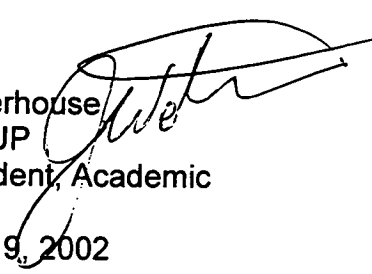


SIMON FRASER UNIVERSITY

Senate Committee on University Priorities Memorandum

TO: Senate

 FROM: John Waterhouse
 Chair, SCUP
 Vice President, Academic
 
RE: Master's of Pest Management
External Review

DATE: December 9, 2002

The Senate Committee on University Priorities (SCUP) has reviewed two separate reports from the members of the External Review Committee for the Master's of Pest Management Program (MPM) which were submitted following the review site visit November 27 and 28, 2002. The report of the Chair, Dr. G. Khachatourians, was submitted on February 18, 2002. The second report was submitted by Drs. C. Scott-Dupree and Dr. M. Kogan, the two other external members of the review team, on March 5, 2002. The response of Z. Punja, Director for the Centre for Environmental Biology was received on April 18, 2002 followed by that of N. Haunerland, Chair of the Department of Biological Sciences on May 23, 2002. Comments from the Dean of Science, W. Davidson, were received on October 3, 2002. Drs. Davidson, Haunerland and Punja were invited to the November 6, 2002 meeting of SCUP to provide input into the draft recommendations for the review and to respond to questions.

Motion:

That Senate ^{receives} ~~concurs with~~ the recommendations from the Senate Committee on University Priorities concerning advice to the Dean of Science, Department of Biological Sciences and the Master's of Pest Management Program on priority items resulting from the external review as outlined in S.03-3 and requests that the Department of Biological Sciences consider these recommendations and report to SCUP by July 2003 on its recommendations for the Pest Management Program.

SCUP recommends to Senate that the Master's of Pest Management Program, the Department of Biological Sciences and the Dean of Science be advised to pursue the following as priority items:

1. Program Structure and Fees

Working with the Dean of Graduate Studies, every reasonable effort should be made to continue a graduate program in Pest Management at SFU. Specifically, SCUP recommends that the program should be structured as follows:

- The program should be a course-based Master's level degree with a project requirement, separate from the existing MSc program in the Department of Biological Sciences;
- The program should be no more than two years in length (excluding a co-op option);

- The program shall charge regular graduate tuition fees, however, a cost recovery supplementary course fee for the summer field program should be charged;
- The program should be encouraged to explore the possibilities of a cohort based program.

2. Administrative Structure

The following administrative structure is recommended:

- MPM should be a program within the Department of Biological Sciences;
- The MPM Program should have a Coordinator/Director whose mandate is to oversee the students and course of study in the MPM Program and who would represent the Program on the Department's Graduate Studies Committee;
- The Department of Biological Sciences is responsible for hiring and allocating faculty to staff the MPM program.

3. Centre for Environmental Biology

Given the proposed changes outlined above, it is advisable that the Centre for Environmental Biology (CEB) be dissolved. If faculty members decide that it is important to have the equivalent of a CEB to give them a profile outside of the University, then it is recommended that they form a Schedule A centre along the lines of the Behavioural Ecology Research Group, the Centre for Wildlife Ecology and the Chemical Ecology Research Group which currently exist within the Department of Biological Sciences.

4. Curriculum

In view of the proposed changes to the program structure and administration, SCUP recommends that the proposal for a revised curriculum be revisited with the Dean of Graduate Studies, ensuring that the needs of present and future students are considered. In addition, the MPM Program is advised to consider the introduction of a co-op option.

5. Recruitment and Graduation of Students

In order for the MPM Program to utilize resources most effectively, it is anticipated that an intake of 10 or more students per year would be needed. To achieve this goal, the Department will be required to undertake appropriate recruitment efforts for students and to ensure that they have sufficient course offerings for students to complete the program within the 24-month timeframe (excluding a co-op option).

6. Budget

The Faculty and Department need to allocate realistic budgetary resources to the MPM Program, including a sufficient number of full-time equivalent CFL faculty members, in order to ensure the success of the program.

7. Reporting Requirements

SCUP requests that the Dean of Science, the Department of Biological Sciences and the Master's of Pest Management provide a joint annual report. The focus of the report will be to outline the progress that has been made with respect to the implementation of the recommendations and to identify any problems arising. The report should be presented on an annual basis to the January meeting of SCUP for a period of three years (with the possibility of an extension of this requirement if SCUP deems it necessary).

