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Report of the

EXPERT WORKSHOP ON GREENHOUSE GAS EMISSIONS STRATEGIES AND METHODS IN SEAFOOD

Rome, 23–25 January 2012

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PREPARATION OF THIS DOCUMENT

This is the report of the Expert Workshop on Greenhouse Gas Emissions Strategies and Methods in Seafood, held in Rome from 23 to 25 January 2012.

The papers contained in this work have been reproduced as submitted by the participants, without editorial intervention by FAO.

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ABSTRACT

This document contains the report of the Expert Workshop on Greenhouse Gas Emissions Strategies and Methods in Seafood held in Rome, Italy, from 23 to 25 January 2012. The Workshop was convened by the Director-General of the Food and Agriculture Organization of the United Nations, following a recommendation by the Twenty-ninth Session of the Committee on Fisheries that FAO should provide Members with information on possible fishing industry contributions to climate change, and on ways to reduce the sector's reliance on, and consumption of, fossil fuels, respecting the principles embodied within the United Nations Framework Convention on Climate Change. Financial and in-kind support for the Expert Workshop was provided by the Government of Norway, the FAO Regular Programme, Seafish, Dalhousie University and other contributing participants.

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OPENING OF THE MEETING AND ARRANGEMENTS FOR THE SESSION

1. The Twenty-ninth Session of the Committee on Fisheries (COFI) recommended that FAO should provide Members with information on possible fishing industry contributions to climate change, and on ways to reduce the sector's reliance on, and consumption of, fossil fuels, respecting the principles embodied within the United Nations Framework Convention on Climate Change (UNFCCC). Following this recommendation, and the deliberations of industry practitioners and policy agents expressed at the International Symposium on Energy Use in Fisheries (Seattle, 2010) and the Seafood Summit (Vancouver, 2011), the Director-General of the Food and Agriculture Organization of the United Nations convened an Expert Workshop on Greenhouse Gas Emissions Strategies and Methods in Seafood. The Expert Workshop was held at FAO headquarters, Rome, Italy, 23–25 January 2012, with funding and in-kind support from the Government of Norway, the FAO Regular Programme, Seafish, Dalhousie University and other participants.

2. FAO staff members, researchers and academics, industry representatives, standards experts, civil society, and fisheries consultants attended the Workshop. The attendance list is provided in Appendix 2. Background papers circulated to the participants prior to the Workshop are provided in Appendix 3.

3. The Secretary of the Workshop, Mr Francis Chopin, called the meeting to order.

4. Mr Árni M. Mathiesen, Assistant Director-General, FAO Fisheries and Aquaculture Department, referred in his opening statement on behalf of the Director-General to the high dependence of the food system on fossil fuels, and to the fact that, for the fisheries and aquaculture sector, the use of fossil fuels has significantly helped feed the world over the last few decades, mainly through their contribution to increased mechanization of fishing vessels, processing and transport to markets. He highlighted that ensuring that the agrifood sector becomes "energy smart" at both the small family and large corporate scales will require strong and long-term supporting policies and innovative multistakeholder institutional arrangements. He noted that at the Twenty-ninth Session of COFI, FAO reported that net greenhouse gas (GHG) contributions of fisheries, aquaculture and related supply chain features are poorly studied and the paucity of data on GHG emissions across fisheries and aquaculture supply chains is a key factor constraining the development of strategies to address energy use. He observed that FAO also reported that the transition to energy-efficient and low-footprint aquatic food production systems would be facilitated through the development of: standardized methodologies for energy and emissions calculations throughout the food chain; collection of data within this framework; and the development of policy and technologies associated with energy use and GHG emission reductions. He thanked the experts at the Workshop for taking the time to consider these important issues. His statement is attached as Appendix 4.

ELECTION OF THE CHAIRPERSON

5. Mr Graeme Macfadyen (the United Kingdom of Great Britain and Northern Ireland) was elected Chairperson of the Workshop. In assuming the Chair, he expressed his thanks to the Workshop for its confidence in electing him to the position. The workshop participants agreed with the Chairperson's proposal that discussions would be held both in plenary and in informal breakout working groups, as required, in addressing specific issues.

