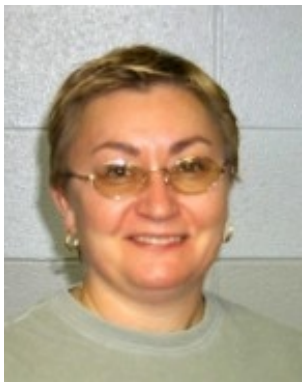
BULLETIN

Public Awareness and Education

105-2, August 2005

Introduction



L. C. Halfyard

During the Aquaculture Canada[OM] conference held in St. John's, NL on July 3-6, 2005, a special session was held to highlight the vital role that public awareness and education play in the development of the aquaculture industry. As with other new and developing commercial industries, aquaculture is experiencing challenges associated with communicating its 'messages' to the public. Such messages include promoting awareness of aquaculture products as healthy and safe food choices, the types of work available in the industry, the various species being cultured, and the sustainable farming practices used by the industry.

Stakeholders acknowledge that public awareness and education must target households, schools, post-secondary institutions, and the service industry and government sector, if the aquaculture industry is to be a commercial success. This special session highlighted many of the public perceptions, misconceptions, and consumer issues, as well as the strategies being employed to increase the level of public awareness about aquaculture in Canada. Topics such as Canada's efforts towards sustainable and environmentally-sound farming practices and its production of safe, healthy food were reiterated throughout the session.

In the opening session, Dr. Patrick Moore, founder of Greenspirit Strategies Ltd., spoke of being "in the eye of the aquaculture storm in British Columbia". He discussed the tactics used by the anti-aquaculture lobbying groups and possible mitigation strategies the aquaculture industry could employ to negate media slander. Stewart Lindale presented the results of the federal Department of Fisheries and Oceans study on Canadian perceptions of the aquaculture industry and its products. Sherry Power and Tess Benson reported similar public perceptions from surveys conducted in Newfoundland and the UK, respectively.

Education or formal training was identified as one method for increasing public awareness and reaching various sectors of the population. Dr. Susan Steele of the Irish Sea Fisheries Board spoke of her experiences in Ireland teaching practical aquaculture skills to farm workers of varying literacy levels, experiences, and ages. David Conley, creator of *Aquaculture Newsclips*, highlighted the use of digital video as a teaching tool. Bernetta Delaney of the Newfoundland District 5 School Board presented her experiences teaching an on-line aquaculture and fisheries course to high school students in rural Newfoundland. The final presenter, Kelly Moret, from Marine Institute International, provided an international perspective on aquaculture education, that ranged from skills-based training at the grass-roots or community level to higher formal institutional education and applied research.

This was the first time that Aquaculture Canada[OM] dedicated an entire session to these social and educational topics. During another conference session, a visiting scientist from the US complimented Canadian researchers for making a concerted effort to study both the science and the societal impacts of aquaculture. Hopefully the papers published in this *Bulletin* will spark further discussions on how public awareness and education can become incorporated into our daily conversations, jobs, and lives. Being aware is being informed.

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Bulletin de l'Association aquacole du Canada

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Front cover: Educating children in Chapola Village, Malawi of the value of conserving and sustaining fish stocks in the lake and improving fish handling and processing procedures after the fish have been harvested. This project also aims to encourage female participation in various fishing activities. Photo by Laura Halfyard of the Marine Institute, Memorial University of Newfoundland.

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in St. John's, Newfoundland, July 3-6, 2005

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Qualitative Research Exploring the Perceptions, Attitudes, and Concerns of Canadians Towards Aquaculture

Stewart Lindale and Paul Lyon

Conflicting information regarding the environmental sustainability of aquaculture operations and the safety and health benefits of aquaculture products has led to an erosion of public confidence in the future of this promising sector. In addition to negatively impacting the aquaculture sector, this erosion of confidence has the potential to undermine the entire seafood category. As part of the effort to rebuild public confidence in aquaculture there is a need to better understand Canadians' views about aquaculture and their expectations of governments in managing the sector. While opinion surveys can measure pubic views as a whole, qualitative research gauges individual opinion by posing questions, listening, and allowing participants to answer freely. In January 2005 Fisheries and Oceans Canada (DFO) undertook a series of meetings with focus groups across Canada in order to gauge public awareness of aquaculture issues and to identify specific actions that DFO and its partners can take to increase public confidence in the future of the sector. While many participants were hopeful about the future of the industry and think Canada could be a world leader, deep emotions, doubts, and concerns persist. This paper endeavours to summarize the results of DFO's focus group research and outline how DFO is moving forward with its partners to help rebuild public confidence in the aquaculture sector.

Background and Purpose

In January 2005 Fisheries and Oceans Canada retained the services of Createc+ to undertake a national qualitative study on the perceptions, attitudes, and concerns of Canadians towards aquaculture.(1) The study included 22 focus groups held in 6 Canadian provinces and one territory (11 locations) with a total of 138 participants.

Previous studies have revealed a very low level of awareness and knowledge about aquaculture among Canadians. The need to gain a clear understanding of how Canadians feel about aquaculture and their attitudes towards policy choices related to public health, food safety, and environmental sustainability prompted this study in the hope the findings might inform decisions related to building public confidence in aquaculture and raising public trust about how this sector is managed. Thus, a series of focus groups was designed to cover a range of topics related to aquaculture, with the following 3 main objectives:

1) To gauge the general public's awareness and understanding of aquaculture and related issues, including perceptions, attitudes and concerns;
2) To identify specific actions that DFO and its partners can take to increase public confidence in the future of the sector; and

3) To inform policy and communications.

Research Approach

This qualitative process was not intended to build consensus, but to explore awareness, perceptions, and views. The moderator's role was not to inform or suggest right or wrong answers, but to facilitate the discussion, collect information and observe, while encouraging participants to interact freely.

Target Populations

Three populations were targeted: opinion leaders of the general public (not necessarily informed about aquaculture), people who regularly consume fish, and aboriginal people.

Highlights

- Overall, the findings reveal a great deal of consistency across regions and respondent types. 'Top of mind' awareness of aquaculture was generally low, with pockets of greater familiarity and particular understandings in the coastal areas.
- Negative perceptions seemed to fall along a continuum, moving from east to west. The East tended to be positive, the central areas of Ontario and Quebec took on more of a neutral tone, and pockets of the West showed a stronger negative bent.
- Despite negative perceptions about the current state of the industry, many groups saw aquaculture as having tremendous potential, and some even wanted Canada to become a world leader.
- On the whole, people were highly receptive to positive information about aquaculture. However, often, some felt manipulated and misinformed because the dominant information flow is negative.
- For most, aquaculture is far from 'top of mind'. However, once invited to discuss the topic, it generated high involvement and had high personal relevance because it affects their personal safety and well-being, and the health and well-being of the planet.
- Further information the survey can be found on DFO's web site at: http://www.dfo-mpo.gc.ca/misc/focus.aquaculture_e.htm.
- Additional information regarding the focus group results in the context of social awareness of Canadian aquaculture can be found in *Aquaculture, Innovation and Social Transformation* which is expected to be released by the Springer Publishing Company in the coming months.

