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Eels, Pearls and Algae—Aquaculture in Australia

Aquaculture is the farming of fish and other aquatic animals (including pearl oysters) and plants in either a saltwater or freshwater environment. Most of the world aquaculture production (about 60%, excluding plants) is of freshwater fish and originates from inland areas.[1] Unlike agricultural production, an aquaculture 'farm' is not a single type: depending on the species it may be a series of ponds (prawns); a dam (yabbies); ropes suspended in the sea (mussels); or sea cages (salmon, tuna). With the global catch in decline through overfishing, pollution and marine habitat destruction[2], aquaculture is regarded as an increasingly important source of food. In 1993 aquaculture produced nearly 16 million tonnes of the total world fish production of 101 million tonnes and contributed 21.8 percent of the world food fish supply.[3] Asia produced 84 percent of world aquacultural production in 1992, with China alone accounting for 49 percent (6.8 million tonnes). Australia's production of edible, high-value fish, crustaceans and molluscs in 1994–95 was only 23 507 tonnes.[4]

Size of industry

Aquaculture is a rapidly growing industry in Australia, with the value of production more than doubling from $158 million five years ago, to $419 million in 1994–95.[5] It now accounts for nearly one quarter of the total value of Australian fish production. Pearl oysters are the largest earners, earning $206 million in 1994–95 compared to $130 million the year before, while the value of farmed salmon rose 40 percent in 1994–95 to $67 million.[6]

Nature of Australian aquaculture

Australian aquaculture is not typical in that most of the operations are on or near the coast,[7] characterised by a relatively small volume of high-value species. Overall, more than 60 species are currently being farmed. These include pearl oysters, Pacific and Sydney rock oysters, mussels, prawns, freshwater crayfish, trout, Atlantic salmon, barramundi, eels, southern bluefin tuna and algae.

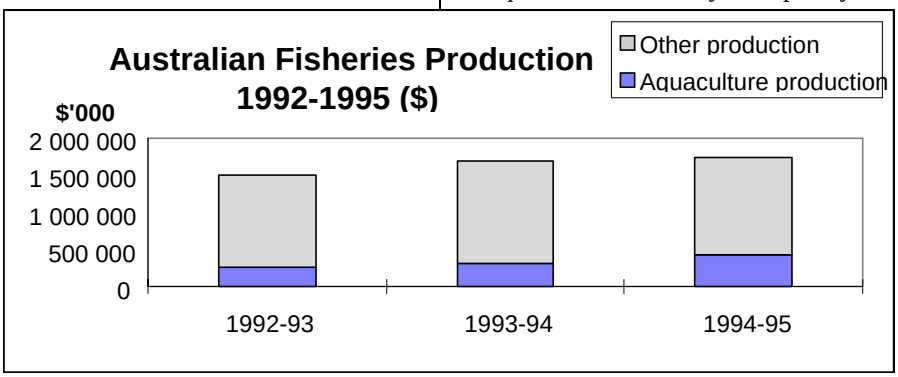
Factors in success

Successful aquaculture depends on a range of factors including: site selection; design and construction of facilities; biological techniques; water quality and farming practices; feeding controls and suitable markets. Depending on the country and the product different factors may assume importance. Site selection is very important, and there are surprisingly few sites in Australia which meet the specific land and water requirements (and these will vary depending on the species to be farmed) once cities, National Parks, heritage areas, fisheries habitat and wetland reserves and areas reserved for recreation, boating and other developments are excluded.

A primary requirement of a site is the availability of sufficient suitable water (defined not only by quality but also factors such as temperature). Aquaculture is a heavy consumer of water—to support the animals, replenish oxygen and remove wastes. The quantity and requisite quality of the water will vary depending on the species and the size of the operation. Both the ponds and waste water require a higher degree of water quality management in the case of 'intensive' (high stocking density) aquaculture, which leads to high concentrations of uneaten food and metabolic wastes. Each of the States has environmental standards for discharge water, to which the aquaculturists must conform.

Relative ignorance

Knowledge of aquaculture has been compared with the state of knowledge of agriculture several thousand years ago.[8] A great deal remains to be learned about breeding, feeding and growing, and biological techniques. Similarly, the environmental impact of aquacultural activity is poorly



understood at present. Concerns include effluent wastes; the impact on biodiversity; degradation of land and reduced water quality from acid soils; fishmeal requirements for some intensively farmed species—such as salmon, which require about 3.25 tonnes of fishmeal for every tonne produced[9]—which impact on fisheries resources; the introduction of exotic species and diseases not found in Australia; and the possible implications for both the ecosystem and human health of the use of chemotheraputants (vaccines, antibiotics) and other chemicals.

Positive benefits from aquaculture include high production from intensive farming; increased selectivity of stock for the market (size of fish, time of harvesting, quantities to harvest); no bycatch of other species (e.g., bycatch can be up to 90% by weight for prawn trawlers); and breeding of stock can be used to help repopulate depleted wild fisheries.

Interest in sustainable practices

Aquaculture is attracting enthusiastic and dedicated entrepreneurs, despite the relatively high risks. They are finding innovative solutions to the above-mentioned concerns—including practices such as 'polyculture',[10] which is the term for an ecologically integrated, sustainable farming system of both flora and fauna; the use of the mineral zeolite, or oysters and algae, as filters for wastes; and constant improvement of pond and water management. Interest in sustainable aquaculture extends beyond Australia. The key session of the World Aquaculture Conference held in Bangkok (January 1996) was "Policy and Management for Sustainable Aquaculture".[11]

Regional development

The potential for aquaculture in regional development has been recognised by the states and Northern Territory. Each state government now has an aquaculture section with a dedicated manager in the State Department which oversees the fish production industry. Technical support is also provided, by officers who generally go 'out into the field'. South Australia, e.g., has an Aquaculture Industry Development Officer who specifically works as an aquaculture investment advisor. The Western Australia State government announced in 1994 a development strategy for the aquaculture industry in that state. There is also a National Aquaculture Industry Working Group comprising thirteen state and territory representatives.

Impediments to growth

Some of the impediments to current growth of the industry in Australia are the limited availability of suitable sites, the availability of finance for high risk ventures and state-based regulatory constraints (which are more onerous in some states than others).

Potential for larger industry

The future direction for aquaculture in Australia is toward a significantly larger industry than at present, based on sound farming practices developed for sustainability. Production will be 'niche-specific', high-value and low-volume. The labour force will be increasingly better educated and trained as more graduates with majors in aquaculture from tertiary institutions enter the industry. There will be strong, interdependent links between industry groups and research institutions, State fisheries departments and the markets. World demand for food fish, crustaceans and molluscs will continue to rise.

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