ADOPTION OF THE AGENDA AND ARRANGEMENTS FOR THE TECHNICAL CONSULTATION

6. The consultation adopted the agenda as given in Appendix 1. The Chairperson then outlined the timetable of work for the consultation, noting that a degree of flexibility would be required to make best use of the resources available to the meeting.

NOMINATION OF THE WORKSHOP FACILITATORS AND RAPPORTEURS

7. Mr Rod Cappell (the United Kingdom of Great Britain and Northern Ireland) was nominated as a workshop facilitator, with Mr Cappell and Mr Macfadyen nominated as rapporteurs to prepare this workshop report.

DAY 1 – BACKGROUND PRESENTATIONS

8. The Workshop was informed that a number of organizations with a mandate or history of engagement on seafood sustainability issues, including *inter alia* (FAO, Seafish, Dalhousie University, industry), are working within a framework for collective action as a means of addressing and potentially resolving some of the issues around methodologies for GHG emissions and mitigating strategies. This framework for action, within which the Workshop fits, aims to work towards common positions on GHG emissions methodologies, common standards where possible, shared understanding of key seafood production systems, and platforms for sharing emissions-related data.

9. Presentations during the first day of the Workshop focused on an overview of findings to date with respect to GHG emissions, a review of key methodological choices in GHG emission methodologies, and some potential performance metrics. Some key points highlighted were:

10. Mr Francis Chopin of FAO highlighted the growing pressure on global food production, in which fisheries, particularly aquaculture, would play an important future role. However, future production needs to be "energy smart" as many production methods were developed when fossil fuels were much cheaper and their impact on climate change was not widely understood. To develop effective policies, it is necessary to be certain that the appropriate data for measurement are available; it is not a case of favouring large-scale producers in industrialized countries, or of placing unnecessary burdens on small-scale producers.

11. Mr Angus Garrett of Seafish described their work analysing seafood systems, which identified GHG emissions as an issue throughout the supply chains. He explained how Seafish sought to contribute to changes in industry practice and described the objectives and scope of the collective action between Seafish, FAO and Dalhousie University. There are four areas of action: common methods of assessment (the focus of this Workshop); development of standards; understanding seafood systems; and sharing data.

12. Mr Peter Tyedmers of Dalhousie University explained the range of threats posed by GHG emissions, the significant contribution by food production (particularly livestock) to global emissions and the growing interest in measuring these and attempting mitigation. There is an opportunity for seafood to make a major contribution to future food demand with GHG emissions that are lower than other animal protein choices, and these GHG emissions can be reduced further. The key emissions stage in fishing is the fishing stage itself, but fuel use varies hugely by type of fishing gear. For aquaculture, the main emissions come from the feed production stage and, therefore, differing feed formulations, levels of intensification and food conversion ratios can make a big difference. For some production systems and supply chains, there are other stages where emissions may be significant (e.g. if product is air freighted). To date, the focus of life cycle assessment (LCA)/GHG assessment has been on whitefish fisheries in the Northern Hemisphere with less on pelagics and shellfish. For aquaculture, the focus has been on salmonids, but in recent years other finfish and shrimp studies have emerged.

13. Mr Rod Cappell of Poseidon described GHG assessment methods. Two broad approaches are noted: a top-down "approach" using economic input–output tables; and a bottom-up "process LCA" approach summing the emissions from the various stages identified within a lifecycle. He noted that most seafood assessments to date have considered large-scale systems with very few small-scale and developing country examples. The presentation highlighted some of the methodological challenges in their application to the fisheries and aquaculture sector, defining common product typologies and system boundaries, allocation issues and the lack of available resources for key emissions factors (e.g. from fuel use by gear type and from various aquaculture feed formulations).