Notes

1. The consulting firm Createc+ (http://www.createc.ca) provides marketing and public opinion research services.

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Sherry Power

Public Perceptions and Attitudes Towards Aquaculture: A Case Study in Urban Newfoundland

Sherry Power and Cyr Couturier

Negative perceptions of aquaculture exist in society and are promulgated with the aid of the popular media, leaving the industry open to attack. The purpose of the present project was to evaluate and recommend tools to aid in developing greater awareness of aquaculture among consumers and, by doing so, lead to enhanced acceptance of aquaculture in Canada. The objectives of the study were: 1) to evaluate public opinion of aquaculture with surveys and focus groups in an urban setting in Newfoundland, and 2) to develop recommendations for public relations approaches for aquaculture. Public opinion surveys showed strong support for the industry in general, particularly for job creation and the availability of a consistent, high quality food supply. Over half (56%) the survey respondents felt positive or somewhat positive about the industry, while 7% felt negative about aquaculture and 37% were uncertain. A common theme in the focus groups was a desire for more information on farmed products, including their origin (farmed or wild), and details relevant to food safety, such as the types of feed used and whether antibiotics were used, etc. Most respondents recommended instituting a labeling system to address these concerns and they wanted the labels to be backed by organizations such as Health Canada and even aquaculturists themselves!

Introduction

Aquaculture is a relatively new industry in Canada that has expanded rapidly. It is often the target of negative behaviors and attitudes in the media, government, and society in general. Lobbyists flood society with myths that confuse the public about the industry's practices and products.

The list of myths is endless and includes: a) PCB levels are higher in farmed salmon than in other foods, b) organic pollution created by farm sites can equal the treated sewage from a small city, c) escapees of cultured fish debilitate wild stocks, and d) farmed salmon are responsible for the massive spread of disease to wild fish stocks.[1,2]

It is important to understand what is influencing public opinion.[3] If the media claims their reports are based on science, the general trend is for the public to believe them. Society in general is unaware that many anti-aquaculture statements are strongly supported by environmental groups that are well organized, well financed, and interested primarily in shaping political policy or public opinion.[2]

The objectives of our study were threefold:

1. Evaluate public opinion of aquaculture via quantitative surveys;
2. Conduct meetings with focus groups to assess public opinion of aquaculture; and

3. Develop recommendations for developing public relations strategies for aquaculture.

Methods

- An extensive literature review was undertaken of previous public opinion surveys[4-6] of aquaculture in Canada, the United Kingdom, and Oceania.
- A survey was developed containing 27 questions to assess the attitudes and perceptions of the aquaculture industry in urban Newfoundland. Two hundred surveys were distributed across public sector areas such as health care institutions, university campuses, and employees in government service offices (e.g., Canada Post).
- Two focus group meetings were conducted that ran for 60 minutes each. They addressed issues such as general awareness of aquaculture, importance of the industry, and who should be responsible for regulating the industry. Individuals were randomly selected for the focus groups, and each group included a mixture of genders, ages (18 to 65+ years), and occupations (professionals, university professors, homemakers, etc).

Results and Discussion

A number of interesting observations were noted from both survey respondents and focus group participants. These observations complement those of other similar studies and range from differences of opinion among age groups to the effects of advertising on public opinion.[4-6] The full results of the survey can be obtained by contacting the primary author. Only a sample of the findings are presented here.

Survey findings

A total of 77 responses were obtained from the survey, for a response rate of 38.5%. Sixty-eight percent of respondents were less than 25 years old, 26% were between 25 and 54 years of age, and the remaining 6% were 55 and older.

Awareness of aquaculture among respondents was high, ranging from 65% in the under 25 group to 88% in those over 25 years of age. Less than 8% of respondents had a negative opinion of

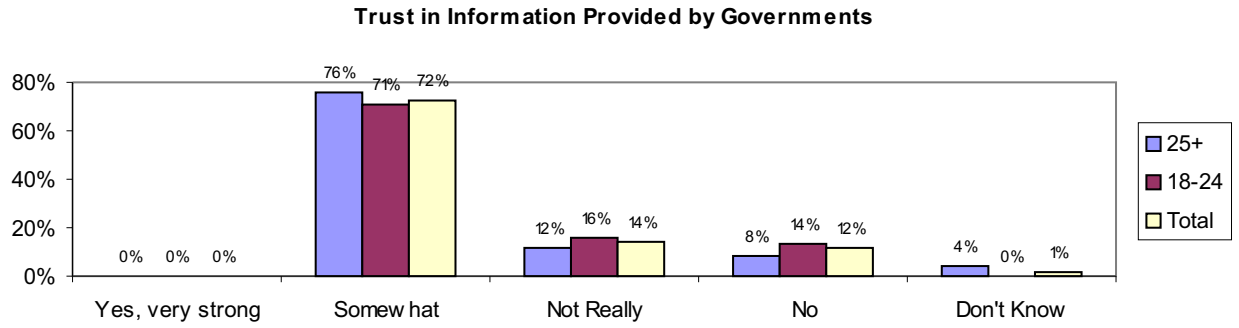


Figure 1
Level of trust among survey respondents regarding government sources of information. Total respondents = 77. Respondent age categories are shown in the graph.

aquaculture and 56% were either somewhat or very positive about aquaculture. Thirty-seven percent of respondents had no opinion of aquaculture.

In the older age category (above 25 years of age), 20% of respondents described media presentations of aquaculture as positive; only 6% in the younger group (below 25 years of age) had a similar opinion. A relatively small number of respondents felt that media coverage of aquaculture was negative: 0% of the older group and 20% of the younger group cited negative media coverage of the industry (average 13%). This indicates possible room for improvement of the industry's image in the eyes of younger populations, who may be more easily influenced by anti-aquaculture media campaigns.

Between 71% and 76% of survey respondents reported that they generally trusted information provided by government sources (Fig. 1). However when the question was posed regarding information about aquaculture, the level of trust in government sources on this subject fell to an average of 4% (Fig. 2). Respondents indicated that they are more likely to trust information about aquaculture from scientists (40%), aquaculturists (37%), and environmental groups (19%).

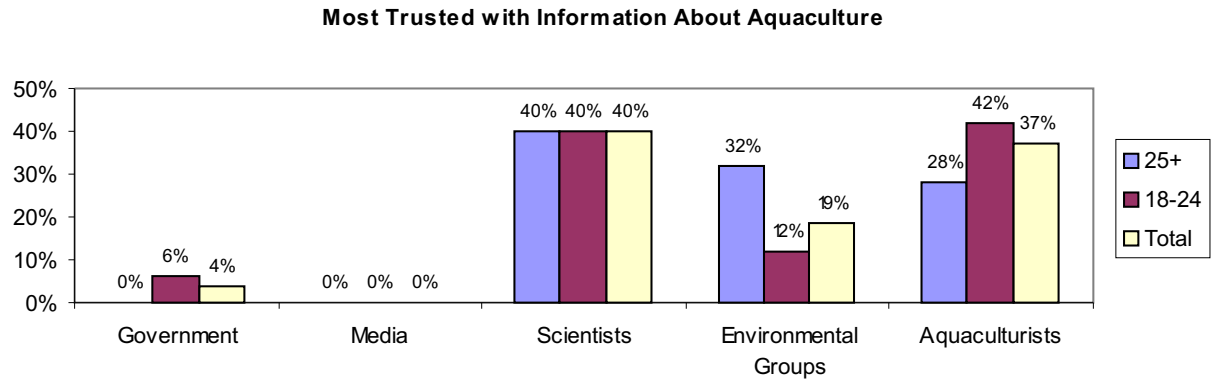
Focus groups

A number of trends arose during the focus group meetings. Among the top ones were the desire for more information about fish and shellfish products and their origins. Additionally, while all participants felt the government should be involved in providing information on products, there was strong support and desire for Health Canada or the Canadian Food Inspection Agency to monitor products and provide a stamp of approval on aquaculture products. Participants indicated that backing from such departments and agencies would greatly increase their confidence in farmed products.

