The approaches towards the end of the above list begin to recognise not only the importance of transparency and trust, but also the potential contribution of stakeholders to the risk assessment process, and especially those parts of the process which have significant subjective elements.

5.4.2 The way forward: a more participatory approach

As discussed above, our responses to hazards and risk are heavily influenced by psychological and social factors. Risk communication must therefore seek to integrate the scientific aspects of risk analysis with relevant psychological, social, cultural and political factors. However, distrust seems to be an inevitable element of our social and democratic institutions, and this tends to work against the resolution of the conflicts that so often complicate risk analysis and management.

A new approach is therefore needed – one that focuses on introducing more public involvement early in a risk analysis which is transparent and in which it is clear to all involved that the biological and physical sciences have a distinct role from that of the economic and political sciences. The role of the biophysical sciences is to measure and develop the knowledge that will allow prediction of how much change will result from the introduction of a hazard into the environment, its geographic extent and its temporal duration (this is risk assessment). Risk communication takes information from these sources and orders it in a way that speaks to people's concerns, by translating the socio-economic values to the environmental manager and helping to make the science relevant and informative in relation to socio-economic interests. Managers can also supply supplementary post-analysis data from monitoring programs that will allow the risk assessment to be used in an adaptive management protocol.

Work in Europe and North America has begun to lay the grounds for public participation in the deliberative and decision-making process (for example, *see* Renn *et al.* 1991; Renn *et al.* 1995; Stern and Fineberg 1996), and for the creation of tools to improve the effective use of the contributions from stakeholders and other interested groups.

5.5 Developing a Communication Strategy

5.5.1 Overall considerations

Risk Communications strategies inevitably differ between situations, even within a single field such as coastal aquaculture. The particular circumstances vary with location, and the mix of concerns will vary with the people affected or concerned about a development. It is therefore not possible to be highly prescriptive in advice on how to undertake risk communication. However, the following sections attempt to identify some themes that are generally applicable, although the scale of effort required to complete the tasks will vary greatly. Communication in relation to a regional or national plan for coastal aquaculture will be a very different challenge

to that required for the extension of a single existing production site. The communications strategy mapped out at the outset of the risk analysis process should:

- Define the need and scope of consultation and communication;

- Identify relevant stakeholders, interest groups and experts who should be involved, and their particular interests, knowledge, needs and perspectives;

- Decide on the approach and technique for engagement and communication with respect to each stage of the risk analysis and for each stakeholder group, government, and technical experts.

The details of such a strategy will depend on the issues being addressed, the political or decision-making context, and the nature of the lead organisation. The following guidance should therefore be interpreted with flexibility. Nonetheless there are some general principles which should be applied in most circumstances:

- Engagement with key stakeholders should be undertaken from the outset, to maximise transparency and ownership;

- Specifically seek out, show respect for, and take full account of local and/or user knowledge;

- Consultations should be expertly facilitated by someone seen by all parties as neutral and trustworthy;

- The process should be iterative – consultation informs analysis; analysis informs consultation; consultation generates consensus..... and so on. The number of iterations may range from one to many according to the issues being addressed and the scope of the whole exercise.

- The final assignment of estimates of severity, probability and uncertainty – the core of risk assessment – should not be done by a single individual. Although they may be informed by technical experts, final estimation should be undertaken by an agreed delegated group, including technical experts, and including appropriate or requested stakeholder representatives.

The objective of this process is to maximise the flow of information and the interactions between all involved. It is a continuous process, including not only the risk identification and risk assessment but also the implementation of the decision, its subsequent monitoring and iterative improvement (mitigation) process.

It should also to be emphasised that a risk communicator and/or facilitator is not a public relations official whose primary aim is to limit the possible impact of the Risk Analysis on the development of the project. The risk communicator's main objective is to ensure that stake-

holders and the public are equally informed about the risks, and can agree on how to manage the risk. If such agreement is not attainable, the process should lead to a common understanding of the management options.

Irrespective of the degree of consultation and interaction, transparency must be established and maintained. The procedure must be clear; the process must be open; the analysts should be available and accountable; the reporting regular; and the basic analysis should be value neutral.

