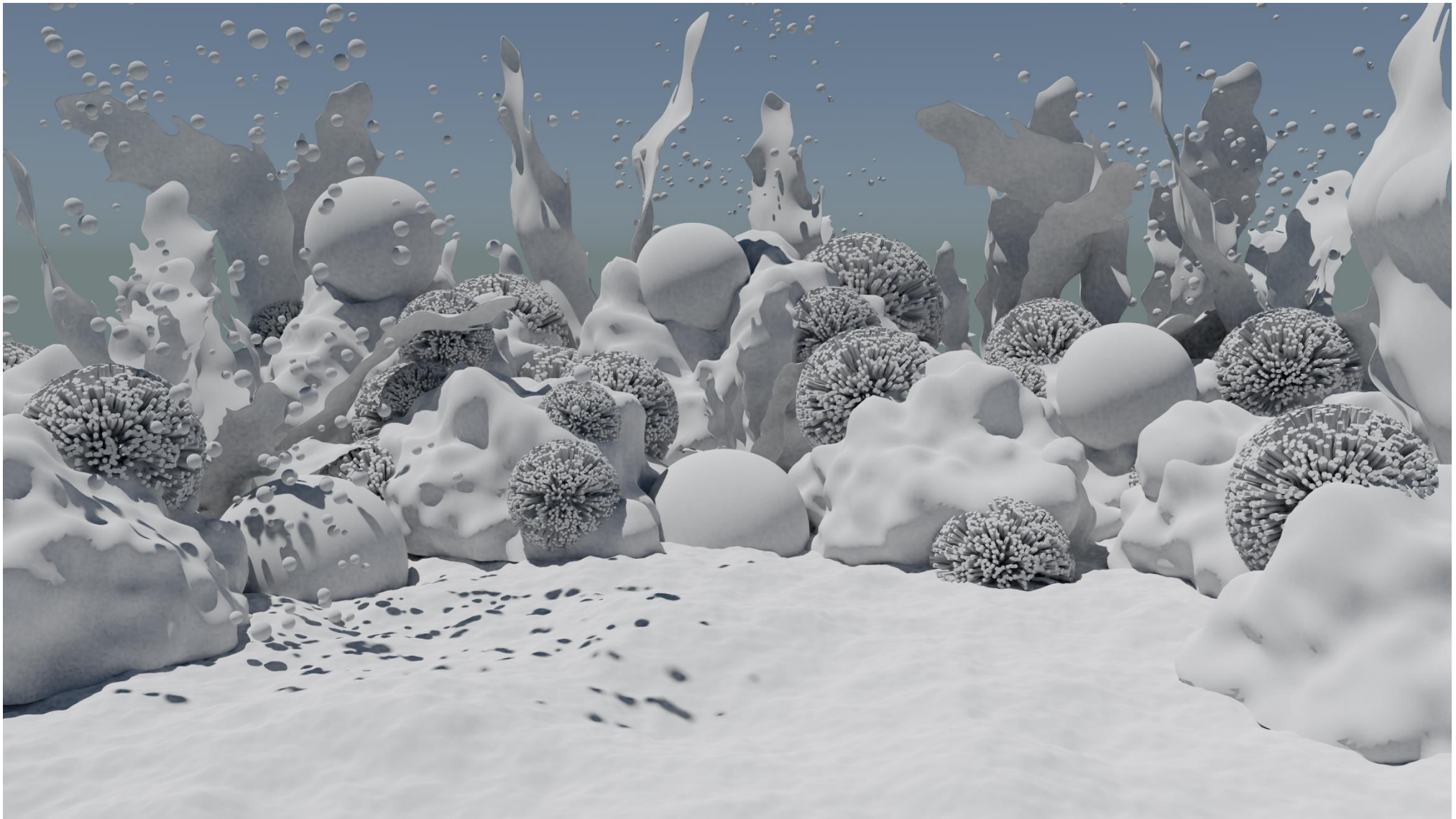
Rendered at 3840x2160 resolution with 128 samples per pixel and NLM Denoising turned ON.

VARIANT-A



Rendered at 3840x2160 resolution with 128 samples per pixel and NLM Denoising turned ON. Camera positioned above the scene at a 45 degree angle facing downwards.

VARIANT-B



Rendered with Diffuse-gray material override at 3840x2160 resolution with 16 samples per pixel and NLM Denoising turned ON.