Many participants were unaware that aquaculture included shellfish farming. Many people assumed that all mussels in the marketplace were collected from the wild. Finally, there were mixed responses on how to determine whether a product is of farmed or wild origin. The following direct quotes reflect the generally poor understanding of farmed products:

- "Farmed fish are on steroids"
- "It can't be good having all of those escaped farmed fish mating with the wild ones"

Figure 2
Level of trust among survey respondents regarding different sources of information. Total respondents = 77. Respondent age categories are shown in the graph.



- "I can tell a product is from the wild fishery because it will say something like 'fresh Atlantic' on the label, which means wild salmon"
- "I can tell a product is produced via fish farms because it will be softer when I touch or squeeze the fish"
- "I usually only buy Heritage Salmon which is wild salmon"

Recommendations and Conclusions

There is a clear need for information pertaining to the safety and health benefits of aquaculture products. Such information should take the form of on-food labels and perhaps information pamphlets. Labels should be backed by trusted government departments and agencies such as Health Canada and the Canadian Food Inspection Agency. Most importantly, they should be well publicized so that consumers understand what the label stands for.

Finally, a more comprehensive study in rural Newfoundland and Labrador is needed to compare urban and rural attitudes and opinions of aquaculture so the industry has a better understanding of how all Newfoundlanders feel towards aquaculture and its practices.

Acknowledgments

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Improving Perception of Aquaculture: The Importance of Keeping the Public Informed

Tess Benson

Public concerns about food quality and the welfare of food animals have increased significantly in recent years. This has led to increasing demands for the development of quality standards, and it is important that these are based upon sound science and a thorough understanding of the aquaculture industry. As consumers develop their opinions, accurate information is required to help them form their own conclusions. It is to the industry's advantage to be proactive in explaining its methods. Two of the most controversial aspects of aquaculture are perceived environmental threats and humane slaughter. This paper will focus on slaughter and, by following examples from other industries, show how a proactive approach can be helpful in promoting a positive image. The key to this is to have suitably trained staff and clear policies for animal welfare and production standards. Extending such information to the government informs policymakers of the latest improvements and practices and the current constraints. Following this, a co-ordinated approach to public awareness and education should be undertaken, allowing consumers the opportunity to make informed decisions. The Humane Slaughter Association (HSA) has used this approach when producing best practice guidelines for slaughter which are highly valued by the industry and help educate the public by providing independent, sound, unemotive advice on the humane slaughter process of different species.

"... public perception is not always based on fact or reality ..."

Why does the Aquaculture Industry Need to Improve Perceptions?

Why does the aquaculture industry need to invest time and money in convincing people that what it does is right? After all, the industry understands what it's doing, so why can't people just leave it at that? Why should the industry worry about what other people think — it is their industry, so what has it got to do with other people? The industry could always let the public draw their own conclusions.

Hopefully this paper will highlight the benefits of keeping the public informed of aquaculture practices and why public perceptions should not be ignored. Three facts:

- public perception is not always based on fact or reality,
- the most likely impression the public has is from the most graphic and dramatic images,
- the negative impressions and images rarely come from the industry!

In just a five-minute search of 'fish slaughter' on the internet, a number of negative headlines can be found. The truth behind many of these is questionable in today's industry; however, this is the information that reaches the public and sticks in their mind. Groups campaigning against aquaculture practices often take a twist on old research or out-of-date information. The public can only form an opinion based on what they are told. If they are only given one side of the story, who can blame them for their mistaken perceptions?

Organisations opposing aquaculture are also very clever at the use of images and data, making them sound believable to people who know no different or do not have an understanding of the aquaculture industry. The majority of the general public has a natural empathy towards animals and often take an anthropomorphic view when considering what is right and wrong. This in itself is a problem as animals are very different from humans and it does not follow that what is unacceptable to a human is necessarily unacceptable to a fish. This empathy for animals is exactly what those opposing the industry focus on to influence public opinion and it is for these reasons that the public needs to be educated about the difference between perceived issues and real issues.

So if we go back to the first question—

Why does the aquaculture industry need to improve perceptions?

The simple answer is to develop an ethically acceptable way of producing food and provide the correct image to the general public, based on the facts.

How can Perceptions be Improved?

Until relatively recently, the aquaculture industry has not received as much tabloid interest as other farming systems. It is now time to use this advantage and provide the right image before others start showing the wrong one.

The truth needs to be told in a matter-of-fact way and in simple terms that avoid confusion. By taking charge of the situation, and provided the aquaculture industry is responsible, legislation and standards governing the industry can be set based on current practices rather than on the perceived requirements. It also means that the industry is in charge of how quickly change has to happen. If new laws come into effect, which cannot be complied with, it is the industry and the fish that will suffer. It may also mean aquaculture production moves to other countries and the standards could possibly be lowered once again.

Improving public perception should take place in stages, with the starting points being:

- a structured approach that takes into account people with all levels of knowledge about the industry,
- an investment in research and development — it isn't acceptable to do things a certain way simply because they have always been done that way,
- the transfer of technology — it is critical to share information,
- the development of good practices,
- the development of sound, written industry standards that are reliable and widely available.

Often the most transparent documents are those written by independent organisations in consultation with the industry. Such a document should:

- be based on sound scientific and practical information,

- provide basic standards, but also be capable of encouraging producers to improve standards.

Best practice guidelines should be written in such a way as to raise the baseline standard but also encourage companies to develop their own guidelines and improve their practices. The way in which the HSA has approached this is by using three categories of standards: legal, must, and should. The legal category is self explanatory. The 'must' is a standard that must always be implemented (e.g., all staff must be trained appropriately). Where a 'must' is specified, the HSA knows that it is possible for the entire industry to reach this standard, albeit with improvement or investment. The 'should' lies somewhere in the middle; it is an ideal that is not always immediately possible or may not be suitable for certain situations (e.g., in smaller organisations). However, it does give those who want to comply with the guidelines room for improvement and a standard to aim for.

Welfare Policy

A welfare policy should be:

- a simple and short document that clearly states the organization's aims and objectives, and
- highlights the commitment to animal welfare.

Despite most people's perceptions, a welfare policy does not have to be an in-depth document on every single procedure, but a short communication made by the company to highlight its commitment to welfare and how it will go about it (examples of such a document can be found in other HSA publications[1]). Presuming the company is adhering to the welfare policy, it can be seen as a guarantee to consumers that the company is taking ethics into consideration as well as serve as a defensive document to those who choose to criticise the industry.

Management

All ethical considerations and welfare changes must come directly from the company's management, in consultation with other relevant staff. No matter how much training is given or how much information is provided, it is the responsibility of management to take animal welfare seriously and pass this message down the ranks to ensure full co-operation.

In other industries, we often see staff being sent away on training courses and information days at great expense to the company. They come back with bright ideas and new concepts. This can be the ideal way to start change — but often management stops such training because they don't see or understand the need for change.

Company management should be responsible for developing:

- welfare policy,
- standard operating procedures (SOP),
- feedback mechanisms for quality issues,
- contingency plans,
- relevant and appropriate staff training.

SOPs help ensure everybody knows exactly what is expected of them and how to do their job competently. If somebody doesn't know they are doing something wrong, how can they improve? Training is essential for all staff, and an understanding of why they are asked to do a job in a certain way is also imperative to en-

sure people do their job correctly.

