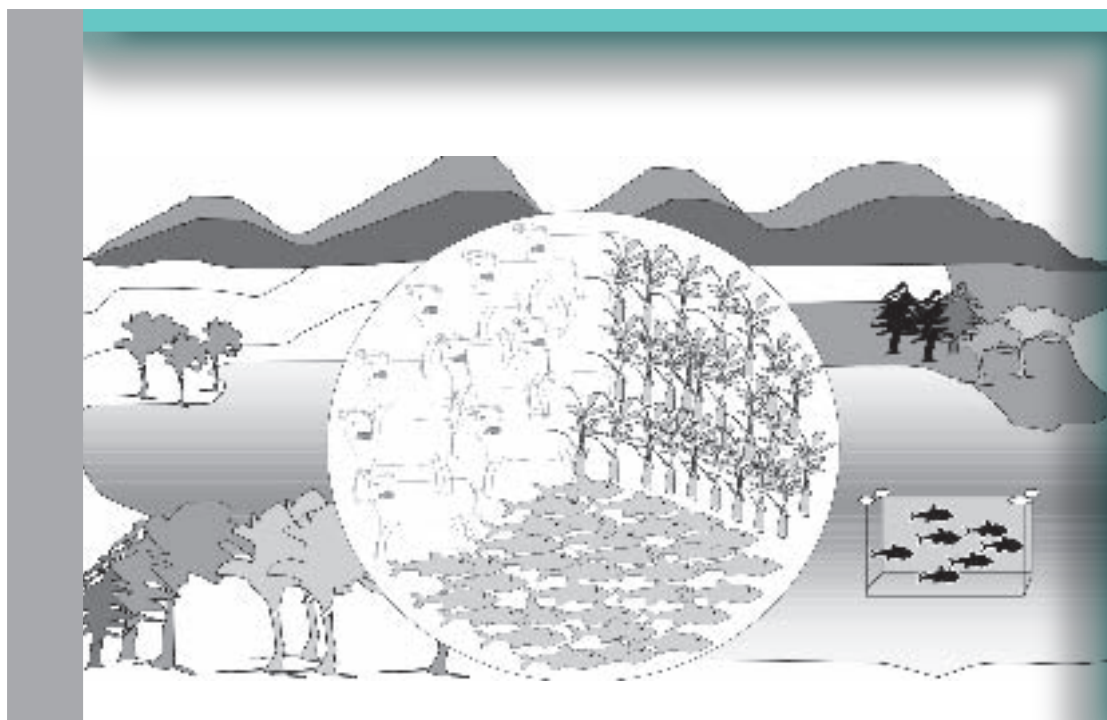


Comparative assessment of the environmental costs of aquaculture and other food production sectors

Methods for meaningful comparisons

FAO/WFT Expert Workshop
24–28 April 2006
Vancouver, Canada



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Preparation of this document

This publication represents the proceedings originated from the Food and Agriculture Organization of the United Nations/World Fisheries Trust Expert Workshop *Comparative Assessment of the Environmental Costs of Aquaculture and Other Food Production Sectors: Methods for Meaningful Comparisons* convened in Vancouver, Canada, from 24 to 28 April 2006. Nineteen experts in the fields of environmental economics, energy accounting, material and environmental flows analysis, aquaculture, agriculture and international development contributed scientific discussions and papers on various aspects of environmental costs of aquaculture and agriculture.

The workshop was jointly organized by the Aquaculture Management and Conservation Service of the FAO Fisheries and Aquaculture Department and the World Fisheries Trust; the Vancouver Aquarium provided the venue. The proceedings were compiled and technically edited by Devin M. Bartley, Cécile Brugère, Pierre Gerber, Doris Soto and Brian Harvey, with the assistance of the participants.

We acknowledge Mrs Pilar Gonzalez and Mrs Annarita Colagrossi for their assistance in word processing and editing, Ms Tina Farmer, Ms Françoise Schatto for their assistance in quality control and FAO house style, Mr Jose Luis Castilla Civit for layout design and Doris Soto for page cover design.

Abstract

The global food production sector is growing. In many areas farming systems are intensifying. This rapid growth has in some cases caused environmental damage. In acknowledgement of the potential for adverse environmental impacts from food production, the first session of the FAO Committee on Fisheries' Sub-Committee on Aquaculture recommended "undertaking comparative analyses on the environmental cost of aquatic food production in relation to other terrestrial food production sectors". These proceedings include review papers describing methods for such comparisons as well as the deliberations of their authors, a group of international experts on environmental economics, energy accounting, material and environmental flows analysis, aquaculture, agriculture and international development discussed during the FAO/WFT Expert Workshop on Comparative Assessment of the Environmental Costs of Aquaculture and Other Food Production Sectors, held in Vancouver, Canada, from 24 to 28 April 2006.

Problems in making valid comparisons arise from the differences between the aquatic and terrestrial environments and the tremendous diversity of farming systems used in both. The values of environmental goods and services that may be impacted by farming need to be determined and included in comparisons. The way farms are managed will have a strong influence on environmental impacts and costs; a well-managed farm will have much less environmental impact and cost than a badly managed one producing the same commodity. Comparisons can be useful for addressing local development and zoning concerns, global issues of sustainability and trade and consumer preferences for inexpensive food produced in an environmentally sustainable manner. In order to be useful, however, methods to assess environmental costs should be scientifically based, comparable across different sectors, expandable to different scales, inclusive of externalities, practical to implement and easily understood by managers and policy-makers.

Environmental impacts can lead to environmental costs that can be incorporated into the analysis of the financial benefits or losses of the activity to which they are related. Environmental economists classify such costs as follows:

- *private* costs (cost of the damage to the activity itself, e.g. damage to production factors);
- *external* costs (primarily to the environment) including the cost of abatement and residual damages after control measures are in place;
- *user* costs (where future uses are compromised); and
- *rehabilitation* costs.

Methods for comparing the environmental cost of aquatic and terrestrial food production systems include cost-benefit analysis, material and energy flows analysis, human appropriation of net primary productivity, life cycle analysis, ecological footprint analysis, risk analysis and environmental impact assessment. Comparative analysis requires normalization of the unit of assessment and the scope of the consequences of the activity for the environment. Because there will be trade-offs between economic gains and environmental costs, multicriteria decision analysis methods that prioritize benefits and costs (e.g. life cycle analysis) are useful. However, the interpretation and communicability of these methods to policy-makers is more difficult than for methods that produce aggregated single measures or indices (e.g. ecological footprint). No method is robust enough to capture the full suite of environmental impacts and costs associated with food production. Many of the methods can, and should, be used together where information from one links or feeds into another.

A balanced picture of the environmental costs of all food-producing sectors will lead to environmental policies that deal with the impacts of all sectors. Developing this balanced view will require a multidisciplinary team of ecologists, economists and social scientists working with the appropriate food production sectors. Their conclusions will need to be communicated to:

- *policy-makers* to establish environmental regulations, environmental impact mitigation measures and zoning of aquaculture/agriculture;
- *farmers* to plan production, understand and comply with environmental regulations and implement good management practices; and
- *consumers* to make informed choices on food production and drive appropriate policy and farming practices.

Participants discussed a variety of actions that FAO and others could undertake to help analyse environmental costs and stressed the importance for including such analyses in responsible aquaculture development.

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