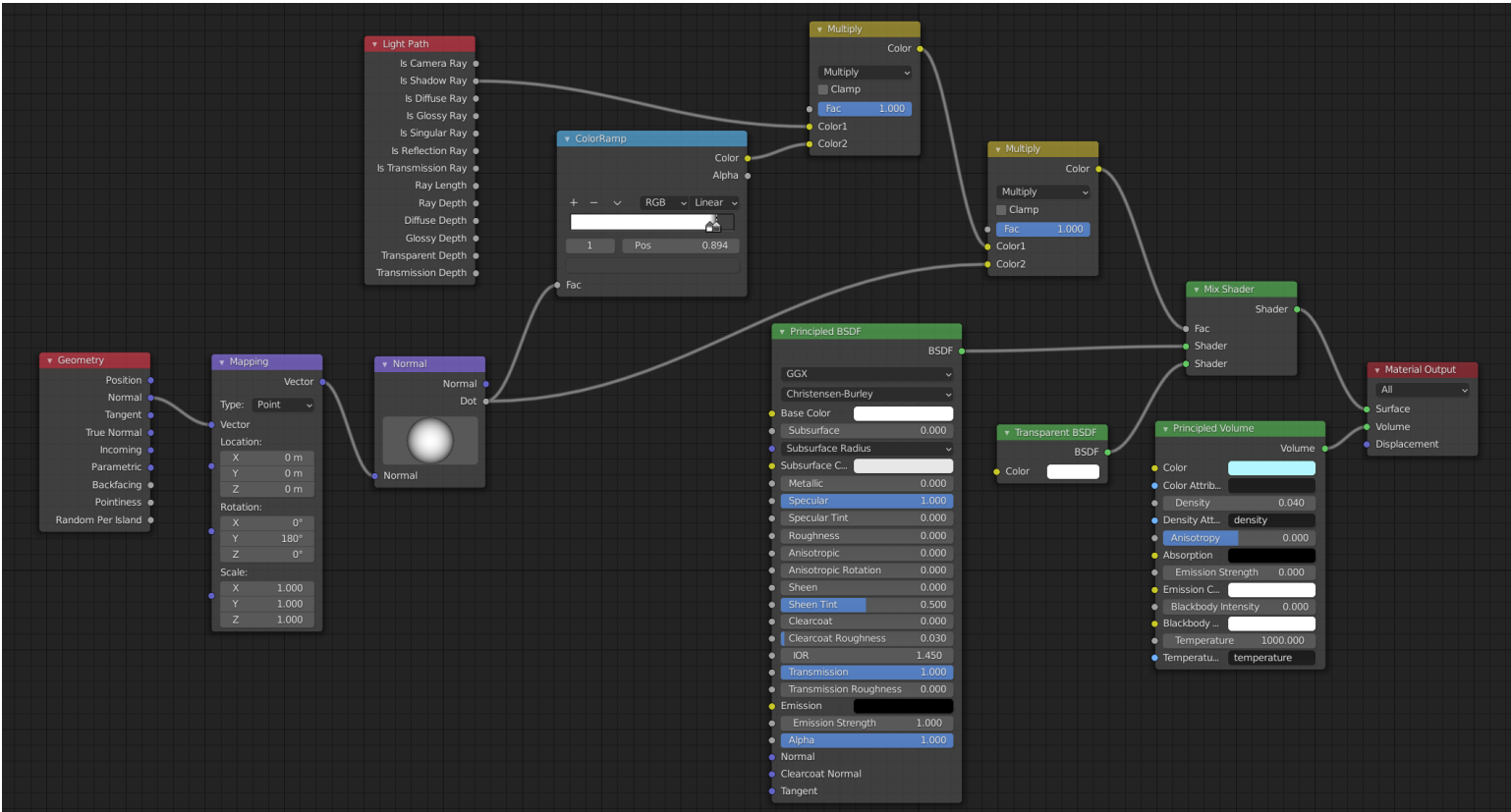
Note: The Ocean object is turned OFF from rendering as it's a volumetric object and rendering it in gray would make the scene completely dark (black) – camera is actually looking inside this object.

