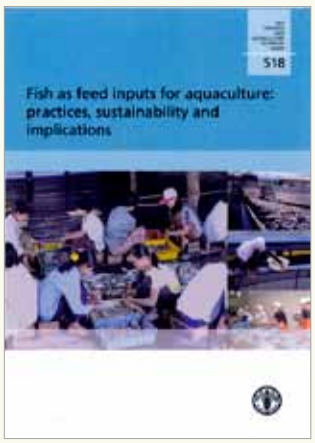


Hasan, M.R.; Halwart, M. (eds.). Fish as feed inputs for aquaculture: practices, sustainability and implications. *FAO Fisheries and Aquaculture Technical Paper,* No. 518. FAO, 2009. 407 pp.

This technical paper provides a comprehensive review of the use of wild fish as feed input for aquaculture and discusses the existing practices, analyses the sustainability of feed/reduction fisheries and reviews the implication. It comprises of four regional reviews, three country-specific case studies from Latin America, a global synthesis and a review on the use of wild fish from the perspective of poverty alleviation and food security. The regional reviews specifically addressed the role of feed and reduction fisheries that may impinge on food security and poverty alleviation in these four regions and elsewhere, including sustainability of these finite resources and environmental implication of the direct use of fish as feed. On the basis of the four regional reviews and the five case studies (three from Latin America and two from Asia), an attempt was made to develop a global perspective on the status, trends, issues and challenges confronting reduction fisheries and use of fish as feeds. Based on the information presented in the global synthesis, regional reviews, and three case studies and through the fresh analysis of the information presented elsewhere, a review was prepared on the use of wild fish as aquaculture feed from the perspective of poverty alleviation and food security.

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Hasan, M.R.; Chakrabarti, R. Use of algae and aquatic macrophytes as feed in small-scale aquaculture – a review. *FAO Fisheries and Aquaculture Technical Paper* No. 531. Rome, FAO. 2009. 123 pp.

This technical paper presents a global review on the use of aquatic macrophytes as feed for farmed fish, with particular reference to their current and potential use by small-scale farmers. The review is organized under four major divisions of aquatic macrophytes: algae, floating macrophytes, submerged macrophytes and emergent macrophytes. Under floating macrophytes, Azolla, duckweeds and water hyacinths are discussed separately; the remaining floating macrophytes are grouped together and are reviewed as 'other floating macrophytes'. The review covers aspects concerned with the production and/or cultivation techniques and use of the macrophytes in their fresh and/or processed state as feed for farmed fish. Efficiency of feeding is evaluated by presenting data on growth, food conversion and digestibility of target fish species. Results of laboratory and field trials and on-farm utilization of macrophytes by farmed fish species are presented. The paper provides information on the different processing methods employed (including composting and fermentation) and results obtained to date with different species throughout the world with particular reference to Asia. Finally, it gives information on the proximate and chemical composition of most commonly occurring macrophytes, their classification and their geographical distribution and environmental requirements.

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FAO. Environmental impact assessment and monitoring in aquaculture.*FAO Fisheries and Aquaculture Technical Paper.* No. 527. Rome, FAO. 2009. 57 pp. Includes a CD-ROM containing the full document 648 pp.

