Seaweed

Scotland's Sustainable Super-Plant of the Future?

Seaweed, that smelly stuff that washes up on the beach. Seaweed; a generic name leading to a negative perception, a weed, a nuisance. 'Seaweed' is, more correctly a macroalgae; a vital contributor to a healthy marine ecosystem. Seaweeds can modify water flow, dissipating wave energy, creating habitats and shelter for other marine plants and animals, thereby providing spawning grounds and nurseries. Many organisms including birds, marine mammals and humans rely on the high biomass availability and diversity of the habitat that seaweeds support[1].

Throughout history across cultures, seaweed is intertwined with human activity. Whether as a food source, a fertiliser, medicine or vital ingredient for industrial innovations it has played a somewhat forgotten central role in human life.

This scheme of work is built on the third level of Scottish Curriculum for Excellence and explores this fascinating organism in four phases; the role of seaweed in a marine ecosystem, its cultural history, and its industrial promise as a sustainable resource all framed within a Scottish context. In the final phase, students embark on a group enterprise project to develop a sustainable solution to food packaging using knowledge from the first three phases.

Marine Ecosystem; Natural Balance (2+ periods, 1 field trip)

Basic Biology of Seaweed	Seaweed Survey in Situ	Seaweed in a Scottish context
Covering the basic biology, ecological niche & the key role that seaweed plays in balancing a marine ecosystem, with reference to Scottish species. Highlighting the interconnectivity of the environment and ideal conditions for growth.	Investigative sampling and surveying of the intertidal zone of a local beach & identification of species present. Ideally working with external organisations or local environmental groups e.g. Countryside Rangers or Restoration Forth.	Classroom based mapping data from the fieldtrip survey & identifying how this fits within the wider Scottish context. Threats to areas of seaweed growth from human activities, or the climate crisis will be explored.

SCN 3-01a, SCN 3-02a , SOC 3-14a

Seaweed and Culture; Folklore and Food (3+ periods)

Historical/Religious context	Literary context	Seaweed as a Food Source
Exploring links between Scotland's cultural & industrial history with seaweed. Emphasis on folklore and tradition, importance in daily life expanding to a world religious view.	Understanding the importance of seaweed throughout Scottish folklore and literature. Researching examples of seaweed creative writing & creating seaweed inspired poetry.	Investigating nutritional benefits of seaweed, seaweed as a staple in the diet of other cultures. Exploring how to introduce seaweed into diet by baking dulce infused bread and oatcakes.

RME 3-04a, RME 3-04d, SOC 3-02a, LIT 3-06a, ENG 3-17a, ENG 3-19a, HWB 3-30a, HWB 3-31a

Industrial Seaweed; a Sustainable Solution? (3+ periods)

Making a Biofilm	Establishing a seaweed farm	Value to the Economy
A practical lesson where students will create a Biofilm using seaweed extracts (predominantly agar agar) and then explore potential industrial uses of this biofilm.	Identification of a location suitable for an industrial seaweed farm by introducing the concept of a 3D ocean farm[2] as a sustainable and viable commercial business model.	Investigation into the potential economic value of seaweed in Scotland, by looking at other countries, the availability of resources and potential for the growth of the industry.

SCN 3-20a, SOC 3-08a, MNU 3-09a, MNU 3-09b, MNU 3-07a

Sustainable Enterprise Challenge (one full day)

A Business Plan	Product Design	Product Appeal
Identifying possible plastics which can be replaced by a bioplastic generated from seaweed & investigating viability of setting up a business to create seaweed biofilms in Scotland.	Identification and design of a product with a high environmental impact which could be reduced by utilising bioplastics generated from seaweed to replace plastics used currently.	Exploring how to marketing the product to consumers making it attractive whilst highlighting and explaining the importance of its sustainable origins.

SOC 3-20a, SOC 3-21a, TCH 3-04c, EXA 3-03a, EXA 3-06a

Intention: Students will learn how ecological imbalance caused by human activity impacts on a marine ecosystem, alongside historical industrial and cultural applications of seaweed as a natural resource. Students will also learn about seaweed's cultivation potential for it to restore balance to marine ecosystems[2], whilst providing a sustainable alternative to some plastics.

Assessment: Embedded formative assessment whilst completing a workbook with progress checked at the end of each phase of lessons. A group presentation at the end of phase four will lead to one group being crowned the Scottish Sustainable Seaweed Superstars of the School.

Wider application: Building an understanding that the world's reliance on hydrocarbons is unsustainable is central to preventing ecological devastation. As is understanding that the world won't give up its addiction without sustainable alternatives. This scheme of work aims to address that whilst also exploring the interconnectedness of the natural word with our cultural heritage, alongside some basics of viable business models and marketing.

Sources: **1.** Scottish Government; Wild Seaweed Harvesting Strategic Environmental Assessment
2. Greenwave.org; Our Model

This poster was created as an assignment for PGDE (Secondary): General Science, Moray House, School of Education and Sport,
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