IMAGE ASSETS

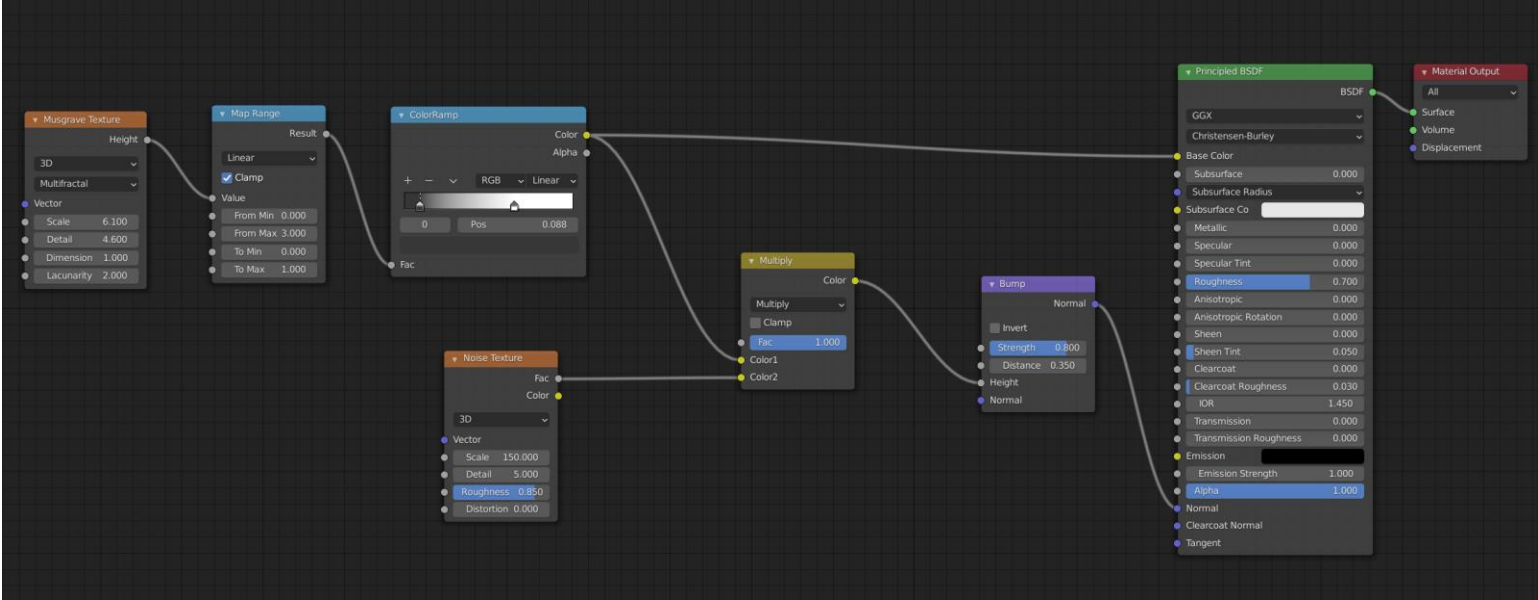
S.No	Asset	Source	Description	Reference
1	Seabed	Self	Made using subdividing a plane, applying displacement modifier, UV unwrapping it and then applying 'sand' texture.	https://www.youtube.com/watch?v=W3xp3jciQN8 https://www.youtube.com/watch?v=ZIXFZOulw7Y&t=1418s
2	Sand Texture	Online	Sand image used to morph 'seabed'	https://unsplash.com/photos/qX-04R51kTc
3	Ocean	Self	Made using a plane which was subdivided into at least 100 cuts and extruded and a procedural texture applied to create the water look and fake "God-rays" and "Caustics". The blender built-in "Ocean" modifier was used to simulate/animate waves which helps in creating the "God-rays" and "Caustics".	https://www.youtube.com/watch?v=s9RQ83BKcyI
4	Coral-1	Self	The base of the object is a Cube on which a subdivision surface modifier is applied along with a material designed using blender nodes like displacement and Voronoi texture to give the features on the surface and some randomness as well. We also incorporate mix shaders to give a beautiful white to red ramp of shading on the surface.	https://www.youtube.com/watch?v=eAFRDeAKhzc