5.5.2 Step by step development of a communication strategy

Any risk communication strategy will have to undergo a clear planning process and the following sequence has been developed from an amalgamation of several different approaches that have been taken in various jurisdictions, and which contain key elements for successfully building a strategy of risk communication. As an initial step, the communicator/facilitator who will organise the communication process has to be appointed. Thereafter, the strategy should be built gradually, as visualised in Figure 5.2.

The process is not a linear one and may go through several iterative loops between several steps, depending on the number of hazards identified and the complexity of the system. It also can be a short process with all stakeholders and regulatory agencies involved in one meeting (yellow box) dealing with all steps if hazards and risks are clearly identified and well-controlled. If no hazards are identified, the process may end at the scoping meeting.

1) Starting with a scoping process which is based on the documentation provided by the proposer and developed with the respective authority/ organisation in charge (in accordance with the existing framework in any of the regional and/or national jurisdictions and their policy or mandatory procedures).

This exercise will have to be well documented, in agreement with the participating parties without peer review. It provides the basis for the next step in the process. If it becomes clear at this early stage that the proposal will be contentious and that resolution might be difficult, it might be advantageous to identify and involve a facilitator (see step 3) at this point.

Public involvement may not be required at this stage, unless issues have already been discussed between the proponent and various stakeholders (i.e. NGOs) and the media. If advisable, (case dependant) communications of the status of preparation of the project to stakeholders and the public (including media) should be based on the agreed minutes of meetings or on specifically agreed press releases.

2) Identifying the relevant stakeholders and interest groups and seek and consider their needs

One difficulty is the appropriate and reliable identification of stakeholders. While many are clearly identifiable, some may enter the process later as their interests evolve. There is a need to be alert to such groups and to solicit contacts as early as possible. Another barrier to effective risk communications are conflicts and lack of coordination among stakeholders. The facilitator should anticipate such difficulties during the planning and preparation of the discussion process. It requires a skilful professional to organise effective risk communication strategies, for example selecting the timing and number of meetings, the composition of participants from various stakeholders in one or several subsequent meetings, whether to focus on one specific and complex issue, or on many issues, in a single meeting. Those with a vested interest should be invited to cooperate closely with others who may be affected by the project and may have formulated their own objectives.

For example, when dealing with the expansion of shellfish long-line farming near existing oyster bouchots and bottom cultures (see case study 6.2) it might well be advisable to have all stakeholders at the first meeting because (a) the issue may have been already been of public debate via the proponent, or (b) there is a need to ensure that the experts capture all issues that need to be addressed in developing the influence diagram, and (c) the scientists may wish to inform the farmers and authorities of the potential effects and of what needs to be studied. While competition for food (phytoplankton) is one of the key issues, and carrying capacity may have to be established, there are others such as fisheries or boating that may wish to identify their own interests.

In the case study on benthic deposition under and around a cage farm that it is proposed to expand (see case study 6.1), existing knowledge and risks have been well-established. The scale of the effect is among the key issues and therefore may require involvement of only a few experts, the farm operator itself and those next to him.

3) Defining the key issues that must be addressed in relation to risk assessment of the specific project, particularly those which may have not yet been covered by an EIA (if it already exists; in some jurisdictions this is not mandatory)

At this stage, there is a need to involve a facilitator who may not only be able to solicit further ideas from the representatives of the stakeholders but also to facilitate the communication and negotiations with the regulators, governmental agencies and the scientific experts. The process will result in the development of an influence diagram to be used in the mental models approach. The reasoning and agreed outcome of the negotiations should be clearly documented. This may be in form of a protocol or an elaborate document which stakeholders may wish to expose to peer review, for example in cases where risks are complex. An iterative approach to clarifying the issues may be required.