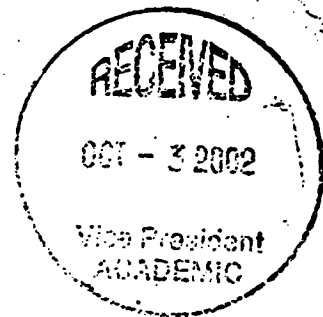
encl.

c: W. Davidson
N. Haunerland
Z. Punja

**Comments on the external reviews of the Master of Pest
Management Program and responses from various groups**

from

**William S. Davidson
Dean of Science**



Background

An external review of the Pest Management graduate program in the Department of Biological Sciences was called for by Senate following an earlier external review of the Department of Biological Sciences as a whole. Initially, the terms of reference of the review were very specific and dealt with whether to offer a course-based professional Master of Pest Management (MPM) possibly with differential fees and/or a more research intensive program with standard graduate fees that would lead to an MSc degree. These terms of reference were expanded to consider the future of Pest Management at Simon Fraser University and, as a result, indirectly the future of the Centre for Environmental Biology (CEB) which houses the MPM program and the Master of Environmental Toxicology (MET).

A three person external review team could not agree on a single report although they stressed independently that this was more a matter of style than arriving at radically different conclusions. This was not the best outcome of an external review as it allows one to be selective in choosing aspects from each review depending on one's personal point of view or bias.

A response to the external reviews was prepared by Dr. Z. Punja, the Director of the CEB, in consultation with the faculty members of the Pest Management group. The external reviews and the response from faculty members in the Pest Management group were the subject of discussions at Biological Sciences departmental meetings and a response was formulated by Dr. N. Haunerland, Chair of Biological Sciences, on behalf of the department. In the period between the departmental meeting and the release of the department's response, Dr. Punja distributed widely a document in which he presented three options which included a recommended course of action to ensure renewed growth of the MPM and MET professional programs at SFU.

It was obvious from the content of the responses to the external reviews that there were very strong but divergent opinions on the future of Pest Management held by faculty members in Biological Sciences and that often the views were such that they were mutually exclusive. In order to bring some focus and to generate dialogue among the players, I held an open meeting to which everyone with an association to Pest Management was invited. Several representatives from outside the university attended and these included people from government and private industry. I do not consider this meeting to have been a success as there was no convergence of minds. However, after this meeting I received submissions from several faculty members from the Department of Biological Sciences some of whom considered themselves part of the Pest Management group and others who did not. I met personally with some concerned faculty members and discussed scenarios for the resolution of this issue.

The conclusions and recommendations that I am presenting below will not satisfy everyone. They will probably be quite controversial and may lead to even more debate and heated argument. However, it is my considered opinion that in the long run they represent a workable solution that will enable Simon Fraser University to maintain its deservedly strong reputation as being the home of the best Pest Management program in North America while being adaptive and progressive in its response to a changing world in which environmental issues dominate our daily lives and the decisions of our governments.

Recommendations

1. Every reasonable effort should be made to continue a graduate program in Pest Management at Simon Fraser University.
2. There should be an option for a course-based (with a research paper) Master of Pest Management (MPM). This is in line with the original plan for this degree.
3. There should also be an option for a research-based MSc in the area of Pest Management..
4. Neither of these graduate programs should have differential fees. However, a partial cost recovery system should be instituted for field courses which should be part of both programs.
5. The current administrative structure for the MPM and MET graduate programs, namely being housed in the CEB, does not appear to be desirable or workable. The CEB as it currently stands should be dissolved.
6. The graduate programs in Pest Management (MPM and MSc) as well as the MET should be integrated into the Department of Biological Sciences and should be administered like the regular MSc and PhD programs.
7. Faculty members who feel strongly about the preservation and future success and development of the graduate programs in Pest Management must step forward, provide the leadership and take ownership of these graduate programs.
8. If faculty members feel it is important to have the equivalent of the CEB to give them a profile outside the university, then they should form a Schedule A centre along the lines of the Behavioural Ecology Research Group, the Centre for Wildlife Ecology, and the Chemical Ecology Research Group; all of which currently exist in Biological Sciences.
9. It is unacceptable for there to be a Director of Pest Management or a Director of the CEB at the same administrative level as a Department Chair or Associate Chair.
10. All faculty members must be first and foremost affiliated with a department and that must be where their primary allegiance lies. It is expected that all faculty members be able and willing to contribute to the core teaching of departmental undergraduate programs (including teaching first year classes) as well as provide specialised teaching to upper division students and carry out research in their own specialty areas. There should not be faculty members whose sole purpose is to serve a graduate program.
11. The Department of Biological Sciences as a whole must decide how best to offer its graduate programs, whether they be considered "professional" or not. These should build upon expertise that exists in the department. In addition, the department should ensure regular, appropriate offerings of relevant graduate courses to provide for timely completion of all graduate degree options.

