



منظمة الأغذية
والزراعة
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联合国
粮食及
农业组织

Food
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des
Nations
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pour
l'alimentation
et
l'agriculture

Organización
de las
Naciones
Unidas
para la
Agricultura
y la
Alimentación

EUROPEAN INLAND FISHERIES ADVISORY COMMISSION

TWENTY-FOURTH SESSION

Mondsee, Austria, 14 – 21 June 2006

PROGRESS REPORT SUB-COMMISSION II - Aquaculture

Chairperson:	L. Váradi (Hungary)
Vice-Chairperson:	J.-P. Proteau (France)
Rapporteur:	P. Lengyel (Hungary)
Technical Secretary:	U. Barg (FAO)

This Sub-Commission includes four *ad hoc* Working Parties and an Eastern European Affairs initiative. Activities and achievements of the Sub-commission during the inter-sessional period are summarized in the followings:

1. Activities of the *ad hoc* Working Parties

1.1. *Ad hoc* Working Party on the Relationship between fish transfer and fish health

Convener: E. Hudson

No report from the convener has been received until the time of report writing.

1.2. *Ad hoc* Working Party on Aquatic Resources Management in Aquaculture

Convener: M. Verdegem

The working party concentrated on (1) preparations for publishing a comprehensive review of water use and re-use in aquaculture and (2) compared water use in terrestrial animal farming and aquaculture.

1.2.1. Comprehensive review of water use and re-use in aquaculture

At present, no comprehensive review on 'water resources management in aquaculture' is available. Large regions in the world are facing future water scarcity problems, and decisions will need to be taken about the distribution of available water resources between human consumption, industry and agricultural use. Also within agriculture, water use priorities will have to be set for use in crop production, terrestrial animal production or aquaculture. In order for policy makers, developers and the aquaculture industry itself to make sound decisions concerning allocation of

water resources for aquaculture development a comprehensive review on this issue is needed. Therefore, the working party proposes to publish a book on this issue.

This book would give a comprehensive review of the present and future water use in aquaculture as well as water related constraints for further development. The reader will be introduced to insights on water use in aquaculture, will learn to compare productions systems in terms of water use, and will learn to deal with consequences of possible water shortages at local or regional level. The effects of pricing policy on present and future aquaculture production would be reviewed. It will treat the subject in a global context, considering the issues in both developed and developing countries. The book targets a broad audience, including irrigation specialists, aquaculturists, students, policy makers, administrators, water engineers and scientists involved with aquaculture development. The book will help readers further understand the costs, opportunities and constraints of water use in aquaculture, and venture into new and promising areas for water-efficient future aquaculture production systems.

The proposed outline is shown in Annex 1.

Sofar several publishers were contacted, with a request to express their interest in the publication of such a book. The goal is to bring this book on the market as a paperback at a price as cheap as possible. As soon as an agreement is reached with a publisher, a special mini-symposium will be organized. The structure of the symposium will be such that it reflects the various book chapters. The planning is to hold this mini symposium in the first half of 2007.

1.2.2. Comparison of water use in terrestrial animal farming and aquaculture

Drs Verdegem, Bosma and Verreth wrote a paper on “Reducing water use for animal production through aquaculture” , which was published in 2006 in a special issue on “water for food and ecosystems” of the International Journal of Water Resources Development. The abstract of this paper is given in Annex 2.

1.3. *ad hoc* Working Party on Organic Fish Farming

Convener: V Hilge

The Convener presented an invited paper at an Infofish Conference on „Organic aquaculture and sea farming”, in Ho Chi Minh City, Vietnam, June 2004. The paper , Hilge, V. & M. Halwart 2005, Conventional and organic aquaculture in Europe: status and outlook, has been published in The Production and Marketing of Organic Aquaculture Products, (S. Subasinghe, Tarlochan Singh and Audun Lem, eds) Proceedings of Aquaculture and Sea Farming 2004, Global Technical and Trade Conference, 15-17 Jun 2004, Ho Chi Minh City, Vietnam. ISBN 983-9816-31-4, 215 pages. The paper presents results of surveys by questionnaires on the situation of organic fish and organic fish feed production in Europe, including mariculture, and on non – governmental organic certifiers.

The Convener further gave an invited speech at EUROTIER 2004, November Hannover, Germany, presenting : “Comparative results of ecologically and organically produced rainbow trout – husbandry and feeding”. This is a presentation of results from a project dealing with a comparison of organically and conventionally produced rainbow trout in Germany.