4) Identify key stakeholders who can enable a better community understanding of the risk assessment and management issues

Figure 5.2 : Visualisation of a more generalised scenario of risk communication practices involving various participants in different stages of the communication process. Asterix = early determination of stakeholders to be involved
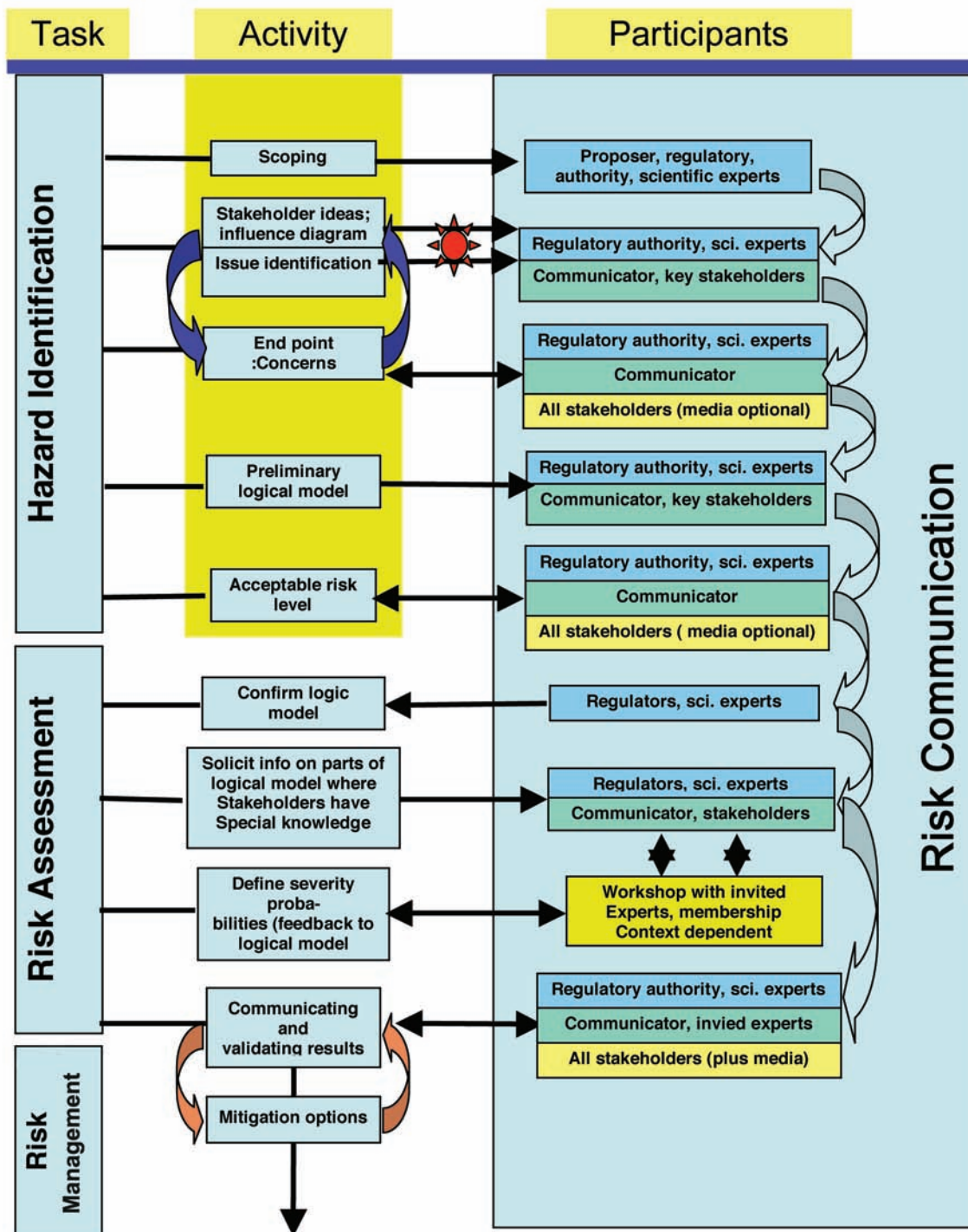
Among stakeholders, there are always a few (for example, representatives of trade associations) who have particular skills and opportunities to convey messages to other stakeholders who share similar concerns but for some reason (for example, cost, or lack of immediate and direct personal consequences) are not able to have their own representative participating in the risk analysis process. Representatives of key stakeholders should be encouraged to act in some form as facilitator and/or communicator with other stakeholders.