5	Rocks, Corals (2-4)	Self	<p>Rocks: Icosphere as the base object which was applied with a subdivision modifier followed by displacement modifier and assigned a cloud texture. The displacement modifier was made to work relative to global coordinates to generate varying rock shapes procedurally. Rock texture was also generated using blender nodes.</p> <p>Coral-2: Made with base as UV sphere with a Blender particle system to model hair to generate tube like structure in the normal direction of the surface. The 'hair' structure was then converted to a 'Mesh' and the original UV sphere deleted. The spline was changed to Bezier and a procedural material generated through blender nodes like Voronoi Texture and displacement was applied. These nodes help in creating random pattern on surface to make unique objects.</p> <p>Coral-3: Same as coral-2 but with a different material to create a look similar to sea-anemone.</p> <p>Coral-4: The base of the object is same as rock – icosphere with Sub-division surface modifier and displacement modifier but the magic happens in the material where we use a combination of Voronoi and color-ramp to generate a two-tone object.</p>	https://www.youtube.com/watch?v=d1yvXx8IsFg
6	Bubbles	Self	<p>Modelled using a Particle System with gravity=0 and Object Instance = UV Sphere with Glass BSDF and transmission=1. The IOR of sphere is adjusted to simulate Air-inside-water. The bubbles get created only after running the animation for a few frames. In this image, the animation is run for 20 frames before the image is rendered.</p>	https://www.youtube.com/watch?v=EnO3nvmPouE
7	Seaweed	Online	<p>Found a low poly seaweed creation using armature and texture mapping of the leaves on the arms on CGTrader. The animation enables to simulate the leaves' movement under water. Five such orientations were at different frame numbers were captured and exported as Object and then imported in the actual project file to give a variety of plant orientation in the scene.</p>	https://www.cgtrader.com/items/2301153/download-page