Staff Training

The importance of suitable staff training should never be underestimated or undervalued. Staff dealing with live fish prior to slaughter not only have moral responsibilities for looking after the fish, but essentially they control the quality of the final product and ultimately the profits made by the company. It would be highly unlikely that any company would hire an untrained accountant for a major accounting role, so why employ untrained staff for live handling of fish?

All staff should be trained in the following aspects:

- company procedures,
- specific role they carry out,
- reasons why they are asked to the job in a particular way,
- repercussions of not doing their job properly.

The final point is often missed and it is vital that staff have a full understanding of their role in the company. They should also have a full understanding of the welfare policy and the roles and responsibilities of other staff, as well as themselves, to ensure the procedures are followed as efficiently and effectively as possible.

Fish Welfare Officer

A fish welfare officer must:

- have specific responsibility for fish welfare,
- ensure all equipment is working correctly,
- ensure staff work effectively in terms of animal welfare,
- be in a position of suitable authority to be able to stop procedures that are compromising the welfare of the fish, and
- report directly to management about welfare issues.

Responsibility for fish welfare is a very important role and should be given to somebody with responsibility. By assigning this specific role and responsibility to one person, the company is supporting its commitment to animal welfare. In addition, there is also a daily focus in this area, so problems can be identified early and prevented from becoming a larger issue.

Educating Others

With all these previous topics under control and taken care of, aquaculture companies will be in a much stronger position to promote themselves as welfare-friendly and ethically-correct organisations and defend their actions when necessary.

By being involved in the setting of standards they can ensure goals are achievable (without compromising welfare). This means that both the standard and the producers are credible.

It is easy to take for granted the amount of knowledge that you have about the industry and forget that not all people have this same level of understanding. For these reasons communication with all bodies needs to be proactive, with simple explanations for certain practices to provide a basic understanding. It is also more likely to make people question adverse information if they already trust and be-

lieve in what you are promoting.

Remember, as industry members, you know the realities of the business and the importance of :

- keeping officials updated about practical changes and technological developments,
- liaising with welfare organisations and industry representatives that set standards,
- being proactive and inviting them to see what is happening,
- speaking to the public, before others do.

Promoting the Industry

The development of standards and assurance schemes helps give consumers confidence in what they are buying and can, in some cases, increase sales. However, the public needs to know what the assurance scheme provides and what it stands for. Independently-assessed standards are often viewed with the most respect as people are less likely to see them as the industry just looking after itself.

"Assurance schemes will give consumers the confidence to believe in the product."

If the industry can comply with standards and viably work with humane systems then it is in a strong position to advise on draft legislation. Scientific evidence backed up by commercial practices can be one of the strongest arguments when changing legislation. It will also help raise the field for all other companies.

By developing codes of practice and being a responsible industry, you are in a good position to defend yourself should there be any adverse publicity. Assurance schemes will give consumers the confidence to believe in the product.

Conclusions

A proactive approach puts a company in a leading position in the industry and provides an ideal opportunity to promote the aquaculture industry. This can be done with confidence and the belief that the company is performing to high ethical standards and producing a consistently high quality product. In addition, good communication will show openness and is less likely to encourage unwanted attention from the media and groups opposed to the industry.

However, should this happen, due to all the procedures in place, when the tabloid press do get interested:

No real problem = No big story!

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On-line Teaching and Learning, and Applied Science Technology: Keeping School Students Awake and Interested, and the Curriculum Relevant

Bernetta Delaney

B. Delaney and L.C. Halfyard

Several years ago, King Academy high school, in collaboration with the Marine Institute (MI) of Memorial University of Newfoundland, developed a web-based science course (Marine Technology 2228) that is currently being taught to Level III (Grade 12) students. The course focuses on science and technology topics related to aquaculture, the wild fishery, marine transportation, marine orientation and safety, and offshore petroleum. This paper highlights the advantages of WebCT as an instructional tool when used independently or in combination with traditional teaching methods. The case studies outlined in this paper reflect actual activities and projects undertaken by several Newfoundland schools. They demonstrate how a curriculum based on local issues and topics can be used to motivate students and pique their interest in the subject areas. In addition to heightening awareness of local and global technologies, the curriculum also demonstrated the relevance of the material to the local economy and its applicability to other courses (e.g., chemistry, social studies, and economics). Access to WebCT, MI's faculty and resources, and other local specialists, helped ensure the course was interesting and encouraged students to seek additional information on the topics.

Introduction

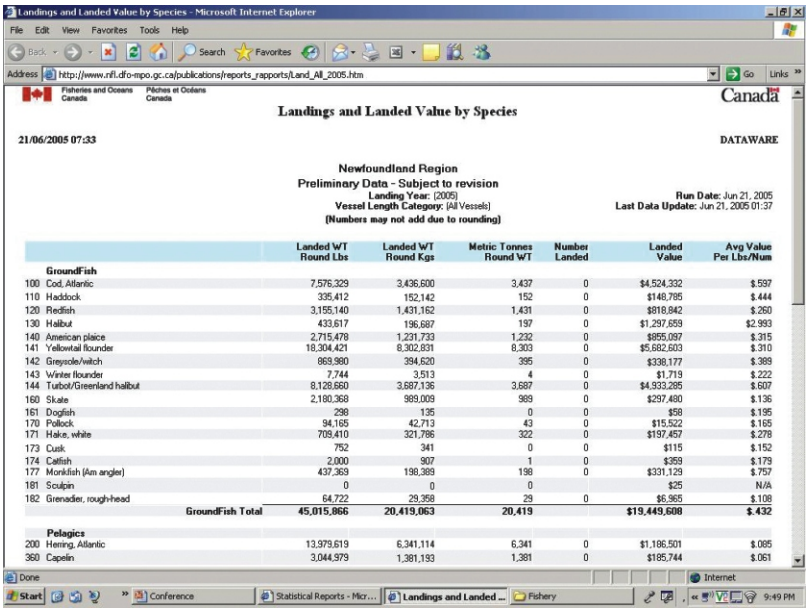
An on-line high school science course, Marine Technology 2228 (MT2228), was developed and piloted as a result of a collaboration between King Academy in Harbour Breton, Newfoundland and the Marine Institute (MI) of Memorial University of Newfoundland. Additional financial support for the initiative was provided by Fishery Products International and the Newfoundland and Labrador School District 5. The course was designed to link the education and training sectors of the Marine Institute to King Academy teachers and students. The linkage facilitated the transfer of MI expertise, knowledge, and resources; promoted awareness of careers in marine-related fields; developed a network of marine educators; and introduced alternative teaching methods to the teachers and students. In the pilot year, funds were procured to support the development of King Academy's computer and on-line capabilities for distance education. There was also a student exchange that provided students with an innovative learning opportunity aboard the Marine Institute's 'Lauzier' ocean vessel as it traveled to various communities along Newfoundland's south coast. This 2-credit science course is being taught in Harbour

Breton (King Academy), English Harbour West (Fitzgerald High School) and Middle Arm (MSB Regionl Academy).

Technology Integration

The main topics of MT2228 include aquaculture, the wild fishery, marine transportation, marine orientation and safety, and offshore petroleum. The course strives to have its participants: a) develop an appreciation of the nature and scope of Canada's marine technologies, b) explore the concepts involved in responsible fishing, c) become aware of marine hazards and safety procedures, and d) complete practical projects related to selected marine technologies. The course is taught through various computer 'technology integration' tools and methods such as WebCT, Microsoft® Office Word, Excel,® and PowerPoint®and other computer packages for distance learning, e-mailing, maintaining electronic portfolios, and creating databases, brochures, and web pages. The following sections provide highlights of the various teaching strategies and student projects, and illustrate the interactive nature of the learning process and its success in maintaining students' interest.

