
Reviewed by Tarquin Holmes (Oxford University)

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Commissioned by Daniella McCahey (Texas Tech University)

Alongside long-standing recognition of the global impact of the post-Second World War “green revolution” on world food systems and terrestrial ecologies, increasing attention has been paid in recent years to the parallel escalation in exploitation of marine ecosystems termed the “blue revolution.” There has, however, been less acknowledgement of the strong interlinkages between these two “revolutions,” not only technologically but also ecologically through the contribution of marine bioenergy and nutrients to agricultural intensification, especially meat production.

In *The Fishmeal Revolution*, Kristin Wintersteen sets out to document the history of one of today’s most important sites of marine exploitation, the Humboldt Current ecosystem. Expanding on the work of Gregory Cushman and others on the postwar Peruvian and Chilean turn from guano harvesting and small-scale fishing to industrial purse-sein harvesting for export, Wintersteen elucidates the fishmeal industry’s origins, its ecological impact, and its entanglement with volatile El Niño-Southern Oscillation (ENSO) climatic cycles.[1]

Despite being recognized since the early nineteenth century as one of the planet’s richest oceanic ecosystems, it was only in the 1950s and 1960s that Humboldt fisheries became a globally important source of marine protein. Wintersteen, like Cushman, stresses the pivotal role of the UN’s Food and Agriculture Organization (FAO) in encouraging the fishing industry’s development, in the shadow of mounting concerns about regional and global malnutrition. Ultimately, however, Humboldt fisheries would come largely to serve the developed world’s appetite for meat, through fishmeal as livestock feed, rather than relieving local food shortages.

To explain this market failure, Wintersteen emphasizes the role of logistics and infrastructure, tied to the materiality of fish flesh as a highly perishable resource that to be brought to market must either be quickly preserved through refrigeration or else transformed into a more stable com-
modity. Fishmeal initially emerged in late nineteenth-century European and American fisheries as a means of stabilizing “waste” fish scrap for secondary utilization as animal feed. But by the early twentieth century, demand driven by its capacity to promote rapid livestock growth had allowed some US and European fishermen to become fishmeal specialists, targeting previously uncommercial “trash fish.” Fishmeal as a technology thus combined greater capacity to travel with ability to convert “trash” into treasure, expanding both the markets that fishing industry products could reach and the range of oceanic species and spaces that could be profitably harvested.

In mid-twentieth-century Peru and Chile, weak national demand for fresh fish and a lack of refrigerated vehicles and warehouses hampered efforts to develop Humboldt fisheries for internal consumption. By contrast, building onshore fishmeal factories for processing catches on landing both required less investment in infrastructure and produced a product that could reach lucrative international markets. Fishmeal may not have provided protein for local people but it did bring in substantial capital, fueling the growth of boomtowns, most notably Peru’s Chimbote. The tension between the economic opportunities and environmental detriments linked to the industry is perhaps best illustrated by Chimboteans rationalizing the pervasive foul odor of fishmeal factories as “the smell of money” (p. 61).

The catastrophic collapse of Peru’s fishmeal industry during the 1972 El Niño highlighted its frailty in depending on a single species, the formerly superabundant anchoveta. This episode has been cited as a classic case of Garrett Hardin’s “tragedy of the commons.” Wintersteen, however, critiques such simplistic models of resource depletion, arguing that they account for neither the remarkable resilience of anchoveta and other Humboldt fish populations to exploitation nor the prominent role of climatic cycles in inducing periodic regime shifts in dominant fish species. These Humboldt Current species regime differences are also spatial, with differing regional vulnerabilities to climatic oscillations—the Chilean fishmeal industry, dependent on non-anchoveta species, was much less affected by the 1972 El Niño. Periodic stock collapses should therefore be understood as multifactorial events not reducible to simplistic depletion narratives. With climate change increasingly destabilizing world weather systems, this broader approach to marine ecologies invites further caution rather than complacency, highlighting as it does the potential fragility of even ostensibly stable fisheries. It also invites further international cooperation rather than enclosure, which Wintersteen shows can in fact intensify exploitation, as seen in the undermining of attempts to impose off-seasons on cross-border migratory fish populations due to conflicts between Peruvian and Chilean fishermen.

*The Fishmeal Revolution* is recommended reading for anyone interested in the intersection of green and blue revolutions. The book does have teething problems, with earlier chapters on the Humboldt Current’s historical ecology and its scientific discovery offering rather scattershot perspectives and which in places would have benefited from more rigorous editing. Patient readers who work their way through these somewhat inelegant initial chapters will, however, be richly rewarded.

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