Comments

I am convinced that there is a general will among most faculty members in Biological Sciences to maintain a graduate program in Pest Management. The dispute in the past over resource allocation and the administration of the CEB has not been helpful. Indeed, it could be argued that the formation of the CEB ultimately led to the creation of different groups or cultures along the lines of "applied" and "pure" research and the designation of "professional" and "research-based" graduate programs. These are not useful distinctions. What all faculty members should be striving for is good quality science. With that in mind, there will be times when applications are obvious and these should be followed up whereas at other periods, fundamental questions should be pursued. A Faculty of Science and its member departments should be able to embrace all productive faculty members and respect their contributions. These contributions to the general goals of quality teaching and research will probably change over time and this too should be appreciated.

There is no doubt that the MPM program has been an important part of Simon Fraser University for over 35 years. Throughout its history Pest Management has been an integral component of the Department of Biological Sciences. This has been its strength. There is no valid reason to change this. The program is based on the core areas of Biological Sciences and relies on students coming into its graduate program with a deep and broad understanding of organismal biology, ecology, physiology, evolution, systematics, etc. The Simon Fraser MPM degree is highly regarded around the world and there is definitely a need for its graduates. As an institution we should maintain our strengths, especially when they are relevant.

Pest Management is a rapidly changing field. There are new opportunities and threats as a result of increased international trade. The underlying science is changing too. One only has to read about transgenic crops that are resistant to certain chemical herbicides or to specific groups of pest to realise that biotechnology is a component of the green revolution. The field of environmental biology is much broader than simply Pest Management and includes Environmental Toxicology, Wildlife Conservation and Protection, and Behavioural Ecology among others. When considering the future of Pest Management, Simon Fraser's Department of Biological Sciences should be asking how it can best prepare graduates: (a) who can play leading roles in policy decision making based on an understanding of the science associated with environmental issues and/or (b) who can be influential in developing the science that is required if we as a society are to have better integrated pest management systems in place. If these become the focus of the debate, then the decisions concerning how to mount appropriate graduate programs should be more easily resolved.

A viable graduate program in Pest Management will require the commitment of the Department of Biological Sciences as a whole and this can only be achieved if everyone feels that they have something to contribute and/or gain by having it. Field courses have been identified as key to the success of the MPM in the past. These should form the foundation for any future program but there is an opportunity to broaden the curriculum to cover the diversity of topics that have become part of today's Pest Management. However, the department should find ways to offer these courses in a more cost effective manner especially in the absence of differential fees. Sharing the courses with other post-secondary institutions may be one way to achieve this. Many

current "non-members" of the Pest Management group have valuable contributions to make. Making Pest Management part of the general graduate program offerings of the department will allow everyone to participate and so buy-in to its success.

Throughout this review process the question of the future of the MET program has never arisen directly but it is tied to the current MPM through the CEB. Faculty who are associated with delivering the MET were never given the opportunity to present their opinions to the external review board. In making the recommendations above, I have tried to take into consideration their views as expressed at the open meeting. I hope that they too will agree that there is merit and benefit from having the MET as a mainstream graduate program within the department.

Willie Davidson,

Department of Biological Sciences

Simon Fraser University

**Response to the External Review
of the Master of Pest Management Degree**

Prepared by

Norbert H. Haunerland, Chair

In consultation with the Faculty of the Department of Biological Sciences

May 23, 2002

Distribution:

**Dr. Willie Davidson, Dean of Science
Dr. Bill Krane, Associate Vice President, Academic
Dr. John Waterhouse, Vice President, Academic**

Faculty, Department of Biological Sciences

The Department has received copies of the MPM reviews, in the following labeled GK (George Khachatourians) and CD/MK (Cynthia Scott-Dupree/Marcos Kogan), and of the response of the MPM faculty (MPM). The recommendations of the MPM response were discussed at two Department meetings. This document summarizes the views of the Department as a whole, but it should be noted that not all conclusions are supported by all Department members.