At present the Convener is running a project (November 2004 – 31.12.2006) on the “Research on quality changes during processing and storage of selected products of bio-trout and conventionally produced trout as a prerequisite for a manual for artisanal trout farmers.”

The convener participated in the “Thematic Conference on Organic Aquaculture in the European Union: Current Status and Prospects for the Future” 12-13 December 2005, Brussels which included a lecture on “Organic Aquaculture in the World; principles, public perception, markets and potential of organic aquaculture products”.

http://europa.eu.int/comm/fisheries/news_corner/autres/conf121205/hilge.pdf

http://europa.eu.int/comm/fisheries/news_corner/autres/conf121205/program_en.htm

A number of feeding trials with ecofeeds of different origin for trout have been performed. The overall result demonstrate that till today the performance of these feeds with regard to growth, feed coefficient etc. is better than that of feeds tested a few years ago but is still inferior to a number of conventional feeds for trout.

No other activities have been run at WP level, partly due to rather little development of the sector in European freshwater aquaculture.

1.4. *ad hoc* Working Party on Market Perspectives of European Freshwater Aquaculture

Convener: L. Varadi

Unfortunately the planned Workshop on Freshwater Aquaculture Marketing, which would have been organised jointly by FAO/EIFAC and the European Commission, had to be postponed due to financial and logistic difficulties. Marketing of freshwater products continues to be a critical issue in European aquaculture, especially in Central and Eastern Europe in view of the enlargement of the EU. Specific problems have been identified through various local consultations and workshops regarding freshwater fish marketing such as:

- changing consumers' preferences (and lack of information of these changes);
- growing dominance of supermarkets in market chain;
- increasing competition with imported fish and seafood products;
- poor marketing organisation of farmers;
- insufficient marketing communication.

The recommendations of the Ad Hoc EIFAC/EC Working Party on Market Perspectives for European Freshwater Aquaculture (Brussels, Belgium 14-16 May 2001) are still valid and further efforts are required to realize them. The weaknesses, which have been identified during the Ad Hoc Working Party meeting five years ago continue to constrain the sustainable development of freshwater aquaculture in Europe especially for small enterprises. In fact, the following constraints and recommendations which the WP had identified continue to be highly relevant and should be addressed:

- a comprehensive sector study still has not been prepared;
- the formation of stronger links among producers is slow and insufficient;
- consumer-oriented economic research is weak especially in Central and Eastern Europe and
- information flow to small producers is also weak .

EIFAC, together with FAO FIU and the European Commission should make further efforts to investigate the possibilities of organizing a follow up EIFAC/EC Working Party meeting on European Freshwater Aquaculture Marketing. Even if an overall European study on the marketing of freshwater species has not been completed as planned, valuable information and data have been generated from recent National Aquaculture Sector Overviews (NASO) and Prospective Analyses of Future Aquaculture Development (PAFAD) studies from 19 Central and Eastern European countries, which would be a very good basis for discussion during the Workshop.

2. Eastern European Affairs initiative

As regards Eastern European Affairs, a significant progress was made since the last EIFAC Session in Wierzba in 2004.

The First Meeting of Directors of the Network of Aquaculture Centers in Central and Eastern Europe (NACEE) was organized in Szarvas, Hungary on 21-24 November 2004, with support from FAO-FIRI and the Eastern European Sub-Regional Office of FAO (SEUR). During this meeting, the establishment and operation of the Network was formalized by a Founding Document officially signed by 23 founding member institutions in presence of witnesses from

FAO. As decided during the Meeting, the Research Institute for Fisheries, Aquaculture and Irrigation (HAKI), Szarvas, Hungary would be the coordinating institution of NACEE.

After the First Directors Meeting, NACEE continued developing cooperation both within and outside the CEE region. It continued informing its members on important aquaculture-related events, first through regular e-mails and later, through an own Internet webpage (<http://agrowebcee.net/subnetwork/nacee/>). It collaborated with SEUR in developing the structure for the Aquaculture and Fisheries Chapter of the AgroWeb Network. It developed collaboration with FAO, the European Aquaculture Society (EAS), the Network of Aquaculture Centres in Asia-Pacific (NACA), the European Fisheries and Aquaculture Research Organization (EFARO), the World Conservation Union (IUCN) and other international and national organizations. NACEE also became involved in the Asia-Europe Meeting (ASEM) Aquaculture Platform.