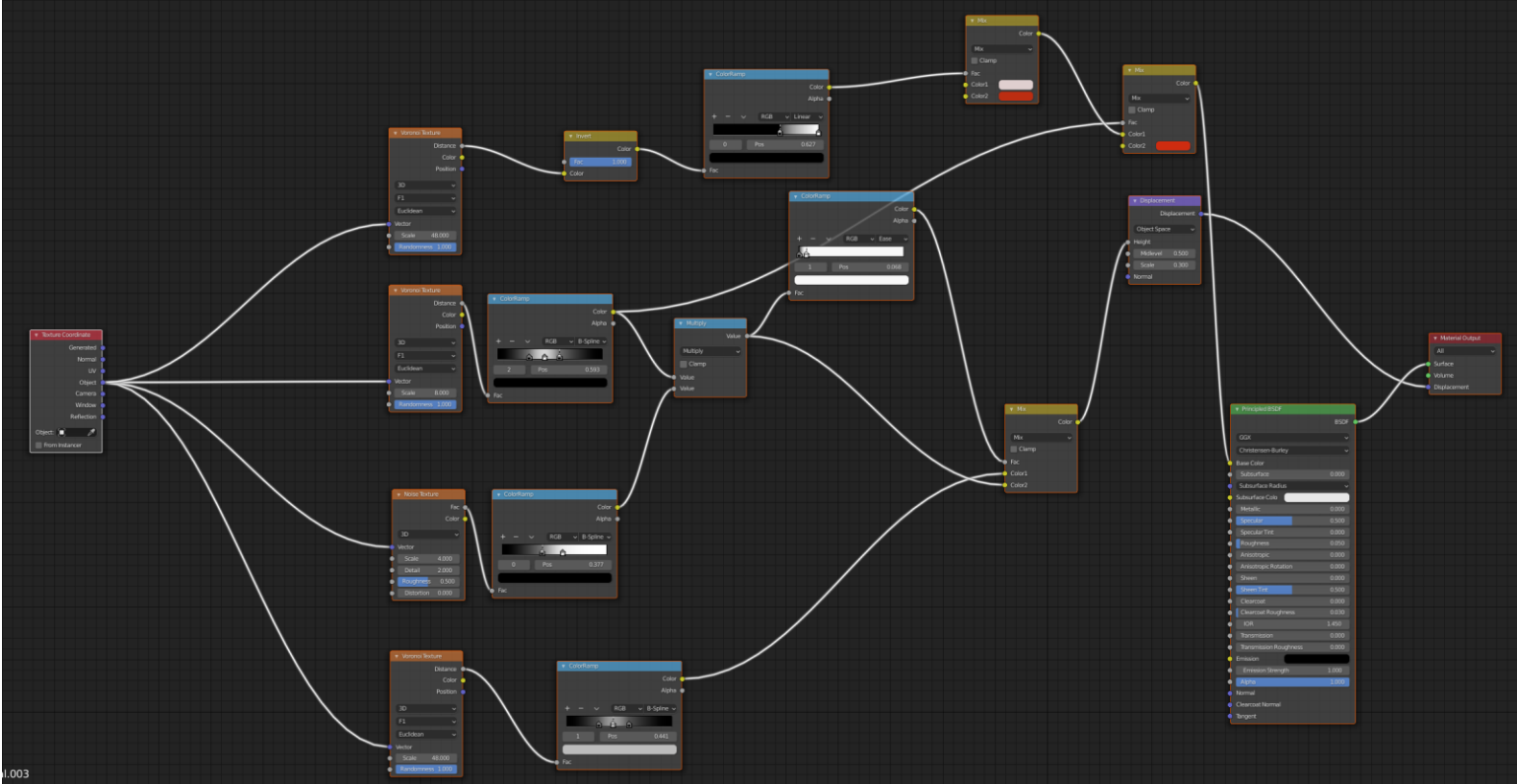
Ocean Material



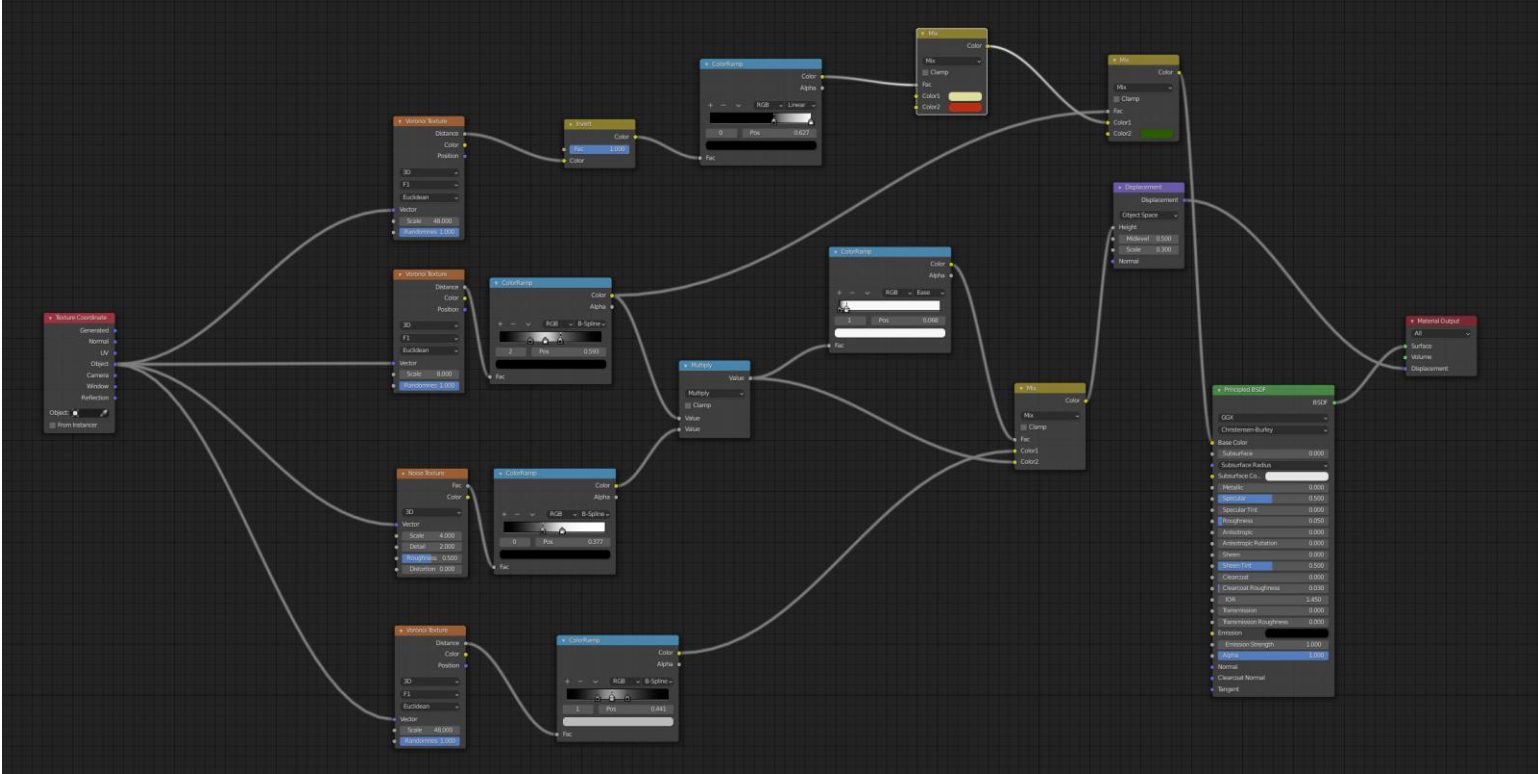
Rock Material



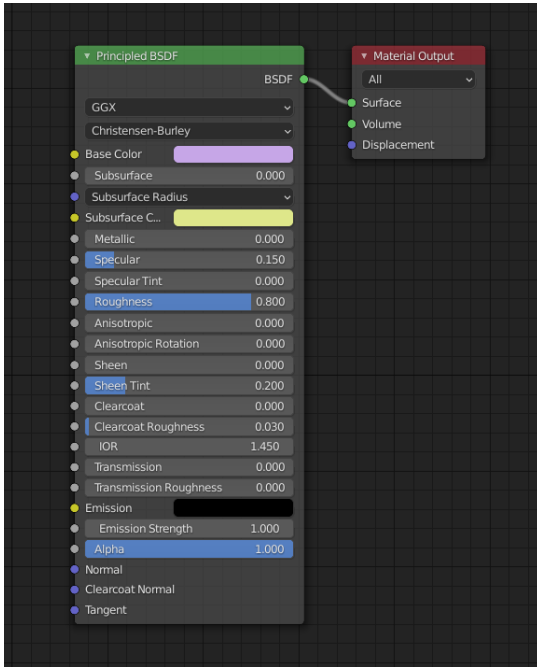
Coral-1 Material



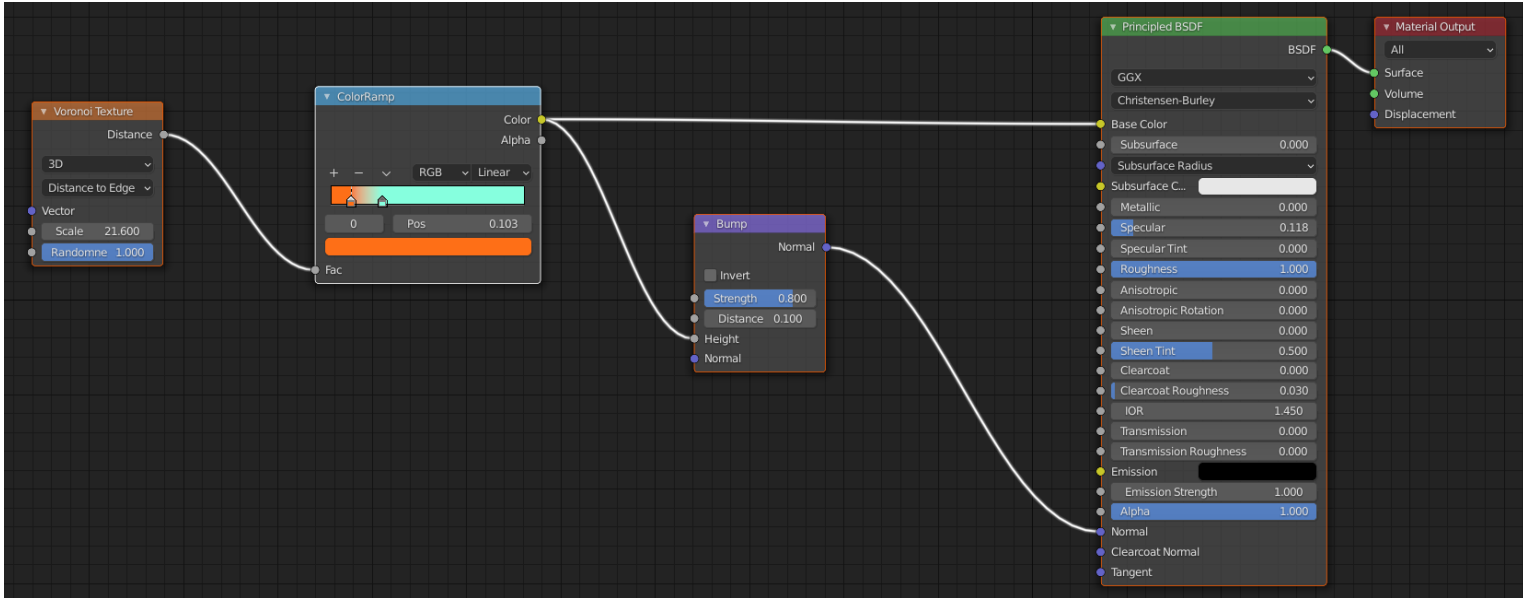
Coral-2 Material



Coral-3 Material



Coral-4 Material

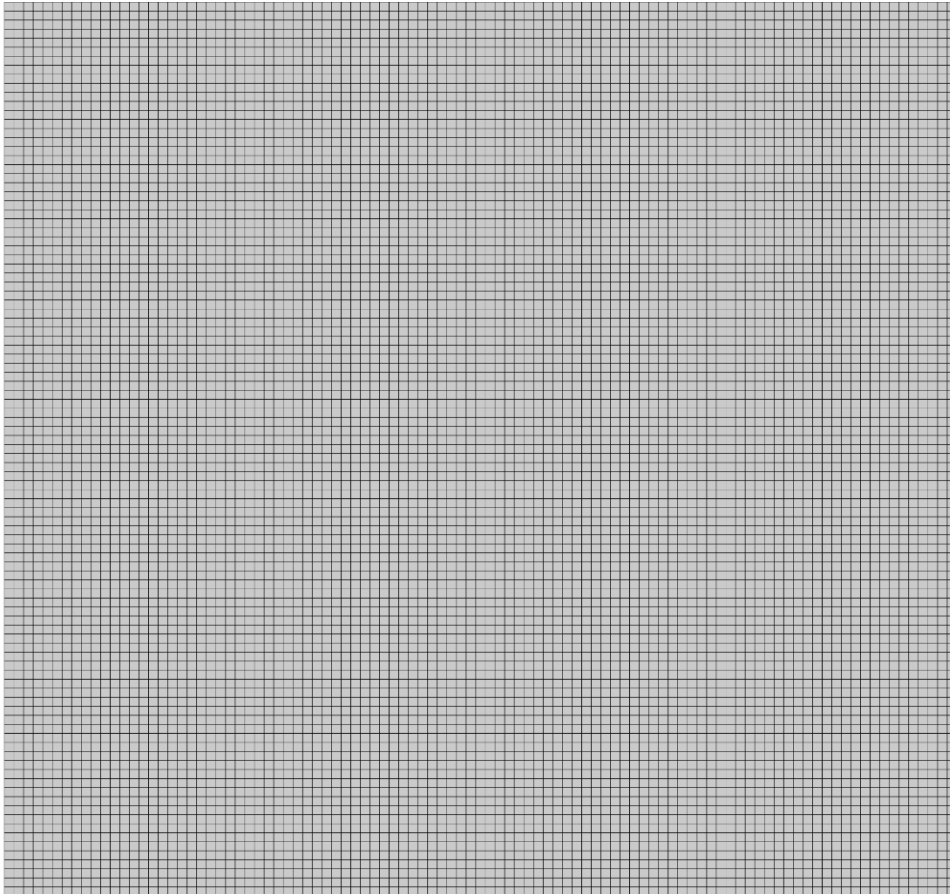


PROJECT REQUIREMENTS

S.No	Criteria	Qualification
1.	Main Geometry from Scratch	All objects except seaweed.
2.	UV Mapping	Seabed – check section UV Unwrapping and Texture on UV
3.	Texturing from Scratch	Corals and Rock
4.	Custom/Procedural Texture	Corals and Rock
5.	Advanced Blender/Cycles feature	<ol style="list-style-type: none">1. Ocean simulation using wave modifier to generate God rays and Caustics2. Used NLM Denoising to generate cleaner image.

UV Unwrapping

In the below image, the 'Seabed' is UV unwrapped and shown. The UV unwrapping was needed to apply sand texture image.



Texture on UV map

In the below image, the work is shown to map the texture onto the UV map.