14. Mr James Muir of the University of Stirling presented a number of GHG emissions sources and issues at each stage in the fisheries and aquaculture production chains. A number of performance metrics were identified specific to each production stage, e.g. energy use in fisheries (tonnes fuel/tonnes catch), aquaculture food conversion (tonnes food/tonnes product), processing energy use (kWh/tonne produced). He noted the importance of recognizing the trade-off between specific accuracy and wider, simpler applicability.

Mr Brian Such of the British Standards Institute presented the range of standards used in carbon management and the potential process for developing seafood standards. All GHG standards take a whole lifecycle approach and cover all the Kyoto gases. The differences in standards are mainly in the approach to reporting and communication. Most standards work at a product (goods and services) level rather than on a wider organizational level. The main reason organizations undertook carbon accounting was to identify hotspots so that improvements could be made. A secondary driver was customer pressure to report GHG emissions. An assessment helped organizations to understand better their processes and to target GHG reduction measures. He also highlighted the standards development work specific to the seafood sector, and outlined how this work would be expected to proceed.

15. All presentations are provided in Appendix 5.

DAY 2 – BREAKOUT WORKING GROUPS ON METHODS FRAMEWORKS

16. Two working groups were established, broadly divided into: governance-related stakeholders, with a primary background in considering national/global assessments; and industry-related stakeholders primarily involved in addressing company-level and group-level assessments. Working across these levels, each group considered both the challenges and options associated with different methodological choices related to: setting the overall goal and objectives of assessments; the subject of assessment; the system boundaries; allocation methods; emissions factors; the approach in terms of using existing data or generating new data; and reporting. The deliberations of the working groups were then presented in plenary.

17. A summary of the working group discussions is provided in Appendix 6. Both groups reported that the overall goal was to enable the identification and reduction of GHG emissions, but the main driver for companies was internal improvement, while a global-level assessment is to enable comparison between sectors, production methods, nations and over time. A primary aim of identifying GHG emissions is to refine estimates in an effective manner. At the global level, this may involve using default data (tier 1 approach), with more specific data collected at the hotspot stages of fuel use for fisheries and feed production for aquaculture. This is less likely to be sufficient for a company, where production-specific data (a tier 2 approach) would be needed and in many instances the collection of primary data (tier 3 approach) may be expected.

18. It was noted that global assessments are likely to be species-based and further defined in terms of production method (gear métier for fisheries, and level of intensity for aquaculture). For a company, a product-level assessment is likely to be at the product level. As products are defined by species, company data could subsequently be aggregated to enable national species-level reporting. It was agreed that assessments should include all Kyoto GHG gases, particularly as contributions by vessel refrigerants (fisheries) and agricultural production (aquaculture feed) are significant.

19. The working group reported that boundaries should be clearly defined. For companies, an important emphasis could be on those practices the company itself can influence, e.g. "cradle to gate". For national or global assessments, the whole lifecycle is of interest, but the focus is expected to be on the productive sector, i.e. "gate to gate", which for primary producers such as fisheries could also be described as "cradle to gate". The allocation of emissions to a single species or product can be difficult for fisheries where other species may be landed. Allocation on the basis of value (economic allocation) is the norm for the existing GHG assessment standard PAS 2050, but allocation by weight (mass allocation) or an alternative could be chosen if this can be properly justified.

20. The working group noted that standardized reporting would be important at every level. For companies, the reporting is likely to be in the context of LCA and reporting standards already exist, but high-level reporting could be more variable.

21. Mr Michael Macleod of FAO's Livestock Information, Sector Analysis and Policy Branch gave a presentation on FAO's ongoing LCA work in relation to livestock commodities. Work streams include developing a model to estimate livestock emissions and a database of supporting information such as emissions factors for animal feed. The process of developing a partnership between FAO, industry and academia provided an example of how work in the seafood sector could be progressed and also identified that information sharing on feed components would be mutually beneficial;

especially with respect to livestock consuming fish-based feed constituents and aquaculture using land-based components.