Figures 1 and 2
Students learn to research websites to obtain data and information (e.g., DFO statistics) which is then used to create graphs (using Excel®) and PowerPoint® presentations.



Landings and Landed Value by Species - Microsoft Internet Explorer

Address http://www.nfl.dfo-mpo.gc.ca/publications/reports_rapports/Land_All_2005.htm

Fisheries and Oceans Canada / Pêches et Océans Canada — Canada

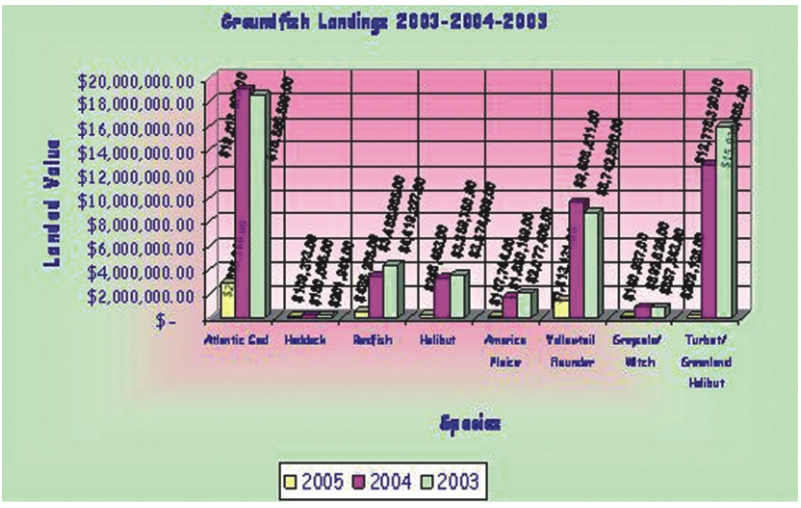
Landings and Landed Value by Species

21/06/2005 07:33 — DATAWARE

Newfoundland Region
Preliminary Data - Subject to revision
Landing Year: (2005)
Vessel Length Category: (All Vessels)
(Numbers may not add due to rounding)

Run Date: Jun 21, 2005
Last Data Update: Jun 21, 2005 01:37

		Landed WT Round Lbs	Landed WT Round Kgs	Metric Tonnes Round WT	Number Landed	Landed Value	Avg Value Per Lbs/Num
	GroundFish						
100	Cod, Atlantic	7,576,329	3,436,600	3,437	0	$4,524,332	$.597
110	Haddock	335,412	152,142	152	0	$148,785	$.444
120	Redfish	3,155,140	1,431,162	1,431	0	$818,842	$.260
130	Halibut	433,617	196,687	197	0	$1,297,659	$2.993
140	American plaice	2,715,478	1,231,733	1,232	0	$855,097	$.315
141	Yellowtail flounder	18,304,421	8,302,831	8,303	0	$5,682,603	$.310
142	Greysole/witch	869,980	394,620	395	0	$338,177	$.389
143	Winter flounder	7,744	3,513	4	0	$1,719	$.222
144	Turbot/Greenland halibut	8,128,660	3,687,136	3,687	0	$4,933,285	$.607
160	Skate	2,180,368	989,009	989	0	$297,480	$.136
161	Dogfish	298	135	0	0	$58	$.195
170	Pollock	94,165	42,713	43	0	$15,522	$.165
171	Hake, white	709,410	321,786	322	0	$197,457	$.278
173	Cusk	752	341	0	0	$115	$.152
174	Catfish	2,000	907	1	0	$359	$.179
177	Monkfish (Am angler)	437,369	198,389	198	0	$331,129	$.757
181	Sculpin	0	0	0		$25	N/A
182	Grenadier, rough-head	64,722	29,358	29	0	$6,965	$.108
	GroundFish Total	**45,015,866**	**20,419,063**	**20,419**		**$19,449,608**	**$.432**
	Pelagics						
200	Herring, Atlantic	13,979,619	6,341,114	6,341	0	$1,186,501	$.085
360	Capelin	3,044,979	1,381,193	1,381	0	$185,744	$.061



Web-CT Distance Learning and Logistics

Teachers and students log on to a website to access course content, hyperlinked websites, and project examples. The WebCT format provides display options such as a course calendar which allows the teacher to enter assignments, project due dates, and other important timelines. An e-mail system provides for student-teacher and student-student communication. The interactive on-line system enables students to access, complete, and submit their assignments while simultaneously allowing teachers to monitor progress and retrieve reports on the due date. The method teaches valuable organizational skills (e.g., categorical filing), as each student is required to maintain an electronic portfolio. It also teaches the students how to use internet search tools and methods to retrieve documents and download images.

Microsoft® Applications

Students learn to use various Microsoft® applications such Word, Excel,® Publisher and PowerPoint® for folder organization, word processing, data entry, and for creating graphs, slide shows, brochures, newsletters, and webpages, in the development of their assignments and projects. Figures 1 and 2 provide an illustration of how students retrieve peer-reviewed data and learn to manipulate the data and create graphs. The graphs are then imported into a Word or PowerPoint® document or a webpage. An example of a student assignment is shown in Figure 3. A group of students created a web page that captures many aspects of mussel culture. To develop the web page, students reviewed the on-line course information, conducted library and internet research, and visited a local mussel farm where they observed and photographed various farm activities and interviewed the workers. Additional information was obtained from a mussel anatomy and dissection laboratory, from developing mussel recipes, and from participating in farm-related activities. The website included resource modules on site selection, mussel dissection and anatomy, harvesting, processing (primary and secondary products), marketing, and other related topics. This project created a 'holistic' approach to learning. Another option for students was the creation of a scrapbook of captured images and text derived from on-line sources. The scrapbook can be presented electronically as a webpage or as a 'hard-copy' version. The scrapbook method is an equally successful learning tool as students became easily engaged in learning when presented with an opportunity to display their creativity and knowledge.

Practical Hands-on Learning

In traditional teaching methods, students who are less academically inclined have a tendency to 'tune out' in a lecture-based environment. A hands-on approach to learning, however, encourages students to acquire knowledge on a subject in a less formal and more interactive manner. Figures 4 and 5 illustrate projects that provided students with an opportunity to collect fishery information from text-

Figure 3
Example of how student research on mussel aquaculture was developed into a web page and an educational resource for others.

books, websites, community visits, and interviews. Learning the practical aspects of where a fishing stage or wharf is best located for environmental reasons, how it is engineered and constructed, how fish are landed, etc., provided insight into local fishing methods and infrastructure needs. Modeling a mussel farm taught the students how to set up a farm (e.g., long-line systems, floatation requirements, mussel life cycle, etc.), determine what site selection and environmental factors need to be considered (e.g., water quality, licensing permits, navigation markers for safety), and identify other factors such as scientific, social, and economic principles that must be considered prior to establishing such an operation. In a similar project on naval architecture, students crafted model boats and learned concepts such as buoyancy, vessel design and engineering, and propulsion methods. With a simple air fan and a shallow tray of water, students investigated how boat design allowed for buoyancy with maximum weight loading (ideal positions), how the loading or distribution of weight on a vessel could cause capsizing, how the design of a vessel impacted its speed in the water, and how variations in vessel appearance could be crafted. This type of learning is definitely a fun and interactive process.

Figures 4 and 5
Students of King Acadmy crafting models of boats and mussel farms as part of their research on aquaculture and fisheries technologies.

