Seaweed farming spatial evaluation tool overview

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Seaweed products can have climate mitigating effects either by storing carbon or avoiding greenhouse gas emissions. Seaweed aquaculture needs to be scaled up to make an appreciable impact on the climate. Seaweed can also provide other environmental benefits, such as the ability to combat ocean acidification or reduce nutrient pollution, and it can provide economic benefits by means of supplemental or diversified income for communities that have historically relied primarily on fishing.
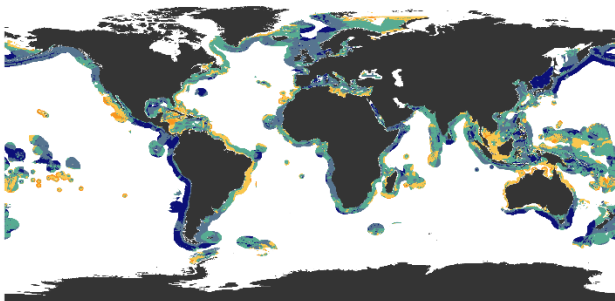
Not all locations are equally amenable for seaweed farming. Numerous factors influence a site's suitability. Evaluating all these factors in a systematic manner can be challenging. Furthermore, priorities will differ between actors involved in seaweed aquaculture.

We created a tool that uses GIS to score suitability for seaweed farming based on the potential amount of seaweed produced, cost, climate mitigation potential, ecosystem benefits, conflicting uses of marine space, and temperature suitability for seaweed growth in the long term. Users can identify suitability hotspots and understand how these hotspots shift when different conditions are prioritized. This tool can also identify where seaweed can be farmed at user-chosen cost thresholds if maps of farming cost are provided. This can aid in identifying the confluence of favorable conditions and profitable or low-cost farming locations.
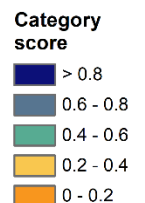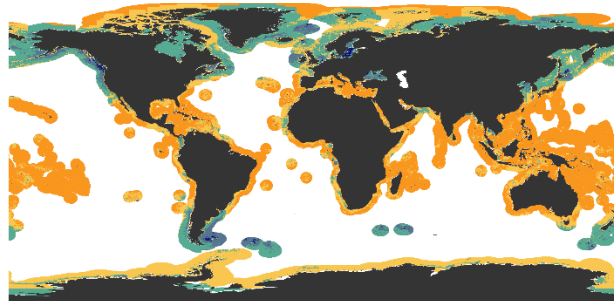
This tool and accompanying user guides have been created for ArcGIS and R. We want to get this tool into the hands of groups interested in expanding seaweed farming to aid in planning for regional initiatives supporting seaweed aquaculture activities, or potentially for planning farm locations if data with enough granularity is available. These tools will be hosted on the Environmental Defense Fund's Fisheries Solution Center website for distribution to the wider seaweed farming community. Finally, we seek to provide training on how to use the tool, either virtually or in person.
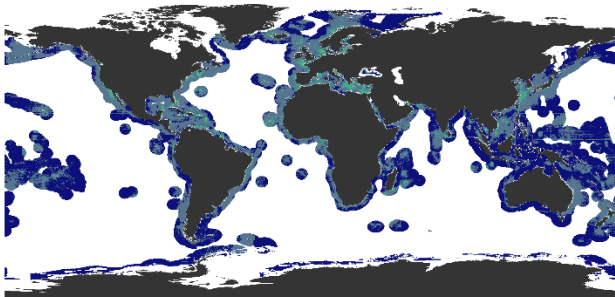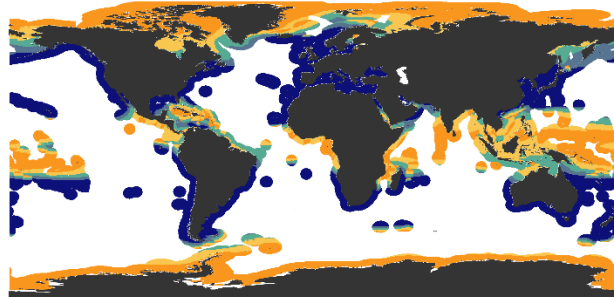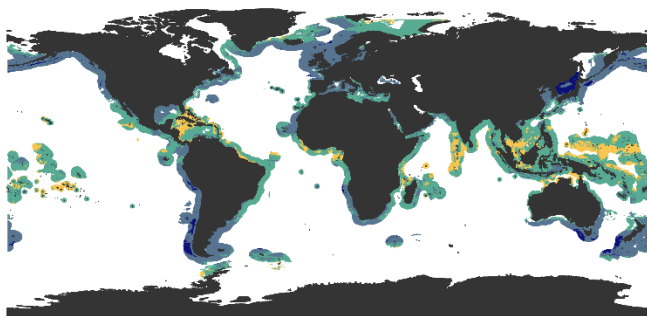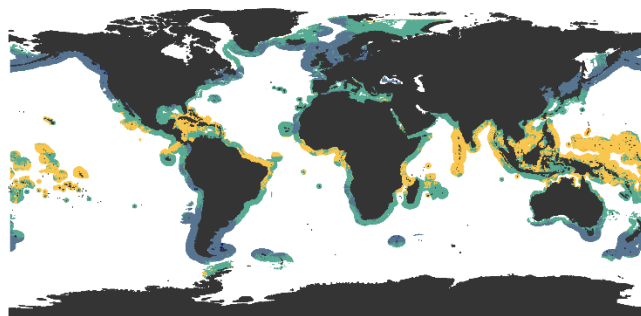
Example outputs:

Figure 1: Scores of seaweed farming favorability for condition categories considered in the tool. Higher scores (cool colors) represent more favorable conditions for seaweed farming than lower scores (warm colors).
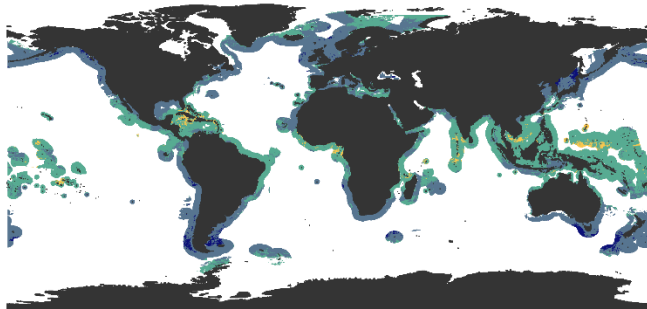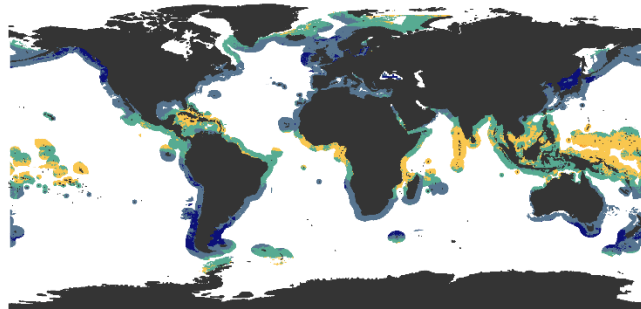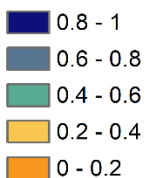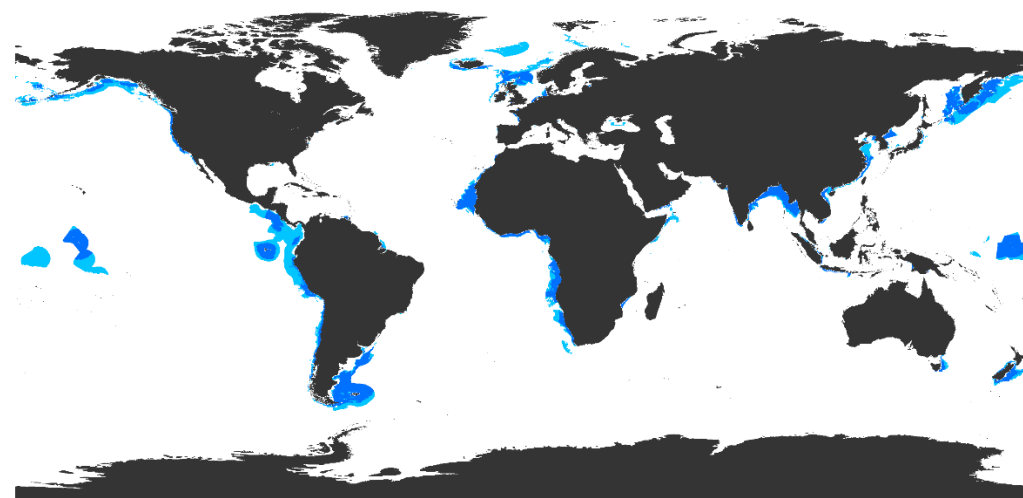
Figure 2: Maps of favorability scores for seaweed farming on an EEZ-wide scale with greater emphasis put on specific categories. Higher scores (cool colors) represent more favorable conditions for seaweed farming than lower scores (warm colors).

Figure 3: Maps of where seaweed can be farmed for net costs at or below 0 USD and 500 USD per ton of carbon dioxide equivalent when used for a specific product. Net cost may be changed based on expected cost and income for growing different products.