22. Mr Marc Taconet of the FAO Fisheries and Aquaculture Department gave a presentation on the Fishery Resource Monitoring System (FIRMS), which provides information on the status of global fisheries resources via submissions from members of an information partnership. The partnership includes regional fishery management organizations (RFMOs) and other regional partners. Information-sharing rules and guidelines have been developed to address data ownership, dissemination rules and quality assurance mechanisms. Resource inventories and fact sheets enable analysis of state and trend statistics on a global and regional basis. The seven-year process to establish FIRMS provides some lessons if LCA resources for seafood are to be established.

DAY 3 – DISCUSSION ON COMMONALITIES BETWEEN METHODS FRAMEWORKS

23. The morning of day three was used to discuss the commonalities between the preferred methodological choices suggested by the two working groups as reported on day 2. Despite some differences in the preferred methodological choices, largely resulting from the primary goal/objective of conducting emissions assessments, a number of commonalities were identified. A summary of the discussion during the morning of day three is provided in Appendix 6.

24. A group discussion on existing approaches and work areas followed. It was recognized that product-level assessments are favoured in a commercial context and these are being addressed through GHG assessment standards. One work package of the collective action is tasked with defining amendments to existing standards specific to the seafood sector. International intervention could usefully be made in the form of operational guidelines (describing how to undertake assessments, particularly in LDC settings) and information provision (databases and emission factor inventories).

25. For the fisheries and aquaculture sectors, the impact hotspots are identified as the fishing stage and feed production stage, respectively. Information exists in relation to fuel use per gear and feed formulations, but there is no platform for information sharing.

26. It was noted that the input–output method provides a useful approach for national and international-level assessments. For example, the Environmental Impact of Products (EIPRO) project of the European Union (Member Organization) using environmentally extended input–output tables is continuing to enable coverage beyond its 27 member States.

CONCLUSIONS AND FUTURE WORK

27. The Workshop progressed the debate on GHG emissions assessment by reviewing approaches and exploring the implications of key methodological choices. However, it was recognized that more work is needed to assess the consequences of such methodologies.

28. Participants agreed that, while an overall reduction in emissions was a common goal across all levels of application, the aim for a common approach for GHG assessments in fisheries and aquaculture was not likely to be appropriate as the drivers, objectives and levels of detail needed at the company level may differ from those at an industry group, a national or global level. However, there are important areas of interchange between these levels, and communication between them would be essential.

29. The working group noted that, at the company level in particular, GHG assessments are likely to focus on identifying internal improvements in performance and there is often a wish to communicate these efforts. For credibility, these are likely to be assessments according to recognized standards often conducted by independent third parties. General GHG assessment standards exist and part of this collective action is to address what specific amendments are necessary for application of those standards to the seafood sector.

30. Higher-level assessments at an industry group, a national or global scale are likely to be informed and validated by company or product-level assessments, but would focus on more generic approaches. Strategies for aggregating data need to be well conceived, and an important practical aim would be to keep the data collection and reporting burden to a minimum. A simplified approach based

on existing data systems might be to allocate national/global production data (e.g. FAO FishStat) to production methods (for example, defined by fishing gears not available and feed-use regimes), and from this to generate sector-wide GHG estimates. This could then be used to identify potential "hotspots" such as fuel use in fisheries and feed ingredients in aquaculture, and where necessary and appropriate to develop more detailed sectoral data together with industry participants. A simplified approach might be to use existing data systems to enhance the assessment of GHG emissions contributions from recognized "hotspot" activities in seafood, e.g. fuel use in fisheries and feed ingredients in aquaculture. Where necessary and appropriate, more detailed sectoral data could be developed together with industry participants.

31. The majority of assessments and available data are from large-scale fisheries (gadoid and salmonid fisheries) in developed countries. There is a role for FAO, partner agencies and industry in ensuring that small-scale producers and less-developed countries are not disadvantaged by the growing demand for GHG assessment information. Assistance could include filling data gaps by encouraging GHG assessment examples from lesser-studied regions such as Asia and Africa and fishery types. It would also be helpful to both company-level and high-level assessments to establish a database of emissions factors for the fisheries and aquaculture sector.