5) Identifying and prioritisation of end points

At this stage (Figure 5.2), all stakeholders should be invited to participate in the meetings and discussions which are facilitated by the communicator. Depending on the complexity of the issues, multiple meetings and discussion for a may be necessary, and an iterative approach may be necessary to make progress. The outcome of these communication exercises should find their expression in an improved influence diagram and finally be reflected in the minutes of the meetings and provided to the experts who incorporate the results into their subsequent report. This report should go through peer review before initiating the next step.

The case study on the effects of escapes from cod cage culture on native populations (case study 6.3) may serve here as an example. Since the genetic influences may be of far-reaching effect in time and scale, those involved in fisheries management must be consulted early in the process. Additional communication exercises are certainly needed with population geneticists who would be able to advice on endpoints (*for example*, scale = number of escapees in relation to natural stock size; potential frequency of outbreaks; genetic impact over time, for example, generations). Each of the stakeholders may have a different view. Through discussion meetings, an iterative process can be initiated that generates more specific endpoints in terms of scale, short-term and long-term impacts of the development of a cod cage farming industry and subsequently helps to determine the complexity of the final logic model.

6) Developing a procedure on how information can be effectively communicated to internal and external stakeholders

The steps to be followed may be sequential to the logic model developed in the risk assessment process, however, there are often scenarios where this is not the case. During discussion, the initial influence diagram can be developed further as long as the logic model has not been finalised.

Taking the case study on the effects of fish farming on kelp (case study 6.4), the kelp harvesters and the wild fisheries (specifically local fishermen and/or first nations) who consider kelp as the 'kindergartens' for their fish would be involved together with local scientists to develop mitigation plans that would either eliminate the problem or affect the design and the outcome of the final logic model. Communication with all involved could also help at this stage to get a better understanding of the acceptable risk associated with severity of the geographical extent of he impact.

7) Assess the outcome of the initial information-gathering exercise

At this stage, there is already a need to analyse how successful the informational exercise has been and what has been learned from this discussion. This allows continuous adaptation of the strategy, in particular identification of the points and aspects that may have been missed and how they relate to those items already within the scope of the risk analysis procedure.

8) Introducing the preliminary logic model

This first attempt to draw up a logic model is important and needs to be in place before any level of environmental change can be agreed as reflecting an acceptable degree of change. Certainly, the regulators, planners and experts, as well as the representatives of key stakeholders, should be involved in this process. Again, there may be a need to refer back to previous groups, expand the tasks, or confirm doubts being raised or the approach being taken. Documentation of the development will have to be rigorous but in clear accessible language that is understood by all involved. Peer-review is not needed at this stage.

Presenting the structural components of the logic model diagrammatically will greatly assist the stakeholders to arrive at a logical framework for their subsequent discussion. The influences diagram can be gradually altered during the discussions, starting with key issues and adding to them, building on interactions between stakeholders, communicators and the public. It should have clear structural links to the logic model which is subsequently developed and finalised early in the risk assessment process.

9) Developing agreed views on an acceptable level of change

Clear definition of the acceptable level of environmental change is an essential requirement for a clear and transparent risk analysis. In some cases, environmental regulation may have developed to a stage where environmental quality standards (for example, for impact on benthic fauna, or nutrient releases) are in place. Clearly, these represent *de minimis* standards that need to be met. In other cases, it may be necessary to develop and agree standards or thresholds relevant to the logic models and endpoints under discussion.

This is, in many cases, by far the most complicated process. It should be science driven but will have to reflect the feelings and requirements of many stakeholders who are indirectly affected. Here, the communication process may be simple in cases where the level of uncertainty is low and the risks can be controlled, but difficult where multiple options of high uncertainty prevail. At the end of the process, certainly a full documentation of the decision is required, and the final report should be subjected to peer-review.