While each of the three documents contains various inaccuracies and misrepresentations on details, the current response focuses mostly on the major findings and recommendations. The Department is unsure about its exact role in the review process, which originated from a recommendation of the External Review of the Department of Biological Sciences but did not involve the Department. In response to the Department review, Senate accepted on November 6, 2000 the following recommendation by SCUP:

"The Department of Biological Sciences should review the Master of Pest Management program and determine whether to offer:

- a) a course based professional program, possibly with differential fees, for an MPM degree, and/or
- b) a research based program with standard fees for an M.Sc. degree. "

In December 2000, the Dean asked the MPM faculty to "provide a document that outlines [the] vision for the future of the Pest Management Program at SFU. [It] should address and describe:

- a) realistic expectations of requirements for course work and original research
- b) the role of work experience
- c) faculty complement required to cover the program
- d) numbers of students that could be recruited and into what types of degree programs
- e) general resources required to mount the program
- f) cost benefit analysis of [the] program"

The MPM faculty submitted on January 31, 2001, various documents (DOC) to the Dean, who subsequently requested suggestions for appropriate external reviewers. The Dean assembled the review panel in consultation with the VP Academic, whose office coordinated the review. The Department as a whole, or the CEB as the administrative unit created to coordinate professional programs in the Department, were not part of the planning process, and had only minimal representation during the review itself. The MPM faculty alone prepared the review documentation, which unfortunately did not explicitly address all the points raised by the Dean. However, it contained a detailed proposal for a re-vitalized MPM program, in which it was concluded that in order to continue to offer a viable degree in Pest Management, the program would need substantial academic, budgetary and administrative autonomy, including control over the hiring of three new faculty members in the next 2 years. Because the MPM faculty felt that a credible program could otherwise not be maintained, they asked for the termination of the program if these changes were not supported (DOC VI). In light of the uncertainty of the future of the program, the MPM admission committee did not process any of the applications for admission to the MPM program during the current academic year.

As stated, not all of the points specified by Senate and the Dean were addressed explicitly in the reports. While the three members of the review panel apparently could not agree on a single report, the major recommendations of both reports echo the demands of the MPM faculty. Both

reports speak highly of past accomplishments, but point out that the gradual decline of the MPM program should have been prevented, and that the immediate addition of resources is required for its survival. The reports acknowledge that the Department of Biological Sciences must prioritize its activities to meet the various demands in undergraduate and graduate training. They express concern that the more basic oriented Department does not appreciate the applied nature of the program, and that new faculty members hired by the Department may not be sufficiently specialized to be useful for the program. Hence, administrative autonomy is deemed essential, with 80 % of the efforts of the faculty directed to the MPM program, and only 20 % to the mission of the Department as a whole. They strongly endorse the hiring of three new faculty members in the next two years, and a revision of the course offerings. There are different opinions on the exact focus of the revised program and the associated faculty, however. The Chair of the review panel recommends a market survey to obtain data on the demand in the next decades for a revised MPM program, perhaps with an added focus on business and policy issues, and with differential fees. The other report, as well as the response from the MPM faculty, find such a study unnecessary, and recommend to proceed with the changes outlined before.

Current commitment of the Department

In the discussion of the reviews and the subsequent MPM response, it became apparent that the Department did not fully agree with the analysis of the problems of MPM within the Department that are contained in these documents. Given the far-reaching recommendations of the reports, however, such disagreements may not matter. The Department acknowledges that MPM has less faculty directly assigned to the program than a decade ago. This, however, is a consequence of additional duties the Department has assumed over this period. The number of full time faculty in Biological Sciences today is identical to 1990, but the number of Biology majors and undergraduate and graduate FTEs increased by 20-30 %. The faculty formally associated with MPM decreased during this period (-20 %), but so did the number of MPM students (-20 %). In order to cope with added demands and diminishing resources, the Department instituted various measures to assure rational planning of course offerings, including that of graduate courses. This was one of the reasons for the creation of the Centre for Environmental Biology, which was expected to enhance cross-disciplinary teaching between the two professional degree programs (MPM and MET), and thus make offering of both programs more affordable. However, the CEB did not achieve these or most of the other academic goals envisioned in the initial proposal. MPM students need to complete 10 courses for their degree, while M.Sc. students require four. The Department offers at least 6 graduate courses per year almost exclusively for MPM students (currently ~20), and approximately 16 for the remaining ~120 students. An increase in the course offerings for the MPM program, as advocated in the reviews, would add to the difficulty of the M.Sc. and Ph.D. students, who in some cases already rely on course offerings in other Departments or even at UBC. Disproportionate resources, in addition to the assigned faculty teaching, are expended on the core MPM courses, which are currently subsidized with \$ 15-20 K per year, mainly for travel expenses and guest speakers. It is noteworthy that in the Faculty of Science, Department budgets are allocated according to a formula that is based on performance (or need) indicators, including the total number of graduate students. Based on our graduate student headcount, we received ~\$ 60 K for the last academic year (15 % of our total operating budget). Thus, less than \$ 9 K in operating funds was generated by the MPM graduate program which enrolled less than 15 % of all graduate students. The Department has accepted higher total expenses for professional programs, based on their perceived benefits, but it is unable to increase the resources as recommended by the external review reports, as this would lead to an erosion of its undergraduate and M.Sc./Ph.D. programs.

