

Social, Environmental and Economic Impact of Natural and Cultured Pearls



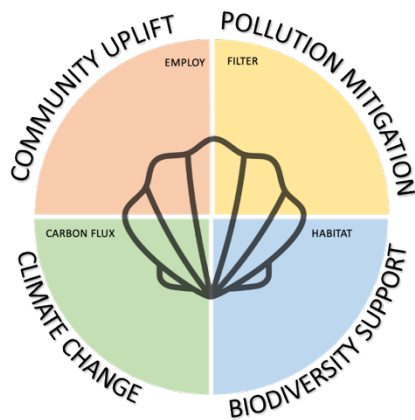
Preamble:

Sustainability can be defined as meeting the needs of the present without compromising the ability of future generations to meet their own needs (UN Brundtland Commission 1987). Economic viability, environmental protection, and social equity are the three pillars of sustainability. Those components - sometimes also called the triple bottom line - describe the impact of an organisation beyond its financial performance.

While still having room for improvement and not dwelling on some past practices, both natural and cultured pearls are uniquely positioned amongst gems to eventually become and profess sustainability as part of their appreciation alongside beauty and rarity.

Information:

- **Community:** Pearls grow for extended periods in molluscs requiring protection and care, creating employment and community engagement in often remotely accessible areas.
- **Climate:** Ocean acidification challenges shellfish calcification¹ Molluscs both capture and release Co2 ².
- **Biodiversity:** Overexploitation and habitat loss are the most serious threats to marine life. Invasive species and diseases are the next ones³.
- **Pollution:** Sewage, agricultural runoffs, industrial waste dumping and oil spills all contribute to nutrient and heavy metal ocean pollution ^{4&5}. Today's global abundance is estimated at approximately 82–358 trillion plastic particles weighing 1.1–4.9 million tonnes⁶.

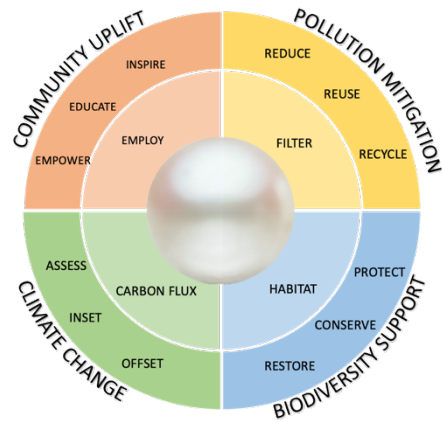


Mollusc driven impact on community and ecosystems:

Molluscs and pearl products generate value for communities (employment), impact climate (carbon capture and release), affect biodiversity (abundance and diversity), and mitigate pollution (water filtration). With this in mind, and while recognising room for overall improvement, natural and cultured pearls have often called the only inherently sustainable gems.

Information:

- A significant volume of direct employment is generated globally in both natural pearling and culturing (salt and freshwater) operations.
- The Clearance Rate of molluscs ranges from 2 to 50 litres per hour depending on the species and maturity of the animals. They filter and retain pollutants and their shell and soft tissues extract phosphorus and nitrogen⁷. The average removal rate of nitrogen by shellfish is stated to be 520 bs acre⁻¹ year⁻¹ (58 g m⁻² year⁻¹)⁸.
- Oysters and seaweed can double marine life abundance and increase its diversity by 30%⁹ whilst freshwater mussels can be raised alongside fish and algae in a circular relationship where the waste of one becomes the resource of the others.
- Cultured pearl farms may be thought of as suspended oyster reefs and generally have a low carbon footprint¹⁰ which can be further improved through on-farm, up and down-stream emission reduction best practices¹¹. A Cultured Pearl farm, of 400,000 shell, reportedly sequesters 47.5 tonnes of carbon, CO₂ sink over a period of four years¹².



Farmer/Natural Pearl fishers impact on community and ecosystems:

The entire journey of a mollusc is recorded within layers of nacre and reflected by the virtues/ value factors of the natural and cultured pearl(s). There is a clear incentive for farmers/natural pearl fishers to further amplify the mollusc benefits to communities and ecosystems as it customarily results in better quality pearls that improve the economic benefits to the farmers and fishers

Information:

- Freshwater, saltwater, cultured or natural pearls, and molluscs each have a different impact and require a different level of effort to graduate from being sustainable to consistently deliver a positive social and environmental impact.
- By the very nature of natural and cultured pearling, healthy water leads to healthy molluscs therefore farmers/natural pearl fishers protect and support natural resources and the environment.
- Sustainable harvesting and farming techniques used by mollusc/pearl fishers and farmers reduce environmental impact and preserve biodiversity.
- By contributing to the local community's development, farmers/natural pearl fishers promote self-sufficiency through education and training.