10) Finalisation of the logic model and acquiring special stakeholder knowledge

Entering the Risk Assessment phase, the scientific experts and regulators should prepare the final logic model to be used for further elaboration and refinement. Commonly, extended negotiations with key stakeholders will follow to explore the possible gaps which may be filled by specialised stakeholder knowledge.

At this point, key stakeholders may have arranged their own internal communication processes. It is important to assure that all are being adequately informed in time, so that none of the stakeholders feel that they are being excluded or overlooked, or faced with being out-competed by coalitions that have established themselves. The Communicator and/or lead agency has to assure a comprehensive flow of information among all involved.

11) Special workshops, and expert consultations

Depending on the complexity of the project and its potential environmental effects/endpoints (*for example*, large geographical range, long-term effects), external expertise may be required to resolve the questions of assigning appropriate classifications to severity and probability. Special workshops with invited experts may need to be organised and may be held separately or in conjunction with the representatives of stakeholders and/or regulators. Certainly, the resulting report and accompanying documentation will be provided to the regulator, scientific experts, communicator and representatives of stakeholders who will assess and incorporate the material in the decision process.

The case study on the expansion of shellfish farming (case study 6.2) may provide an example again. There may be specific issues that had not previously been addressed because of the need for specific expertise or site specific information. While carrying capacity assessment using hydrodynamic modelling, primary productivity and filter feeding capacity may be sufficient, questions concerning the effects of benthic accumulation of faeces and their fate (resuspension) may become an issue for which a specialist group may have to be called upon either to provide direct advice or gain solid new data through experimental work. There may be a need for several consultations to help design technical aspects of the assessment. Subsequent feedback may be expected to adjust the logical model.

12) Communicating and validating results, considering mitigation measures

Validating the results of the logic model will have to include the identification of the severity of the risk. The use of decision rules and scoring systems described above for the risk assessment should aid validation and communication of results of the risk analysis. There may be a need to fill specific knowledge gaps that have been identified during the final phase of testing the logic model. To gain this knowledge quickly, specific workshops with invited experts to deal with clearly defined Terms of references may be the best approach to make progress within

a reasonable time window. These invited experts should meet and discuss the issues independently and discuss their findings with the facilitator and key stakeholders, involving also the identified lead regulatory authority and respective administrators and scientists. It is only after the severity of risk has been clearly identified, a sound sequence of potential mitigation strategies and their efficacy in reducing the severity of environmental risk will be possible. This phase is particularly sensitive and needs to be approached in an iterative process where results from the expert group are communicated to the respective assessment bodies.

5.6 The operational dimension of communication with participants and the media

5.6.1 When to release information

Communication with stakeholders is not a public relations exercise but an undertaking that has to serve all the parties involved, rather than any particular interest group. Timing and careful selection of the issues to be conveyed, however, is important, particularly when dealing with uncertainty. Decisions are needed on when to go to public with information and when to convey messages to different participants first. Good, speedy and effective communications between all parties need to be established early in the process.

The media quickly can have a selective 'amplifying' effect, by placing special emphasis on negative points. This can cause discrepancies in the perception of the magnitude of risk between stakeholders, resulting in public perceptions of risks as being much greater than expert assessments would suggest. Covello and Sandmann (2001) identify a long list of so-called outrage factors that may lead to amplification, and thereby influence participants' perceptions.

Timing can affect the choice of media used. There may be good reasons to release information early in the process. It is understood that people are entitled to be informed on activities that affect their lives. Early release of information also sets the pace for achieving a resolution of the problem. If a long-lasting process is anticipated, it may be advisable to inform people why this is, in order to minimise speculation and reduce negative amplification through interest groups or the media. Delaying the release information can also mean that information may be leaked anyway. If information is leaked to a wider audience, it may be incomplete and/or misleading and have unpredictable, usually negative, consequences.