32. Following the Workshop, the organizers and a small number of participants held a discussion/follow-up session to explore possible future options, work areas and shared activities. These are outlined in Appendix 7. These work areas are to be further defined and prioritized by the collective action partners

33. Building on the findings from this Expert Workshop, a second workshop is planned in order to identify mitigation measures to reduce GHG emissions in fisheries and aquaculture.

CLOSING OF THE WORKSHOP

34. The Chairperson thanked the workshop experts for their contribution to the workshop discussions, and invited the Secretary, Mr Francis Chopin to close the Workshop. Mr Chopin expressed his gratitude to the experts for their active participation in the Workshop, and formally declared the Workshop closed.

APPENDIX 1

AGENDA

Day 1 – Setting the scene
Key themes:
Objectives of Workshop
Benefits and drivers (commercial/policy) of GHG emissions assessment
Examples of assessment
Methods used

Time	Session title	Speaker	Theme
08:30 – 09:00	Building/security, registration, etc		
09:00 – 09:20	Welcome	FAO Opening address Árni Mathiesen ADG Department of Fisheries and Aquaculture FAO	1
09:20 –09:45	Introduction to workshop and objectives Nomination of Workshop chair	Frank Chopin, FAO Angus Garrett, Seafish	1/2
09:45 – 10:30	Tour de table; workshop expectations and comments, housekeeping	Chaired discussion	1/2
10:30 – 11:00	Coffee		
11:00 – 11:30	Overview of findings to date/ Review approaches used to assess GHG emissions in the seafood sector, plus discussions	Peter Tyedmers, Dalhousie University	2/3
11:30 – 12:00	Performance metrics – existing approaches & information sources	James Muir, Consultant	4
12:00 – 12:30	Review implications of key methodological choices on GHG emission assessment outcomes and challenges	Rod Cappell, Poseidon	4
12:30 – 13:30	Lunch		
13:30 – 15:00	Preliminary discussions and feedback	Chaired discussion	4
15:00 – 15:15	Presentation of development in standards	BSI	4
15:15 – 15:45	Break		
15:45 – 16:45	Industry and governance perspectives on methods and tradeoffs Industry (economic drivers) & governance (policy drivers)	Chaired discussion	4
16:45 – 17:00	Establish working groups to consider each of three major methods issues of interest: • setting of system boundaries of analysis • addressing coproduct allocation and related issues • tradeoffs between detailed, accurate but resource intensive assessment methods versus accessible, timely and resource "lite" approaches Remit to deliver high-level principles and detailed guidance		4
17:00 – 17:15	Review and schedule for Day 2	Chair	
18:15 – 20:00	FAO reception (Aventino Room)		

Outcome: Participants are clear on objectives of workshop and have a good understanding of the need for GHG emissions assessment, the "state of the art" (how this is currently done), where choices/techniques affect results i.e. why methods matter, and are prepared to engage on a substantive issue at the start of Day 2.

Day 2 – Reviewing GHG emissions methods
Key themes:
Identify key methods and preferences
Define potential standard/common methods and areas of diversity
Develop methods framework