This document contains the main outputs of Component 2 of the FAO project "Towards sustainable aquaculture: selected issues and guidelines". Component 2 focused on environmental impact assessment and monitoring in aquaculture, in particular on the relevant regulatory requirements, the practice, the effectiveness and suggestions for improvements. The report includes four regional reviews on EIA and monitoring in aquaculture in Africa, Asia-Pacific, Europe, Latin America and North America, a special study on EIA as applied to salmon aquaculture, as well as a global review and synthesis report which draw on the findings of the review papers, covering relevant information from more than 35 countries. In addition, this document provides the Report of the Technical Workshop on Environmental Impact Assessment and Monitoring in Aquaculture, held at FAO headquarters in Rome from 15 to 17 September 2008.The global and regional reviews in this study and the associated technical workshop draw on experience from throughout the world in the application of EIA and monitoring to aquaculture development. In practice most aquaculture is small-scale and is not subject to EIA or rigorous monitoring. More emphasis needs to be placed on environmental management frameworks which can address the environmental issues associated with large numbers of small-scale developments – including strategic environmental assessment, risk analysis, management plans for waterbodies and/or groups of farms, monitoring and response procedures.Where EIA is applied there is mixed experience. Several weaknesses were identified in the regional reviews and at the workshop, including lack of consistency in assessment; lack of appropriate standards; lack of integration between levels and divisions of government; inadequate or ineffective public consultation; lack of assessment skill and capacity; limited follow-up in terms of implementation and monitoring; and excessive bureaucracy and delays. There is very little hard evidence on cost effectiveness. Monitoring is of fundamental importance to effective environmental management of aquaculture, and without which EIA itself is largely pointless. The main weakness identified was limited implementation of monitoring requirements as developed in EIA environmental management plans, and limited analysis, reporting and feedback of farm level and wider environmental monitoring programmes into management of individual farms and the sector as a whole.The key to more effective use of both EIA and monitoring procedures will be to nest them within a higher level strategic planning and management framework, including clear environmental objectives and quality standards. More rigorous risk analysis should be used to inform the focus of both EIA and monitoring.

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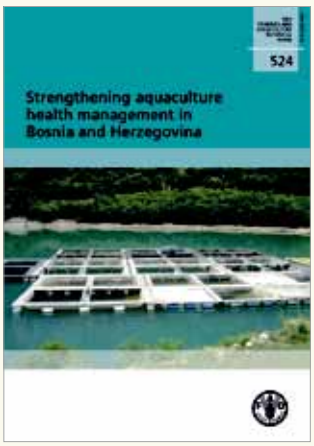


Bondad-Reantaso, M.G.; Arthur, J.R.; Subasinghe, R.P. (eds). Strengthening aquaculture health management in Bosnia and Herzegovina (TCP/BiH/3101). *FAO Fisheries Technical Paper.* No. 524, Rome, FAO. 2009. 81 pp. (in press)

The FAO Technical Cooperation Project, TCP/BIH/3101 Strengthening Capacity on Aquaculture Health Management, implemented between late 2006 until mid-2009, was aimed at increasing the effectiveness and efficiency of the State Veterinary Office of Bosnia and Herzegovina (BiH) on aquatic animal health management to support sustainable and healthy aquaculture production of the country. In this way, BiH will improve the value and efficiency of aquaculture production through the implementation of international aquatic animal health and food safety standards, especially those of its trading partners in Europe. The project developed national policies on aquatic animal health and strengthened the capacity of veterinary administration, inspectors, laboratories and producers in improving compliance with international health and food safety and quality requirements and practices. The project also assisted in disseminating the lessons learned to neighbouring trading partners in order to promote future regional cooperation in aquaculture and aquatic animal health management.

One of the major documentation outputs of the above TCP, this publication contains a series of seven contributed papers that were presented by national consultants and international experts to participants attending the series of workshops organized by the project. These papers contain information on (i) project overview and highlights of implementation, (ii) development of national policy and strategy for aquaculture, (iii) European Union animal health requirements for aquacultured animals and their products, (iv) status of national aquaculture development, (v) aquatic animal health surveillance and disease control system in BiH, (vi) national health status of aquatic animals and (vii) aquacultured fish and fishery product quality and safety in BiH.

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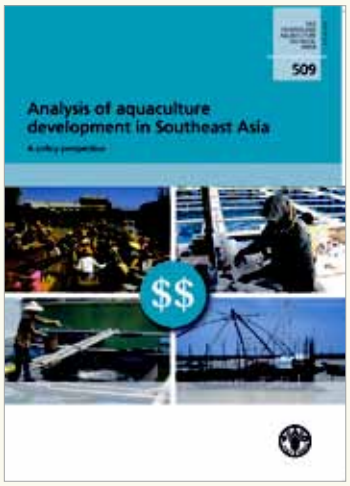


Hishamunda, N.; Bueno, P.B.; Ridler, N.; Yap, W.G.Analysis of aquaculture development in Southeast Asia: a policy perspective.*FAO Fisheries and Aquaculture Technical Paper.* No. 509. Rome, FAO. 2009. 69 pp.