Being the first to release information gives one the advantage of being able to control it, to ensure its accuracy and refer to it if any distortion is discovered. Early release of information tends to avoid the need to correct information that was improperly con-

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Being the first to release information gives one the advantage of being able to control it, to ensure its accuracy and refer to it if any distortion is discovered. Early release of information tends to avoid the need to correct information that was improperly con-

veyed through other channels. It is generally known that people are more inclined to over-estimate risks if information is held back during the risk assessment process and, with few exceptions, an early release of information is generally a positive step.

Appropriate risk communication requires not only good knowledge of the subject but also the proper use of language. While scientific terminology may be confusing to laypeople, it may also lead to misinterpretation and subsequent misunderstanding.

5.6.2 Communication with the public at large and the media

There are many ways of communicating with the public, and each of them requires specific skills. Dealing with newspapers requires careful choice of words and, since journalists mainly use their own language, it might be appropriate to request that text provided to the journalists should be cited as verbal quotation. Radio communication is often done through interviews, with questions and answers and, as in television, time constraints require quick responses.

In choosing the medium to use, one should first decide on the target audience to be addressed. The medium selected as the first platform for disseminating information will influence the spectrum of the public being addressed or informed. The consequences of starting by using a specific type of communication system can be significant. In the case of coastal aquaculture, one may wish to act through local, target-group oriented fixed (landline) telecommunications or through mobile communications (cellular radio) or even satellite communications, which might be initially accessible to fishermen and sailors first rather than the public at large. Amateur radio or specific Internet links or networks contact different audiences. In each case, it is important to realise which audience needs to be informed first. The final decision on any of these considerations is context dependent and certainly needs a case by case approach. Therefore, we are only able to point to these scenarios without giving any preference for any of the case studies outlined in this report.

5.7 Engagement and communication tools

5.7.1 General guidance

There is a need to recognise that building stakeholder relations is very different from public relations activities. As pointed out previously, in public relations, the communicator usually attempts to find the best method to 'sell' an idea. In stakeholder relations, the communicator will have to stay neutral, facilitating communication and trying to bring participants to consensus. There are a number of common rules that are well known, but have not often been followed by science experts involved in risk assessment exercises. These are briefly addressed here. :

(a) Build trust among stakeholders and the public

One has to expect that as communications to the public use quite different strategies to stakeholder communications, there is no need to attract their attention. They are already highly motivated, often sceptical and even worried and sometimes impatient to address their particular concerns. Skills are needed by the facilitator to recognise immediately these sensitivities, scepticism or hostility. A method often used to achieve an acceptable working climate in stakeholder relations and at communication meetings is to acknowledge the expressed problems, apologising for any mistakes made and sharing control. It is important to address people's doubts. Ignoring or downplaying their doubts may reduce trust among stakeholders and with the public.

(b) Simplify language and presentation

It is not advisable to omit information because it seems to be overly technical, even though risk issues may be extremely complex. Participants in communication meetings usually do understand scientific and technical issues easily, if they are properly prepared and presented, mainly through visual aids such as diagrams and graphics. Verbal presentations and printed informational material (*for example*, flyers, posters) should avoid acronyms as well as scientific jargon.

(c) Assure objectivity

It can be difficult to respond in a credible format when opinions are expressed very strongly or even in an intentionally offending manner. It should often be easy to differentiate between opinions and facts. In order to maintain credibility, the facilitator should respond to both opinions and facts in the same manner.

(d) Use proper language

Messages containing negative connotations receive more attention and are remembered longer. This is a well-known fact on which media build their business. However, risk communication is most effective when reporting what has been done rather than what has not been done!

(e) Communicate clearly

Information must be presented at the audience's level of understanding, otherwise people may feel left out or misinformed and may refuse to accept the information provided. It is important 'to know the audience' to be able to convey messages effectively. It is often helpful to use examples that the audience is familiar with. Back these with solid information to help to put the risk in perspective.

(f) Identify and discuss areas of uncertainty

Discuss sources of uncertainty, such as how the data were gathered, how they were analyzed, and how the results were interpreted. Uncertainty should be clearly indicated in logic models or influence diagrams. This demonstrates that the uncertainties are recognized, which can lead to an increase in trust and credibility.