Future of On-Line Teaching and Learning

Most Canadian schools have computer rooms and services that can be accessed for on-line teaching. For this method to be successful, the teachers need to be comfortable with computer technology and flexible in their course design to compensate for the days when the network is 'down'. In such cases, on-line documents and resources may be downloaded in advance as a print/text version for more conventional instruction. Also, teachers may need in-service training or mentoring (e-mails and phone calls) from a teacher experienced in this technology. Memorial University's Department of Education offers a Masters level course—E6650-Marine Science Teachers Institute—which is taught at the Marine Institute during the summer semester. The course was designed to increase teacher's knowl-

edge of marine ecosystems, fisheries, aquaculture, and marine environmental issues (Fig. 6).

Web-based instruction also provides opportunities for students in different schools, provinces, or countries to link on certain projects. In addition, the literacy level of the WebCT school courses should be transferable to adult education low-literacy and/or technology programs, where specific technologies may be taught in short-course training (e.g., shellfish and finfish aquaculture, specific fisheries methods, and vessel safety).

A valuable characteristic of this on-line teaching resource is that other educators may access the information. For example, other teachers within the pilot schools have utilized the resources developed under this course for their subject areas (e.g., environmental science and social studies). Access to information and resource material is critical in rural communities where access to libraries and other learning resources is limited.

It is hoped that content-specific teaching modules that have been developed by other educators or specialists will be added to this course as supplementary resource material. Further, it is hoped that rural schools can capitalize on the existing technology so that sector specialists, who may be in another part of the world, can act as 'virtual guest speakers' for these rural students.

Should anyone be interested in further details about this course, please contact Laura Halfyard.

Authors

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Figure 6
Hands-on experience in fisheries (e.g. the Newfoundland and Labrador crab fishery) and aquaculture science helps teachers develop innovative and interactive teaching tools for various school grades and subject levels.

Susan Steele

"Crying Cockles and Mussels, Alive Alive O!" BIM's Aquaculture Training in Ireland

S. Steele, C. Lunny and R. McCormick

Despite the famous song, cockles and mussels are not the only shellfish farmed in Ireland—oysters, clams, sea urchins, abalone, and scallops are also farmed. Finfish species such as trout, salmon, perch, and cod also form part of the relatively young, vibrant and increasingly important aquaculture sector of the Irish seafood industry, which provides much-needed continuity of supply to the processing sector. Bord Iascaigh Mhara (BIM), the Irish Sea Fisheries Board, provides FETAC (Further Education & Training Awards Council) with nationally accredited seafood industry training courses that target people of varying ages and emphasize practical training skills. These training programmes were developed following a industry-wide training needs analysis on behalf of the ministerial *Task Force in Training & Employment in the Irish Seafood Industry 2001* and deal with the needs of the catching, aquaculture, and processing and retail sectors of the Irish seafood industry. BIM's training is delivered in two regional centres at Castletownbere, Co. Cork and Greencastle, Co. Donegal and by means of two state-of-the-art mobile Coastal Training Units which provide short courses in up to 30 rural coastal and island locations throughout the country. The aim of BIM's training is to develop a competitive knowledge-based Irish seafood industry, whilst ensuring that safety forms an integral part of all training programmes.

Figure 1
Group of students braving the weather in Ireland to learn about seaweed farming. They are repacking bags of *Chondrus crispus* with Jim Morrissey of the Irish Seaweed Growers Organization.

Aquaculture Training in Ireland

Ireland is a land of myths and legends, songs and story telling. However, despite the famous song about Molly Malone, cockles *(Cerastoderma edulis)* and mussels (*Mytilus edulis)* are not the only shellfish farmed in Ireland. Oysters (*Crassostrea gigas* and *Ostrea edulis*), clams (*Tapes semidescussatus)*, sea urchins (*Paracentrotus lividus*), abalone (*Haliotis discus hannoi, H. tuberculata)* and scallops (*Pecten maximus)* are also farmed. Trout (*Salmo trutta)*, salmon (*S. salar*), perch (*Perca* sp.) and cod (*Gadus morhua*) are the principal finfish species farmed.

The Irish seafood industry is an extremely important contributor to the economy of many rural coastal and island communities where employment opportunities still remain scarce despite the favourable economic climate in the wider economy. The total value of Irish seafood has increased from € 621 million in 2000 to € 708 million in 2005, an increase of 14%. Aquaculture constituted 35% of total production by value in 2005 and it is becoming an increasingly important sector of the Irish seafood industry, providing continuity of supply to the processing sector.

The primary role of An Bord Iascaigh Mhara (BIM), the Irish Sea Fisheries Board, is the development of the Irish seafood industry, which since 1978 has included training for the seafood industry. BIM vocational training courses place equal emphasis on practical skills and the underpinning theory behind the skills. The training aims to develop the essential skills needed to work competently on a fish farm or establish a fish farm, and are regularly updated through consultation with the industry.

BIM believes that national accreditation is extremely important and all training courses are validated by FETAC. Accreditation of individual modules allows students to build-up module credits at their own pace towards the eventual award of a FETAC Certificate in Aquaculture. This approach is compatible with the concept of lifelong learning and also fits in well with seasonal rural employment patterns. Safety and sustainability forms an integral part of all course modules. Training takes place in BIM's fisheries centres based in the southwest and northwest of Ireland, through strategic training alliances which BIM forms with other training agencies or by means of two state-of-the-art mobile coastal training units that provide short courses in up to 30 rural coastal

Figure 2
Aquaculture training in Ireland is hands-on and practical. The good weather is taken advantage of and workboat handling classes are taught in the fresh air by Dr. Susan Steele (right).

and island locations throughout the country.

The training delivered also aims to be of very high quality to instil students with the necessary confidence to work in a challenging sector of the Irish seafood industry. In the words of Hugh, a former student who completed a 15-week intensive full-time aquaculture course in BIM's Regional Fisheries Centre Castletownbere:

> "On a sunny December morning I drove in to Castletownbere for a meeting that I had been waiting for the previous ten years. This was my opportunity to see if I could make a living out of the sea; more specifically, aquaculture. From the moment I met the interviewing team I was met by the warmth and positive outlook that was to stay with me for the next four months. The interview board was interested to find out about me and gave me an opportunity to say why it was a good idea to put me on the course and not to shoot me down. A week later I was notified that I was on the course and I quit my office job to get low down and dirty in West Cork.
>
> There was no great shock when I arrived in the Regional Fisheries Centre. The professionalism was equal if not greater than that of any multinational I had worked for previously. The course began at the beginning. We were shown how not to kill ourselves or those around us; then we were shown how to save ourselves and others. With a solid, if rudimentary, grounding in safety at sea, VHF radio usage, first aid and boat handling, we began the course proper.
>
> Trainers imparted knowledge that was practical. The content was focused upon both how things were done and why they were done. Days spent in the teeth of a bitter North Easterly and knee deep in sluchach began to make sense. If you are to learn about an industry you must see the good and the bad. The outdoor experiences were all tied in with class work. The three main modules, finfish, hatchery production, and shellfish ongrowing, gave us a broad understanding of what it takes to produce farmed fish. Yet the course did allow us to fully research our own areas of interest. All the staff were keen to help in whatever way they could. The weeks flew as I was busy from dawn until dusk; although if I had been there for the weekends I may have had another tale to tell.
>
> Engineering was the final module.

Figure 3
Students learning about environmental monitoring with Susan Steele on a rocky shore in Ireland.