This paper aims to understand the factors which have enabled aquaculture to reach a commercial level in many countries in Southeast Asia and constrained it in others. While aquaculture has had a long history in Southeast Asia, its rapid expansion began in response to market demand, both domestic and international. In most countries, aquaculture developed because entrepreneurs were able to benefit from these profit opportunities; government involvement was minimal. Aquaculture was endorsed by governments as a source of livelihood or of export earnings but not promoted with the generous incentives that other countries in the region now offer. The most recent expansion of aquaculture in the region has still been driven by the profit incentive but this time it has been accompanied by government involvement. In some cases, governments have been pro-active, deliberately promoting the sector with incentives, motivated by the sector's contribution to economic development, food security and the balance of payments. In other instances, governments maintain an enabling role but, having learned from earlier mistakes in the region, they intervene with regulations to limit laisser-faire excesses. Although further development could be limited by the unavailability of land and fresh water, shortage and price of good quality feed, adequate energy supply and its rising cost, pollution and environmental degradation problems and limited expertise among government officials, aquaculture is likely to remain important in Southeast Asia for many more years ahead.

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Cai, J.; Leung, P.; Hishamunda, N. Commercial aquaculture and economic growth, poverty alleviation and food security. Assessment framework. *FAO Fisheries and Aquaculture Technical Paper.* No. 512. Rome, FAO. 2009. 58 pp.

This paper proposes some methods for quantifying the contribution of aquaculture to national economies, poverty alleviation and food security so as to improve the much needed political and financial support to the sector for its adequate development. Aquaculture's contribution to a country's economy can be measured by "aquaculture value-added multiplier", an indicator that represents the "increase in gross domestic product corresponding to a one-unit increase in aquaculture value-added. As alleviating poverty occurs by creating well paying jobs, evaluation of the contribution of aquaculture to poverty alleviation can be done through "aquaculture employment multiplier", the increase in the total employment for the entire economy corresponding to one extra job created in aquaculture. The contribution to food availability, one of the three dimensions of food security, can be assessed through the "net sum of protein-equivalent" (direct contribution) and the "ratio between the aquaculture net foreign exchange earning and the total value of food

imports" (indirect contribution). "Aquaculture labour-income and employment multipliers" can be used to quantify aquaculture's contribution to food access, the second dimension of food security. Aquaculture tax multiplier and the "aquaculture ratio between the net foreign exchange earning" and the "whole economy net foreign exchange earning" can be used to estimate the sector's contribution to food utilization, the third dimension of food security.

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Hishamunda, N.; Poulain, F.; Ridler, N. Prospective analysis of aquaculture development: the Delphi method. *FAO Fisheries and Aquaculture Technical Paper.* No. 521. Rome, FAO. 2009. 93 pp.

In order to evaluate the major impediments to aquaculture development in different regions of the world and to indicate opportunities for expansion, a Delphi analysis was undertaken. The Delphi method is particularly useful for sectors such as aquaculture where discontinuities exist and where historic trends cannot be easily extrapolated into the future. The recent global expansion of aquaculture is unlikely to continue at the same pace; however, certain regions have underexploited resources and offer considerable potential. The Delphi method allowed experts in different regions to indicate where the potential and constraints are; they were also encouraged to offer their policy solutions.

Experts from Latin America and the Caribbean were particularly optimistic about opportunities for future aquaculture expansion in their region. With a plentiful natural resource base and sufficient demand for fish products, their principal concern was lack of financing and of human capacity. Other regions such as Eastern Europe were less sanguine partly because of problems with species or with external factors such as negative public perceptions towards aquaculture. However, there was a consensus in all regions that aquaculture should be encouraged. Reasons given ranged from the contribution of aquaculture to food security and poverty alleviation to the role of aquaculture in reducing pressure on wild fisheries.

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FAO. Report of the FAO Workshop on the Development of an Aquatic Biosecurity Framework for Southern Africa. Lilongwe, Malawi, 22–24 April 2008. FAO Fisheries and Aquaculture Report. No. 906. Rome, FAO. 2009. 55 pp.

