to know each other, and familiarise themselves with the positions of others. Such meetings can assist in problem formulation while also exploring the relationships among stakeholders. Subsequent meetings may be in smaller groups, on less controversial issues where consensus can easily be reached, followed by full-scale workshops with all stakeholders. At a series of smaller meetings, participants may more easily overcome any reluctance to speak out, feel more comfortable and acknowledge that they are fully recognised in the process. Such strategy can be time consuming but is indispensable. At meetings, stakeholders should be involved in communicating results. This aspect is often overlooked in consensus building.

Much published guidance is available in many languages about facilitation techniques and this should be referred to, as necessary.

5.8. Concluding remarks

Risk communication should play a key role in the decision process of any resource use development and has – in the past – been largely neglected or employed so late in the process that effective and timely progress by an industry and/or in the development of a project was impossible to achieve. Risk communication provides the fundamental basis on which all hazard identification, risk assessment procedures and project implementation steps should be based.

The examples and strategies presented in this document deal with a comprehensive and complete environmental assessment strategy that is applicable not only to coastal aquaculture but is also valid for a variety of other forms of aquaculture, addressing specific issues to demonstrate the way by which development proposals should be handled in terms of potential hazard identification, and risk assessment as well as how these are interlinked with procedures for risk communication to visualize and demonstrate the processes involved.

Based on these considerations, a number of specific case examples have been elaborated and are presented (Chapter 6) in which the incremental steps of the processes have been demonstrated. They cover:

(a) the localised effects of benthic community changes under and around fish cage farms (Chapter 6.1),

(b) the determination of site-specific carrying capacity for the development of additional shellfish raft culture and its potential interaction with already existing extensive mussel farming in the area (Chapter 6.2),

(c) the far-reaching effects of release of fish (effects of escapes from cod farming on cod populations (Chapter 6.3),

(d) considerations of long-term effects on the adjacent macro-algal communities as being potentially affected by the proposed expansion of fish cage farms (Chapter 6.4),

(e) the salinisation of farm land by low salinity shrimp culture (Chapter 6.5), and

(f) the effect of nutrient released from a fish farms on local phytoplankton (Chapter 6.6).

All these examples can be used as model cases to elaborate further the approaches taken to perform an overall Risk Assessment and to apply the results in the decision making process.

5.9 Literature Cited

Covello, V. T. and Sandman, P. (2001): Risk Communication: Evolution and Revolution. In: Solutions for an Environment in Peril, A.B. Woldast (ed.) John Hopkins University Press Baltimore, pp. 164-177.

Damasio, A. H. (1994): Descartes error: Emotion, reason and the human brain. G. Putnam and Sons, New York, 312 p.

DFO (2006). “Strategic risk communications approach selected to address farmed salmon consumption in Canada” project. Department of Fisheries and Oceans Canada.

Fischhoff, B. (1990): Psychology and public policy: tool or tool maker? American Phychologist 45: 57-63.

Fischhoff, B. (1995): Risk Perception and Communication Unplugged: Twenty Years of Process. Risk Analysis 15:137-145.

Fischhoff, B. and Downs, J. S. (1997): Communication of foodborne disease risk. Emerging Infectious Diseases 3 (4), 489-495.

Gow, H. B. F. and Otway H. (Eds.) (1990). Communicating with the public about major accident hazards. Routledge, London, 635 p.

Howard, R.A. and Matheson, J. (1981): Influence Diagrams. In: The Principles and Applications of Decision Analysis. Vol II. Strategic Decisions Group, Menlo Park, California, USA.

ICES (1999): Report of the International Council for the Exploration of the Sea Working Group on the Environmental Interactions of Mariculture, Montpellier, France, 15-20 April 1999, 159 p.

Morgan, M. G., Fischhoff, B., Bostrom, A. and Atman, C. J. (2002): Risk Communication: A Mental Models Approach. Cambridge University Press, 291 p.

Renn O., Webler, T., and Johnson, B.B. (1991): Public Participation in Hazard Management: The use of citizen panels in the U.S. Risk Issues Health Safety 2, (3), 197-226.