Within three weeks we were given a crash course on how to keep a vessel flying! As with the rest of the course the focus was on learning how to do things as opposed to learning how to pass an exam. That said, we were all very well prepared for all the tests that were put in front of us. I finally can service that old Honda outboard of ours—I think the local marine mechanic is going to have to cancel that new villa in Spain without my business!

What I got out of this course was an understanding of how aquaculture operates, the science and technology that underpins it, and what possibilities there are in the industry. It has been a great stepping point. I am looking forward to my next step."

As you can see from Hugh's comments, BIM's aquaculture training is hands-on and extremely practical, and covers all the key aspects of safety at sea, shellfish farming, finfish farming, hatchery production, engineering, communications, information technology, and workboat handling.

BIM's aquaculture training is also flexible enough to rapidly respond to the immediate needs of industry, examples being the development of a specialist seaweed ongrowing course and what has now become colloquially known as 'D-Day' training. D-Larvae training, to give it its correct title, is an intensive one-day workshop specially designed to help mussel farmers identify the optimum time to put out spat collectors. The course teaches sampling techniques and microscope use and compares different types of spat collectors. A science degree is not required to participate and so far over 120 mussel farmers in Ireland, England, Scotland and Northern Ireland have attended 'D-Day'training courses and many more are pending.

Figures 4 to 6
Seaweed has been harvested from the shore of Ireland for many centuries. Students are learning about seaweed culture and seaweed fouling on longlines with BIM.

Seaweed has been harvested from the shore in Ireland for many centuries. The FETAC Seaweed Ongrowing Module is a 10-day course that covers seaweed identification, seaweed life cycle and reproduction, seaweed cultivation techniques, seaweed hatchery techniques, as well as environmental monitoring, and occupational health and safety. This course helps people who are looking for an alternative to fish and shellfish farming. The course also looks at applications for seaweed and students are actively encouraged to cook seaweed and use different products derived from seaweed. The course has been running for only 2 years and has become extremely popular.

BIM's aquaculture training is constantly evolving and in recent years there has been a greater recognition of the benefits of training evidenced by the substantial number of fish farm employees being sent on BIM's training courses. Consequently, there are plans for a new aquaculture qualification to provide higher skills training for students completing the current FETAC Certificate in Aquaculture. Further opportunities also exist for BIM to develop a strategic training alliance with Teagasc, the Irish agriculture training agency, to deliver joint FETAC accredited aquaculture/agriculture training courses in rural coastal areas, which will expand the rural skills base and improve employment opportunities.

Highly focused specialist modules embracing the concepts of sustainability and environmental awareness, waste product disposal, hygiene and animal health, plus marketing and business training will also be developed. These will address specific needs such as detailed procedures for responding to disease outbreaks on fish farms, the marketing of live Irish abalone, or the marketing of innovative seaweed products. Specialist training for salmon transport well-boat crews will also be developed. Further new modules to improve the maintenance of equipment and maximise the return on their investment will prove equally popular. A new training CD-ROM specifically targeting aquaculture occupational health and safety will be piloted by BIM and increased flexibility in the delivery of training to meet the knowledge requirements of the sector will be served by e-learning.

BIM's hands-on practical approach to training has attracted all levels of students and classes often consist of students with two degrees to their name and students who left school at an early age. BIM's experience is that both types of student learn from each other and the feedback from all students has been positive, with many of them joining the industry as employees or starting their own fish farms. The FETAC Certificate in Aquaculture is recognised by higher education institutes of technology and universities through the Higher Education Links Scheme and some students have taken this option and progressed to degree level. BIM's aquaculture training has gone from strength to strength and over the last 4 years student numbers have increased by over 400%. The motto is 'Give a man a fish and you feed him for a day, Train him how to grow a fish and you feed him for a lifetime'. While this is a Chinese saying, we have adopted it into the Irish aquaculture story!

Authors

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Kelly Moret

Promoting Aquaculture Awareness and Education through Canadian and Overseas Linkages

K. Moret and L.C. Halfyard

When developing an aquaculture industry, sustainability and sound environmental practices should govern all management strategies, regardless of the species cultured or the country of operation. The fostering of a 'sustainable aquaculture mindset' is the focus of the international aquaculture development activities undertaken by MI International and the School of Fisheries at the Marine Institute of Memorial University of Newfoundland. The Marine Institute, through CIDA (Canadian International Development Agency) sponsorship, worked with Tra Vinh Community College in Vietnam and Bunda College in Malawi, Africa to develop aquaculture education programs, extension activities, and instructor capacities based upon Canadian institutional models. Ho Chi Minh's statement "It takes ten years to grow a tree, it takes 100 years to grow a person." articulates the importance of education, training, and continuous life-long learning both in Canada and developing countries. MI's global initiatives include development activities, collaborative scientific research, and building aquaculture networks and linkages worldwide. MI International's Global Graduate Placement initiative, which is sponsored by the Federal Youth Employment Strategy (Foreign Affairs Canada and CIDA), has enabled young Canadians, with a formal education in fisheries and aquaculture to work in the aquaculture sector in countries such as Norway, Vietnam, Malawi, Cambodia, Malaysia, Ireland, and Thailand. Canadian aquaculture principles have also been promoted internationally through extension training, short courses, curriculum development (Malawi, Vietnam, Brazil, and the Phillipines), and scientific workshops. At a recent scientific and gender workshop held at Bunda College in Malawi, the Marine Institute showcased the Aquaculture Association of Canada's mandate as a potential model for developing aquaculture associations in Africa.

Introduction

Aquaculture and fisheries development awareness and education is a critical objective of MI International, through its Canadian and overseas projects. MI International is the international centre of the Marine Institute (MI) of Memorial University of Newfoundland, and its mandate is to develop, manage, and implement a program of activities designed to add an international dimension to the Marine Institute. MI is recognized as one of North America's most comprehensive institutes dedicated to education, training, and industrial support in the aquatic and fisheries industries, including post-harvest technology (agrifoods

and fisheries), food safety, integrated aquaculture and agriculture, biotechnology and fish health, quality management systems, extension and outreach, teacher training, strategic management, and international project management. A cornerstone of MI's 40-year history is its community-based training of non-traditional learners, particularly in remote rural communities through outreach, extension training, and applied industry research. The model has been successfully applied to initiatives in Newfoundland and Labrador as well as in Africa, the Middle East, and Southeast Asia. Throughout its 20-year history MI International has promoted Canadian perspectives on fisheries and aquaculture as evidenced by its 100+ projects in over 35 countries.

This paper highlights current and past MI International projects and defines the three major pillars of influence MI targets in all its fisheries and aquaculture initiatives, namely: the institutional level (colleges and universities), the policy level (government and educational institutions), and the community level. It highlights the international linkages, the strategies used to bring Canadian models of aquaculture research and education to overseas partners, the methods used to build the capacities of our international partners, and the international showcasing of Canadian youth.

Institutional Capacity-Building

For the aquaculture sector, one of the cornerstones of institutional capacity-building (people, programs, and services) is the fostering of linkages and

Figures 1 and 2
Mrs. Jean Chokani (left), owner and operator of Green Gardens Fish Farm, and Kelly Moret, of MI International, organized a workshop that presented a 'model' farmer's perspective of applied research for integrated agriculture (crops, animals) and aquaculture pond systems in the central Malawi region. Participants in the workshop included farmers, staff from local educational institutions and the government, and local and overseas students.

networks among the stakeholders (industry, local communities and governments, and educators). Curriculum and program development that promote environmental sustainability, while meeting community and industry needs, are paramount. This principle transcends all levels of MI training from informal one-day short courses to formal multi-year educational programs. Through CIDA-sponsored initiatives, MI faculty have worked with aquaculture training institutions in Africa, Asia, and South America to develop sustainable curricula. MI faculty have also mentored overseas partners in networking, conducting industry and stakeholder needs analyses, undertaking community-based applied research, and have emphasized the importance of community-based extension and outreach services. MI views the 'participatory approach' of consulting grass-root farmers and fishers as critical to institutional capacity-building. As an example, MI's AUCC (Association of Universities and Colleges of Canada)-CIDA project in Malawi, Africa worked towards enhancing the role of Bunda College, University of Malawi in working with extension officers and local farmers to broaden their integrated aquaculture and agriculture activities. These 'model' farmers, in turn, provided valuable feedback to the scientists, educational institutions, and government, with the information being transferred into curricula and government practices.