The Second Meeting of Directors of NACEE was held during 8-9 September 2005 in Astrakhan, Russian Federation, again with a significant support from FAO. During this meeting, the by-laws and rules of procedure of the Network were adopted. In addition to organizational matters, steps were taken toward development of concrete collaboration. The Department of Fisheries of the University of Dubrovnik was appointed NACEE Focal Point of Mariculture. Four priority collaboration areas were identified: sturgeon culture (coordinated by "BIOS" Research and Production Center for Sturgeon Breeding, Astrakhan, Russian Federation), carp genomics (coordinated by the Federal Centre for Fish Genetics and Selection, Moscow, Russian Federation), introduction of non-conventional species into aquaculture (coordinated by HAKI, Szarvas, Hungary) and aquaculture education (coordinated by the Department of Fisheries of the University of Dubrovnik, Dubrovnik, Croatia and the Faculty of Biological Resources and Nature Exploitation of the Kaliningrad State Technical University, Kaliningrad, Russian Federation). All four working groups developed their agendas for the next year. Some programmes were discussed in detail, e.g. the proposed NACA-NACEE collaboration or the development of a joint NACEE Master Programme in Aquaculture, coordinated by the Education Working Group and assisted by Wageningen University.

In conjunction with the Second Meeting, the FAO Expert Workshop on the Regional Aquaculture Review of Central and Eastern Europe was held in Astrakhan during 5-7 September 2005. Before this meeting, NACEE had assisted FAO-FIRI in identifying national experts for preparation of National Aquaculture Sector Overviews (NASO) and Prospective Analyses of Future Aquaculture Development (PAFAD) in CEE countries. HAKI itself assumed the task of compiling a Central-Eastern European Regional Aquaculture Review Report based on the national reports, which would be later incorporated into the envisaged Global Aquaculture Review Report. During the Meeting, National Reports and the Regional Aquaculture Review Report were presented and discussed. Their editing and preparation for publication is currently in progress.

By now, NACEE has grown into an internationally acknowledged thematic network. It has 31 member institutions from 13 countries. It continues its basic activities of disseminating information and assisting collaboration. The process of granting NACEE a formal International NGO status with FAO is under way, which will allow representatives of NACEE to participate in COFI meetings. A Workshop on Eastern European Aquaculture is being organized by the Network during the AQUA 2006 Conference in Florence, Italy, the organization of which is supported by EU. In addition, NACEE will have a separate stand at the Exhibition Area in Florence. An EU project, "EASTAQUANET" has been submitted with involvement of NACEE as a separate legal entity, and there are other projects including NACEE-member Eastern European institutions (e.g. "EUROCARP" with participation of HAKI and the Federal Centre for Fish Genetics and Selection) where NACEE takes part in dissemination of information. The NACEE working groups are pursuing their agenda, and they will present reports on their activity at the Third Meeting of NACEE Directors to be held in the end of September 2006 in Dubrovnik, Croatia. FAO envisages possibilities of supporting this event.

WATER USE AND RE-USE IN AQUACULTURE

Editors: Verdegem/Varadi/Barg/Muir

1 Review of water use worldwide

Short chapter (10-12 pages) setting a broad framework of global water resources and global water use. The chapter should contain a few world maps with information on:

- *Fresh water availability (5-6 categories, showing which countries have too much, enough, too little fresh water)*
- *Water use for agriculture (in percentages of total water availability)*
- *Balance between rain fed and irrigated areas*

Trends in future water availability will also be outlined:

- *Shifts from agriculture to industry and urbanization*
- *Demographic developments and impact on water availability*

Authors: International wetland bureau, Water Group Wageningen UR

2 Global water use in aquaculture

A review of water use in aquaculture by country. Attention is given to the amount of aquatic products produced and the related water use. Such a comparison will allow to make a by country comparison for aquaculture water use efficiency (for instance MT produced/m³ water)

Authors: Stirling University

3 Water use in the aquaculture production chain

Water uses in aquaculture include on-farm water use (evaporation + seepage + drainage), water treatment/purification systems, fish processing, and fish food production (food ingredient production, processing). Additional water use is related to the construction of facilities, energy use, etc. The goal of this chapter is to review and to define the water use along the whole aquaculture value chain, and to define which types of water use will be considered in the rest of the study.