The Workshop on the Development of an Aquatic Biosecurity Framework for Southern Africa held in Lilongwe, Malawi, from 22 to 24 April 2008 was participated by a total eighteen officials representing nine countries (Angola, Botswana, Kenya, Malawi, Mozambique, United Republic of Tanzania, Uganda, Zambia and Zimbabwe) and including representatives from the Food and Agriculture Organization of the United Nations (FAO) and the World Organisation for Animal Health (OIE).

The aims of this regional workshop were: (i) to present the outcomes of the survey on national aquatic animal biosecurity capacity; (ii) to provide a platform to discuss an aquatic biosecurity framework for southern Africa based on survey findings and ensuring workshop discussions; and (iii) to identify regional capacity-building needs to address aquatic biosecurity gaps or lapses in the region.

A number of key regional capacity building activities and actions to address aquatic biosecurity in the region were identified. Foremost is a request to FAO to develop a follow-up project, possibly to be funded under FAO's Technical Cooperation Project modality, to assist in reviewing institutional and legal frameworks to enable countries to better address current aquatic biosecurity issues, especially addressing aquatic animal health management, transboundary movement of live aquatics and maintaining aquatic biodiversity. Additional

recommendations include the following: (i) for countries in the region to work closely in collaboration with FAO and OIE and regional partners to collectively address matters pertaining to aquatic animal health and biosecurity; (ii) to recognize the University of Zambia's School of Veterinary Medicine as a potential regional diagnostic centre and Uganda as a regional coordinating centre; (iii) to develop a regional model/template on import risk assessment for introductions and transfers of live aquatic animals; and (iv) to convene a ministerial level meeting for southern African countries to raise the issue of aquatic animal biosecurity.

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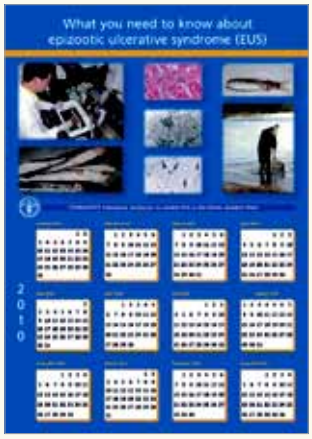


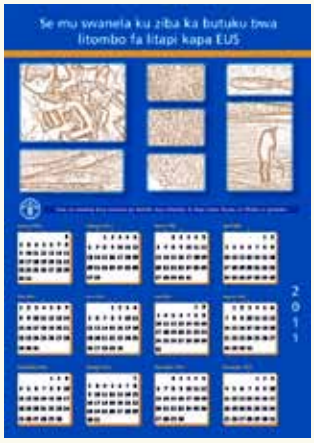


The EUS Calendar – What you need to know about EUS (published in English and Lozzi) is based on an extension material (FAO. 2009. What you need to know about epizootic ulcerative syndrome (EUS) – an extension brochure. Rome, FAO. 33 pp.). It provides simple facts or frequently asked questions by EUS. This extension material in the form of calendar is intended to a wide range of audience from fish farmers and fishermen to extension officers as a public information campaign raise awareness for better understanding about the disease. This product is an outcome of FAO's Technical Cooperation Project TCP/RAF/3111 Emergency Assistance to Combat Epizootic Ulcerative Syndrome in the Chobe-Zambezi River System, prepared under the technical supervision of Drs Melba B. Reantaso and Rohana P. Subasinghe of the Aquaculture Management and Conservation Service, Fisheries and Aquaculture Management Division of the Department of Fisheries and Aquaculture.

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Government of Bosnia and Herzegovina. State Veterinary Office.Veterinary inspector's checklist for aquaculture farms and fish processing establishments in Bosnia and Herzegovina. Rome, FAO. 2009. 13 pp.

This document, Veterinary inspector's checklist for aquaculture farms and fish processing establishments in Bosnia and Herzegovina, developed as one of the outputs of FAO Technical Cooperation Project TCP/BIH/3101 "Strengthening Aquaculture Health Management in Bosnia and Herzegovina", presents a checklist of information that will provide guidance to veterinary inspectors of Bosnia and Herzegovina (BIH) in conducting veterinary inspection of aquaculture farms and fish processing establishments in the country.