Renn O., Webler, T., and Weidermann, P. (1995): Fairness and competence in citizen participation. Technology, Risk and Society No 10. Kluwer Publications, Dordrecht, The Netherlands, 408 p.

Shachter, R. D. (1988): Probabilistic inference and influence diagrams. Operations Research 36, (4), 589-604.

Slovic, P. (1999): Trust, emotion, sex, politics and science: Surveying the emotional battlefield. Risk analysis, 19, (4), 689-701.

Slovic, P., Finucane, M.L., Peters, E., and MacGregor, D.G. (2004): Risk as analysis and risk as feelings: some thoughts about affect, reason, risk and rationality. Risk Analysis 24, (2), 311-322.

Stern, P.C. and Fineberg, H.V. (1996): Understanding risk; Informing decisions in a democratic society. United States National Research Council, Committee on Risk Characterization. National Academy Press, Washington, D.C., 250 p.

Wright, D., Dressel, K., and Merad, M. (2006): Stakeholders in Risk Communication (STARC). Deliverable 2: Risk communication practices in EU Member States, selected other countries and industries. www.starc.jrc.it <http://www.starc.jrc.it/> , 296 p.

5.10 ANNEX: Principles and Checklist for Risk Communication

5.10.1 Principles

1 Risk communication has to start at a very early date and simultaneously with the initiation of the process for hazard identification to allow a full recognition of the diverse issues that need to be addressed in the development process.

2 Risk communication should be an open, inclusive and transparent process for which the strategy should be developed as the procedures for hazard identification of a particular case evolves.

3 Risk communication methodology must assure that all results of the risk analysis procedure are communicated in formats that are clear and useful to individuals and organisations who use the information in their own decision-making process.

4 Risk communication methods should be carefully selected in light of the type of stakeholders involved and the target population to be addressed, thereby fostering effective involvement and support.

5 Risk communication may involve a step by step approach to issues, recognising that the uncertainty levels may differ between issues.

5.10.2 Checklist

1 Identify an agency or an organisation to lead the risk communication process.

2 Prepare an initial list of potential stakeholders who need to be included into the communication process right from the beginning.

3 Prepare campaigns of open-ended interviews to collect the entire spectrum of views of stakeholders (affected population) while ranking these according to perceived risks (severity, potential for mitigation).

4 Check that all needs of these stakeholders are properly conveyed to and considered by the experts when formulating an influence diagram.

5 Critically check that all risks perceived by stakeholders are expressed, and noted and fully conveyed to experts and decision-makers.

6 Collect detailed information on the key characteristics of risks of concern to the general public which might need the attention of experts and decision-makers in perfecting the influence diagram.

7 Check that both present and future risks are perceived and articulated by stakeholders and the public at large in ways that indicate an appropriate perception of these risks, and ensure that their views are fully conveyed to experts and decision makers.

8 Assure the inclusion of cost-benefit information in the communication process

9 Identify the most effective pathways of communication for each of the stakeholder groups.

10 Assure that the timetable is well prepared, indicating to whom and when information gathered in the risk identification phase, as well as the risk assessment phase, will be released.

11 Prepare and regularly update a list of priority subjects to be discussed and communicated in stakeholder group meetings.

12 Set up a list of criteria specific to each project that identifies the format in which information is released at each stage of the process in relation to (a) scale/size and extent of risks, (b) number of people affected, (c) severity (e.g catastrophic, negligible), (d) quality of scientific understanding of risks and uncertainty, (e) controllability of risks and ease of mitigation, (f) present and future risks, and (h) cost-benefits.

13 Prepare a monitoring tool to ensure that incoming results from the risk identification and risk analysis procedures are communicated adequately and in a timely manner to all participants (directly affected stakeholder, NGOs, or/and the public at large).

14 Monitor the responses from public and stakeholder groups to risk communication and pass this information on to the respective experts and decision makers.

15 Prepare a schedule for meetings between experts and stakeholders, and experts and decision makers, in line with the progress made in the risk identification and risk analysis process.

16 Develop a framework for the negotiation mechanism to be employed to bring the risk assessment to an end and transfer the project to the implementation phase.