Chapter 8
Ethics, Governance and Regulation

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Introduction

Black’s paper provides a broad, yet succinct survey of the environmental aspects of aquaculture. I will attempt to enrich this survey by first providing some analysis on the scope, completeness and coherence of the task that Black set out to do. In a second step, I will discuss implications of Black’s descriptions and propositions from the perspectives of ethics, governance and regulation.

Scope

Black chose a humble title – the environmental aspects of aquaculture – but actually provides more. In the introduction, he alludes to his plan to take on more. He touches on the concept of the sustainability of aquaculture (a concept which encompasses issues beyond environmental aspects) and also points out that well-designed regulations (a governance instrument) are of central importance in addressing the results of his survey.

Black follows through on these three different topics. First and foremost, his survey encompasses the main impacts of aquaculture on the physical environment (qualitatively and occasionally quantitatively). Second, it addresses the broader impacts of aquaculture on society and the economy, as one would expect in a paper that touches on the sustainability of aquaculture. Third, Black puts forward a proposition for a regulatory approach – the “limiting factor approach” – which focuses on regulation for the control of the impacts of aquaculture on the physical environment.

Such a broad scope is beyond what can be fully addressed in a single paper, but this perspective provides us with a thread, that goes from a strong focus on the

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impacts of aquaculture on the physical environment, all the way to an interesting proposition to focus the regulation of aquaculture on the management of these impacts.

**Completeness and Coherence**

In general terms, there are two principal ways to approach a survey on the impacts of a human activity on the physical environment. Either one can emphasize the temporal scale by carrying out life-cycle assessments (LCA) of an activity or one can emphasize the spatial scale in environmental assessments (EA). A full assessment of environmental risks (quantity) and hazards (quality) would cover, ideally, both temporal and spatial scales.

Black chose to emphasize the spatial scale with a particular attention to the direct environmental impacts of key effluents. Effluents from aquaculture can reach first and foremost the seabed, the coast and the open waters – all of which Black discusses. It would be possible to also evaluate the effects effluents have on air quality, the climate, and the ozone layer (e.g., from the operation of machinery, the use of pesticides, or fermentation) or the deep sea and fresh water bodies (e.g., via current or migrating organisms), and so forth. However, in the context of aquaculture, they appear to be minor concerns – although Black does mention the production of methane (a greenhouse gas).

The primary effluents discussed in Black’s paper could be categorized into three types – organic chemical effluents (Section 2), commercial chemical effluents (Sections 3 and 4), and living biological effluents (Sections 5 and 6). This approach provides a fairly complete and coherent list of potential environmental impacts.

However, only one type of indirect environmental impact is discussed, namely the environmental impact associated with the production of fish food as a key input into the aquaculture systems. It would be possible to discuss the environmental impacts associated with other inputs, pesticides for example, but these may well be less significant when compared to the effects associated with fish food production.

It would be interesting to add to this spatial approach a geographical survey of the main current and potential developments in aquaculture together with a discussion on the nature and vulnerability of habitats. This would improve the ability of the reader to think in terms of comparative environmental impact analysis. There is no doubt that aquaculture will alter the environment – but how should this change be judged when compared to other practices such as the building of harbors and the transportation of goods, the fishing in the coastal areas and the open seas, the production of protein through agriculture, and so forth? It is implied, however, that the habitats currently affected are sufficiently vulnerable and valuable to give rise to serious concerns.

It would also be interesting to further complete the discussion of the main impacts of aquaculture on the physical environment with a stronger attention to the temporal component, for example, by explicitly discussing the impacts from “cradle-to-grave.” This is a difficult task, but experience in other industrial sectors