Through similar mentoring initiatives, MI faculty and staff have highlighted the importance of involving farmers in formal scientific forums and workshops. Traditionally, aquaculture workshops or conferences in many parts of Africa have only been attended by scientists and government officials. During a regional 'Gender and Scientific Research Workshop on Aquaculture' (Malawi, 2004) MI and Bunda College invited female fish farmers to participate. One woman, Mrs. Jean Chokani, the owner and operator of Green Gardens Fish Farm (Fig. 1) formally presented an overview of the impact of research activities on her farm (Fig. 2) and provided her recommendations to government and academia. Although the participation of farmers at forums such as these is common in Canada, this approach was considered novel in sub-Saharan Africa. The feedback received indicated that the farmers' participation was considered invaluable and greatly contributed to the success of the workshop. Canadian institutional models where academia works in conjunction with farmers to develop short-course training models have also been transferred to overseas partners. Such an approach is highlighted in Figure 3, where a training session aimed at improving fish production was developed collaboratively between MI and its overseas partners. For any institution—whether in Canada or a developing

Figure 3
Farmers and instructors in the Domasi, Malawi region involved in a training session on pond fertilization methods to improve tilapia production.

country—involving the community directly and early helps ensure 'small victories' thereby ensuring acceptance and long-term sustainability of institutional results.

Canadian institutions have transferred Canadian perspectives on training and capacity building through initiatives that develop the capacity of staff and faculty at partner institutions. For example, a project at Tra Vinh Community College in Vietnam sponsored by CIDA through ACCC (Association of Canadian Community Colleges) and the Government of Vietnam saw the construction of a new college in the Mekong Delta region and the development of many new programs to supply regional employers with skilled workers (e.g., in agriculture, aquaculture, post-harvest technology, electronics, mechanics, office administration, etc.). The new college based its academic and administrative models on a consortium of Canadian training institutions: SIAST (Saskatchewan Institute of Applied Technology), Marine Institute (MI), Malaspina University-College, and ITA (L'Institut de Technologie Agroalimentaire de Saint-Hyacinthe). As sustainability of aquaculture, agriculture and fisheries activities is critical for food security, economic return, and reduction of environmental impact, all training models developed during this program, focused on the enhancement of 'hands-on' practical skills (Fig. 4), curriculum development, and sustainable practices.

Figure 4
Aquaculture teachers at Tra Vinh Community College in Vietnam are developing practical 'hands-on' fish farming practical skills for application when teaching field courses to farmers.

Figure 5
Efforts to direct education to both men and women aim to change attitudes, empower women, and influence the decision-making process in families and communities.

Policy Influences and Gender

One of the major goals of international projects, especially those funded by CIDA, is to highlight gender awareness issues. In many developing countries the role of young girls and women is often pre-determined by their low or non-existent formal education or training, high domestic workloads, husband's control of the decision- making process, limited legal and property rights or access to capital, and low social status. Initiatives targeting gender sensitivity can range from providing access to capital or training developed specifically for women, to more inclusive activities whereby men and women are joint participants in an awareness activity. MI's role in the assessment of the training and management policies of educational institutions helps identify gaps in gender policy and practices, identifies methods for encouraging institutions to be more 'gender friendly', highlights strategies for attracting more women into positions in administration and encourages female participation as faculty members and extension-outreach workers in non-traditional sectors such as fisheries and aquaculture. One MI approach to 'gender-training' is to suggest institutions have faculty and outreach workers participate in gender sensitivity training prior to working with community groups and farmers (Fig. 5). Other recommendations include having men and women conduct the training activities together and creating flexible teaching schedules to avoid conflict with women's household or family duties. Additional recommendations include presenting materials in a manner suitable to the literacy level of the group, as well as including a variety of gender examples or case studies in the training. In all overseas development activities, MI works with local faculty members in presenting key information from gender surveys and research to higher administrative officials, thereby ensuring critical gender messages are conveyed to administrative authorities and ultimately included in institutional policy.

Figure 6
Participation in local community schools (e.g. Kadonga Village school in the southern area of Lake Malawi) provides invaluable opportunities to teach new life-skills, to exchange Malawi and Canadian childhood experiences, to provide female mentors, and to contribute resources to poor rural schools (e.g books, teaching materials, and sports equipment).

Community Influences and Youth Internships

Although community extension activities typically focus on providing training to adults, it is generally recognized that adults are the group most resistant to changing traditional behaviours. Many rural communities in developing countries include children participating in fishing, agriculture, and household duties. In recognition of this, MI through its AUCC-CIDA

sponsored project 'Sustainable Fisheries for Food Security' is working with the Department of Fisheries in Malawi to develop outreach activities targeting primary and secondary school children. Children who will become future fishers and fish farmers become the beneficiaries of informal education and mentoring. Through fun and interactive public awareness campaigns, it is hoped that the Department of Fisheries can create a conservation and environmental stewardship mindset in impressionable boys and girls. Learning, even in the non-traditional sense, should improve life skills and encourage young girls to stay in school up to the tertiary education level. Figure 6 illustrates the involvement of extension workers and their Canadian partners with a rural community; such initiatives present an ideal opportunity for exposing children to environmental (e.g., impact of overfishing on lakes) and social factors that could affect their livelihoods and communities.

Initiatives such as the Marine Institute's Global Graduate Placement Program, which received financial support from the Federal Youth Employment Strategy (CIDA-Youth Internship Program and Foreign Affairs Canada's Young Professionals International), has provided young Canadian graduates with an opportunity to work with fisheries and aquaculture organizations in foreign countries. (Note: Budget cuts by the federal government in February 2006 resulted in the cancellation of DFAIT's Young Professionals International Program). Placements offered by MI are the result of international collaborations with researchers, governments, and training institutions throughout the world. Youth are encouraged to become engaged in all aspects of research, policy, and community activities in order to attain a holistic view of the management of the fisheries and aquaculture sector. From a Canadian perspective, it is important to highlight Canadian social and cultural experiences, as well as showcase the skills, capacities, and comprehensive education of our future Canadian leaders in the development of the aquaculture industry. To date MI International has placed approximately 120 Canadian youth in 6- to 8-month professional placements in Europe, Asia, Africa, and Latin America. These programs build tangible skills in cross-cultural communication and environmental management. Enhancing the skill set of Canada's future business and community leaders will help build Canada's reputation as a world leader in environmental stewardship.

Summary

International activities provide opportunities for capacity building of partners through research, education, training, and global networking. Projects provide opportunities for Canadians and international partners to work together to establish global models of aquaculture and fisheries research and management. By working directly with colleges and communities from both the developed and developing world, Canadians are poised to highlight their education and research models, demonstrating their contribution to the global development of a sustainable aquaculture industry.

Authors

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Membership Application

Aquaculture Association of Canada

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