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Quantifying environmental impacts associated to sodium alginate extraction from seaweed

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Seaweeds have been harvested along coast line for different purposes. Potential uses of harvested seaweeds depend on the type, being used either as food for human consumption, feed for aquaculture sector, or fertilizers due to their nutrients content. Kelps —which grow along the West coast of the United States— present a high ratio of sodium alginate within their cell walls, a compound widely used by pharmaceutical and food industries because of its features: viscosity, gel and film formation capacity (FMC Corporation, 2015). This fact explains the increasing interest of extracting alginate from this seaweed at industrial level. During the last five years, several projects aiming at establishing an industry around the

algae *Nereocystis luetkeana* have been developed in the State of Washington, as a possible boost in an economically depressed coast area. In a first phase of this development, a pilot plant is to be created as a spin-off of the University of Wyoming (Laramie). This study focuses on the environmental profile of sodium alginate extraction from *N. luetkeana* in the projected pilot plant by means of life cycle assessment (LCA) methodology. The extraction method assessed was based on a sequence of stages including cutting, soaking with formaldehyde, washing with several solvents, pre-extraction with sulfuric acid and alkaline extraction. The application of Life Cycle Assessment methodology to this process allowed identifying the main hot spots and thereby the inventory items responsible for the environmental impact. The results obtained together with the improvement actions evaluated should be considered for the sake of the optimal valorization of natural resources.

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