Authors: Verdegem/Varadi

4 Future growth in aquaculture production and related water needs

FAO has published various scenario's for future development of aquaculture. The goal of this chapter is to related future growth in aquaculture developments to future demands for water use, and where possible to outline water scarcity limits for future aquaculture development, given present technologies stay the same.

Authors: FAO/Barg

5 Approaches to reduce water use in aquaculture

5.1 Intensification of pond aquaculture

Recent insights in pond production techniques allow to increase production per unit surface area, without negative impacts on sustainability and water use. Intensification

leads to reduction in water use per amount produced. This chapters reviews recent developments in pond aquaculture and analyses the impact on water use in aquaculture. Techniques to reduce seepage losses will also be discussed.

Authors: Avnimelech/ Verdegem

5.2 Recirculation technology

5.2.1 *Outdoor semi-closed and closed systems*

This chapter reviews developments in semi- and closed production technology of outdoor systems in relation to water use. Besides the use of artificial wetlands, stabilization ponds and activated sludge, partitioned aquaculture systems are also reviewed.

Authors: Pekar/Brune/Stirling team

5.2.2 *Indoor recirculation systems*

This includes a review of greenhouse production systems and super intensive indoor recirculation systems, considering water use.

Authors: Blancheton/Eding

5.2.3 *Desert aquaculture*

This chapter describes options for aquaculture development under desert conditions, and technologies for water conservation.

Authors: Neori/Appelbaum/Moses

6 **Costs of water use in aquaculture**

6.1 Direct and indirect costs of water use in aquaculture

Pricing policy of water use in various European and Asian countries will be reviewed and compared, as well as the consequences on aquaculture production costs. Often different price tariffs are used for water for agricultural, industrial and human use.

Authors: Stirling/FAO ?

6.2 Economics of shared water use in integrated systems

Use of ponds as nature reserves, recreation, flood control, recharge of aquifers and water storage. This also includes the use of reservoirs and rivers for fish production. Effect of joint use on total costs.

Authors: N/A

7 **Recommended practices for water use in aquaculture**

This chapter draws conclusions on the basis of previous chapters and gives recommendations for reducing water use in aquaculture, and discusses future trends in aquaculture water use. The year 2020 and 2040 are proposed as reference years.

Authors: Editors

8 **Research and training priorities**

This chapter reviews priorities for training and research by countries/regions, including a cost estimate.

Authors: Editors

ANNEX 2

Verdegem M.C.J., Bosma R.H. and Verreth J.A.J. (2006). Reducing water use for animal production through aquaculture. Special issue on “water for food and ecosystems”(Brindaban P., van Keulen H. and Warner J. guest editors) ; International Journal of Water Resources Development ; Vol. 22, nr. 1: 101-113

ABSTRACT

Animals fed formulated diets indirectly consume large quantities of water. Globally, about 1.2 m³ of water is needed to produce one kg of grain used in animal feeds. Cattle in feedlots consume about 7 kg of feed concentrate to gain one kg in weight. For pigs this is close to 4 kg and for poultry slightly more than 2 kg of concentrate. Fishes or crustaceans require less than 2 kg of grain concentrate for each kg produced, making them the most efficiently producing animals in terms of feed-associated water use. Non-feed-associated water use can also be considerable, and a comparison was made in total water use between aquatic and terrestrial animals. On-farm water use for terrestrial animals, including drinking, but excluding water for cooling animals or cleaning their sheds is only 1% of feed-associated water use. However, on-farm water use in aquaculture can be very high, attaining values of up to 45 m³ per kg produced in ponds. Intensification of aquaculture reduces on-farm water use per kg product, and only intensive aquaculture production systems are equally water-efficient as terrestrial animal farming systems. Within existing aquaculture pond systems reductions in water use can be achieved through (1) selection of feed ingredients that need little water to be produced (2) enhancement of within-system feed production through periphyton based technology, and (3) integration of aquaculture with agriculture. Still, these approaches will not make pond aquaculture more water-efficient than terrestrial animal production systems. That can only be attained in recirculating aquaculture systems and systems producing fish as a by-product of waste water treatment. Currently, the most promising approach is to concentrate on further development of brackish and marine aquaculture, as such systems use small or negligible amounts of non-feed-associated fresh water.