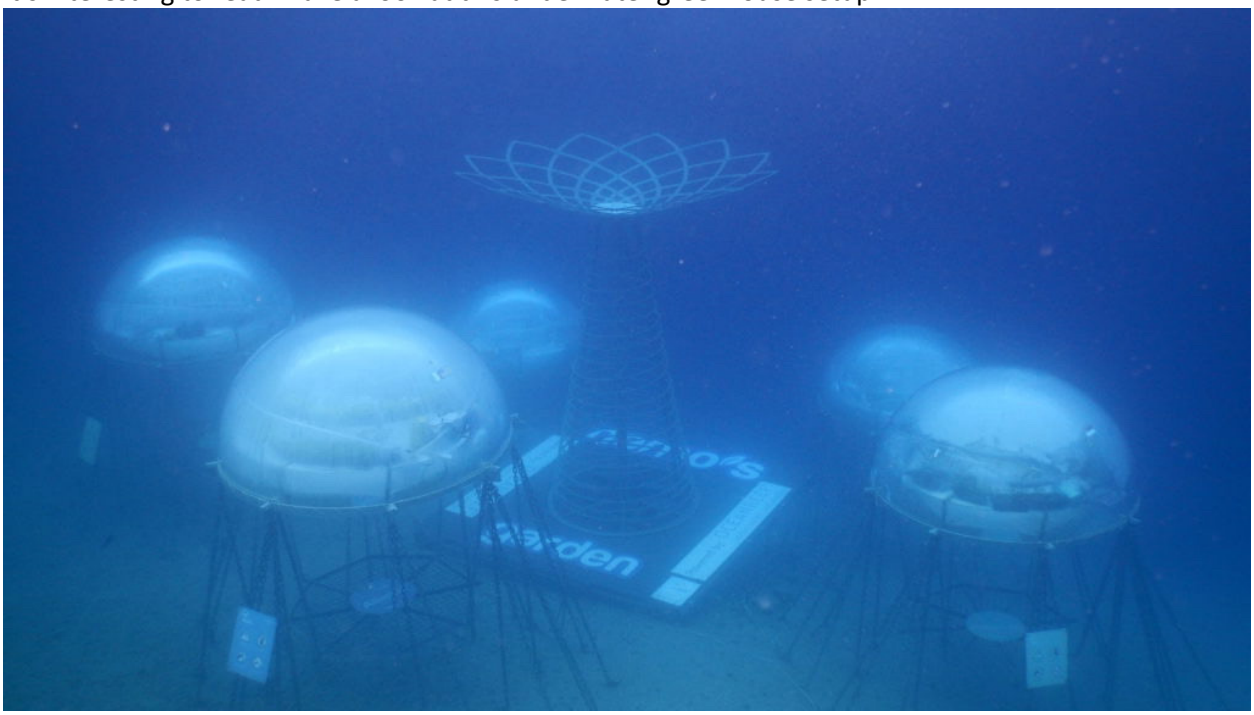
Project Nemo's Garden

A friend sent me this link of a high-tech way to farm underwater: http://www.nemosgarden.com/science-behind-nemos-project/underwater-vs-standard-agricolture/. It's interesting to read. Take a look at this underwater greenhouse setup:



It's basically putting farms underwater, really, as greenhouses underwater. This is not growing marine organisms (kelp, fish, etc.) but terrestrial organisms (vegetables, e.g.).

Motivation: reduce water use and fertilizer pollution, as primary goals, it seems

Proposed gain: lower water use: Likely to happen, since surrounding seawater cools the surfaces and condenses the water transpired by plants back to liquid water. The claim that no fresh water need be added is false, since harvested crops take out water. The condensing action works in oceans and big bodies of water. It would not be "useful for those locations far from the bodies of water available," because of several things:

* Water evaporates. Or, one wishes to prevent that with a covering:
* Temperatures rise very high unless the artificial body of water is very deep (has lots of capacity to absorb solar energy while only warming a bit....but that would require pumps)
* A covering costs lots of material and energy.

Proposed gain: less pollution (even claimed as zero pollution): "a liquid product of natural origina liquid product of natural origin is applied..." – where did that come from? Sounds like liquid manure, which is nice to use up rather than to process to products of no value, but:

Proposed gain: eliminating the need for pesticides and disease control agents: that fertilizer is but one of many ways to bring in outside biological contaminants. Once a disease gets into a hydroponic system, it spreads like wildfire. Without soil microorganisms as natural control agents, a hydroponic system has to

be monitored very carefully...and restarted from scratch with full decontamination using strong chemicals (bleach, for example).

Proposed match to land productivity (implied, not explicitly claimed): a toss-up. A substantially sealed system has the benefit of avoiding problems of hail, droughts, storm damage (though ocean and big-lake storms are incredible and can rip up a Nemo garden) and some temperature extremes, which often clobber land productivity. On the other hand, light levels decrease at depth in water. How far down does one go to avoid storm waves, so, how much light does one lose? The relation of light intensity to productivity is complex, since full sunlight saturates crop photosynthesis (the excess light is wasted) and the utility of light increases with the amount of light scattering (diffuse light, as might be generated in a water column with some particulates in the water) is used better.

Other notes: (1) A hydroponic system needs water circulation and aeration. So, the system needs a power source. This could be photovoltaic, but the structure holding the cells and the power lines need to be robust against wave action or, for inland ponds, from good old winds and hail. (2) How much extra area for food production can be put into play? We don't want to clog up the continental shelf area off our coasts for ocean-based Nemo gardens, and, even if we did, that area is pretty modest compared to land crop areas. Setting up dryland areas with water tanks is hugely expensive compared with normal field cropping, not to mention the problem of getting all the water to set up in the first place.

Overall, it sound nice at first, but it places so much faith in failure-proofing technology and in very weak numbers (economics, plant physiology, engineering challenges). If you were to invest, do it soon and sell out fast; it will not keep going, alas.