Traceability and transparency

The best approach to identifying a pearl's social, environmental, and economic impact is first to identify its type and origin (natural, cultured, saltwater or freshwater). Pearl traceability solutions are emerging but buying from a reputable source remains a good approach. Your suppliers may not know all the answers to the questions below presently, but asking them about their pearls and best practices will eventually be beneficial towards the development of a traceable, transparent and trustable product. A responsible supplier will understand the need for traceability and transparency.

Questions to ask

Community:

- o Do you offer fair local employment opportunities and prevent harassment?
- o Do you operate under a health and safety, gender equality and diversity policies?
- o Could any of the proceeds of your activity support/ fund violent oppression?

Pollution:

- o Do you organise shoreline/beach/farm/pond/sea/ocean clean-ups?
- o Do you reduce, re-use and recycle or operate under a circular economy model?
- o Do you have an environmental management system or a code of practice in place?

Biodiversity:

- o Do you have an invasive species/disease monitoring program?
- o Do you actively minimise your impact and protect the area where you operate?
- o Do you participate in site rehabilitation/restoration programs?

Climate:

- o What percentage of your energy consumption is generated by renewable sources?
- o Do you know what your carbon footprint is? If yes
- o Are your efforts geared towards offsetting (credits) or insetting (reduce) emissions?

References

1. Understand ocean acidification – NOAA fisheries
<https://www.fisheries.noaa.gov/insight/understanding-ocean-acidification#:~:text=For%20good%20reason%2C%20ocean%20acidification,health%20is%20also%20a%20concern.>
2. Goods and services of marine bivalves – filgueira, strohmeier & strand – 2018
<https://link.springer.com/book/10.1007/978-3-319-96776-9>
3. Ranking threats to biodiversity and why it doesn't matter – Bellard, Marino & Courchamp – 2022
https://www.researchgate.net/publication/360622853_Ranking_threats_to_biodiversity_and_why_it_doesn't_matter
4. What is nutrient pollution? - NOAA national ocean service – 2021
<https://oceanservice.noaa.gov/facts/nutpollution.html#:~:text=Nutrient%20pollution%20is%20the%20process,and%20garden%20fertilizers%20are%20used.>
5. US Environmental Protection Agency (EPA), MarineBio Conservation Society
<https://www.epa.gov/international-cooperation/protecting-global-marine-environment>
6. A growing plastic smog, now estimated to be over 170 trillion plastic particles afloat in the world's oceans—Urgent solutions required
<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0281596>
7. Effects of body size on suspension feeding and energy budgets of the pearl oysters *Pinctada margaritifera* and *p. maxima* - Yukihiro, Klumpp & Lucas – 1998
https://www.researchgate.net/publication/250216097_Effects_of_body_size_on_suspension_feeding_and_energy_budgets_of_the_pearl_oysters_Pinctada_margaritifera_and_P_maxima
8. Comparative analysis of modelled nitrogen removal by shellfish farms. Rose, J. M., Bricker, S. B., & Ferreira, J. G. - Marine pollution bulletin - 2015
https://www.researchgate.net/publication/269723863_Comparative_analysis_of_modeled_nitrogen_removal_by_shellfish_farms
9. Habitat value of bivalve shellfish and seaweed aquaculture for fish and invertebrates: pathways, synthesis, and next steps – Theuerkauf, Barrett, Alleway, costa-pierce, Gelais, Jones – 2021
https://www.researchgate.net/publication/352740485_Habitat_value_of_bivalve_shellfish_and_seaweed_aquaculture_for_fish_and_invertebrates_Pathways_synthesis_and_next_steps
10. Life cycle assessment of oyster farming in the Po Delta, northern Italy – Tamburini, Fano, Castaldelli & Turolla – 2019
https://www.researchgate.net/publication/336932613_Life_Cycle_Assessment_of_Oyster_Farming_in_the_Po_Delta_Northern_Italy
11. Climate-friendly seafood: the potential for emissions reduction and carbon capture in marine aquaculture – Jones, Alleway, McAfee, Reis-Santos, Theuerkauf, Jones – 2022
https://www.researchgate.net/publication/358562508_Climate-Friendly_Seafood_The_Potential_for_Emissions_Reduction_and_Carbon_Capture_in_Marine_Aquaculture
12. Carbon Capture Storage and Utilization of *Pinctada margaritifera* Black Lip Pearl Oyster in French Polynesia- Doimi, M. - Journal of Environmental Science and Engineering – 2021
https://www.researchgate.net/publication/348847107_Carbon_Capture_Storage_and_Utilization_of_Pinctada_margaritifera_Black_Lip_Pearl_Oyster_in_French_Polynesia