The Veterinary inspector's checklist may be applied to several types of aquaculture farms and fish processing establishments, i.e. fish hatcheries, cage-culture facilities, concrete ponds, earthen ponds, fish transporting systems and fish processing facilities. The checklist includes information on aspects of inspections, parameters to be analysed/tested or activities to be performed, samples to be collected and frequency of inspection. The legal reference to which the inspection procedure needs to be carried out is also indicated. These legal decisions ensure that appropriate sanitary practices (for fish, water, feed, facilities, etc.) and monitoring of veterinary health of fish and safety and quality of fishery products are in place.

This veterinary checklist will assist in the implementation of the National Aquatic Animal Health Strategy (NAAHS) for BIH and help to protect and improve the country's national aquatic animal health status, enhance the nation's ability to meet international aquatic animal health and food safety standards and obligations, promote sustainable aquaculture and facilitate access to international markets for aquaculture and fishery products.

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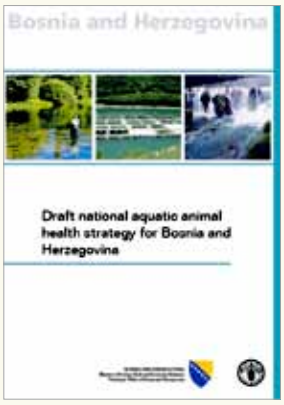


Jažić, A., Zuko A., Omeragić, J., Fejzić, N. and Grbo, S. 2009. Government of Bosnia and Herzegovina. State Veterinary Office. Manual on health management of animals in aquaculture in Bosnia and Herzegovina. Rome, FAO. 2009. 54 pp. (Published in Bosnian)

This publication Priručnik za upravljanje zdravljem životinja u akvakulturi, an output of FAO Project TCP/BIH/310 "Strengthening of Capacities in Aquaculture Health Management in Bosnia and Herzegovina". The main aim of the manual is to provide guidance to government veterinary inspectors, aquaculture producers and other aquaculture and fisheries experts in Bosnia and Herzegovina (BiH) through a better understanding of the health problems caused by the most common and economically important diseases of fish and shellfish of national concern. The manual thus provides introductory guidance on the basic principles of health management in aquaculture, the diseases of national importance to BiH, general examination techniques, sampling methods and procedures for collecting and sending samples to specialist laboratories, and record keeping. Subsequent sections then provide brief information on 18 diseases of fish and shellfish of national importance, the majority of which are diseases listed by the World Organisation for Animal Health (OIE). For each disease, information is briefly presented for each of the following topics: causal agent, susceptible species, epizootiological factors in a disease outbreak, clinical picture, diagnostics, prevention, therapy and legal basis. Additional sections provide information on prophylaxis, administration of drugs, poisoning of fish, regulations and legal instruments in effect in BiH, contacts and other sources of information, and references.

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Government of Bosnia and Herzegovina, State Veterinary Office. Draft National Aquatic Animal Health Strategy for Bosnia and Herzegovina. Rome, FAO. 2009. 24 pp.

As an output of FAO Project TCP/BIH/3101 “Strengthening aquaculture health management in Bosnia and Herzegovina”, the National Aquatic Animal Health Strategy (NAAHS) was developed jointly by representatives of the government and private sectors to assist in formulating policy and planning towards improving national aquatic animal health status, achieving international recognition of the high quality of Bosnia and Herzegovina’s aquaculture products and assisting their entrance onto international markets. The draft strategy expresses a Statement of purpose; Vision; Guiding principles; and implementation; and outlines nine major programmes of activity: (1) Policy, legislation and institutional framework; (2) Risk analysis and quarantine; (3) Diagnostics and health certification; (4) Surveillance, monitoring and reporting; (5) Emergency preparedness; (6) Capacity building; (7) Research and development; (8) Communication and international collaboration; and (9) Resources and funding. Within each major programme are presented its objectives, current status, and a number of projects that are to be accomplished during the initial phase of implementation. The NAAHS will be further developed by the State Veterinary Organization for funding and implementation.

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