Time	Session title	Speaker	Theme
08: 30 – 09:00	Day 2 introduction – update, aims and methods	Chair/facilitation	
09:00 – 10:30	Stakeholder methods*	Breakout groups (Group 1 = industry, Group 2 = governance)**	1
10:30 – 11:00	Coffee		
11:00 – 12:00	Stakeholder methods (continued)	Breakout groups (as above)	1
12:00 – 12:30	Plenary / feedback session	Rapporteurs present Group conclusions	1
12:30 – 13:30	Lunch		
13:30 – 15:00	Opportunities for common methods; identifying individual grounds and discussing areas of common ground (areas of agreement and dissonance)	Breakout groups (possibly mix Group 1/Group 2 members) = governance)	2
15:00 – 15:30	Plenary / feedback session	Rapporteurs present Group conclusions	2
15: 30 –16:00	Break		
16:00 – 16:15	Methods framework	Facilitators overview on potential framework	3
16:15 – 17:15	Group discussion on framework for organizing group methods, recognizing individual and common ground, shared positions and choice points	Facilitated discussion process across key points and issues	3
17:15 – 17:30	Establish working groups to consider each of three major methods issues of interest: • setting of system boundaries of analysis • addressing co-product allocation and related issues • trade-offs between detailed, accurate but resource intensive assessment methods versus accessible, timely and resource "lite" approaches Remit to deliver high-level principles and detailed guidance		4
17:00 – 17:15	Round-up and conclusions to carry forward	Chair	

Outcome: The critical issues associated with GHG emissions methods in seafood (including data issues) are identified and broad agreement on appropriate methods framework.

* Two breakout groups, each containing LCA technical experts, based on:
  - industry stakeholders
  - governance stakeholders

** Key questions for stakeholders (provided in a template, and used as basis for rapporteur feedback to plenary):
  - What purposes do you assess GHG emissions for?
  - What are the preferred units of analysis?
  - What are the preferred system boundaries?
  - What is the preferred allocation to coproducts?
  - What is the preferred level of granularity?
  - What practical challenges (including data and information challenges) does this produce?

In each case, provide a "position" where there is agreement, or provide a "choice point" where there is dissonance, plus justification

Day 3 – Developing methods
Key themes:
Agreeing framework approaches
Identifying pilot systems
Strategic issues – collating and disseminating data, developing a support tool for those wishing to conduct fisheries GHG assessments (with assessment tools, database of emission factors, etc., use and reporting issues)

Time	Session title	Speaker	Theme
08:30 – 09:00	Day 3 introduction – update, aims and methods	Chair	
09:00 – 09:15	Discussion/issue setting for proposed framework approaches		1
09:15 – 10:15	Practical applications of operating the proposed framework; agreeing an approach - stakeholder methods*	Breakout groups (mix across Group 1 = industry, Group 2 = governance)	1
10:15 – 10:30	Plenary / feedback session	Rapporteurs present Group conclusions	
10:30 – 11:00	Coffee		
11:00 – 12:00	Stakeholder methods (continued)	Breakout groups (as above)	1
12:00 – 12:30	Plenary / feedback session	Rapporteurs present Group conclusions	1
12:30 – 13:30	Lunch		
13:30 – 14:00	Strategic implications – introduction to issues/topics (possible inputs from FAO statistics service and NRC)	Facilitation	3
14:00 – 15:00	Strategic implications – stakeholder methods to discuss priorities, potential problems, ways of addressing these	Breakout groups (Group 1 = industry, Group 2 = governance)	3
15:00 – 15:30	Plenary / feedback session	Rapporteurs present Group conclusions	3
15:30 – 16:00	Break		
16:00 – 17:00	Overview of decisions, agreements, choice points, issues to resolve	Facilitated agreement of the workshop report	
17:00	Workshop round-up and conclusions	Chairperson and FAO	

Outcome:
An agreed approach is established and a number of pilots covering a range of situations are identified. Strategic implications identified and discussed with recommendations as appropriate for further action.

Day 4 – The next steps
Key themes:
Detailing a work plan – preparation of the workshop report
Establishing what issues need more investigation/discussion
The next steps

09:00	Work plan: how this will be taken forward, information needs timing, who is involved, etc.		1
	Lunch		
14:00	Future work areas / actions		2 / 3

Outcome:
A work plan is produced establishing which pilots and approaches are to be taken forward, who is involved (structure of pilots and steering group) with each and agreement on info/data use.
Identification of any unresolved issues needing more work.
Agreement on how participants are to be kept informed of collective action.

APPENDIX 2

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