Advocated future commitment of the Department

The resources called for by the reports include the hiring of a minimum of three dedicated faculty members before 2004. After the retirement of Drs. Borden and Rahe, a total of 10 faculty (9 tenure track and 1 lecturer) would be associated with the program (3 new hirings + Drs. Gries, Harestad, Nicholson, Punja, Roitberg, Winston, as well as T. McMullan). These faculty should be dedicated to the MPM program, with a primary teaching commitment in the professional program, and only a minor commitment to Biology (25 %). For the new hirings, the reports and the MPM faculty response emphasize "that 80 % of the interest must reside in MPM proper and 20 % in any of the affiliate areas" (GK 18, MPM 8). Given that the current contributions of the MPM faculty to non-MPM teaching averages >50 %, this would generate a net loss of 3.5 faculty positions to the Biology core program. In light of the added undergraduate and graduate interest in the more "fashionable areas of biological sciences" (SD/MK 13), such a loss can simply not be absorbed.

Advocated autonomy of the MPM program

The proposed minor commitment of MPM faculty for the core Biology program, however, is troublesome for other reasons as well. Various different programs can co-exist amiably in the Department, if all faculty are "dealt with equitably (pedagogically, academically, and scientifically)" (GK 15). However, the presence of two classes of faculty is a recipe for disaster. In the past, the Department experienced severe discontent by real or perceived loyalty conflicts and special privileges of faculty associated with the Center for Pest Management or the Institute for Molecular Biology and Biochemistry, as documented in both, the 1989 and 1999 External Reviews of Department. The "administrative ... autonomy in issues of hiring, budgetary matters and teaching assignments" seen as essential for a revived MPM program (MPM 2) has all the hallmarks of an independent Department. Indeed, one report specifically recommends that the Director has the rank of a Department head and reports directly to the Dean (SD/MK 18). While supporting autonomy, the MPM faculty "do not advocate the installation of a Department head..., but envision a Director who holds the rank and stature equivalent to a Department Chair" (MPM 11). Such an arrangement, in which a subgroup of faculty holds all the rights of a regular Department member but enjoys a great degree of autonomy is without precedent and inconsistent with current SFU policies. The Department feels very strongly that more autonomy will only amplify the problems encountered in the past. Instead, several faculty expressed the opinion that the MPM program can survive within Biological Sciences only if the program is embraced by the Department as a whole; this would require broadening its curriculum to reflect the interests and expertise of other, currently not affiliated faculty. This view contrasts with the sentiment expressed in the reports that faculty teaching in the MPM program need to be highly specialized and mainly focused on the application of science. For example, the view that a plant ecologist would be appropriate to mount a course in weed science has been rejected (GK 16). Consequently, the reviewers and the MPM faculty expressed little hope that the Department of Biological Sciences would ever advance the MPM program, and found the addition of dedicated MPM positions to the Department without administrative autonomy unacceptable (MPM 11).

Role of MET

The MPM response proposes that the autonomous unit includes not only MPM faculty, but also the faculty associated with MET (MPM 20). However, neither the MET program nor the CEB as a whole were reviewed in detail. No assessment of quality, demand, and adequacy of resources of the MET program was made, and the proposal for a "Program in Environmental Biology" does not include any faculty additions that would benefit MET. Currently, >20 students are enrolled in the

MET program, which is maintained by 5 faculty (Drs. Farrell, Kennedy, Law, Moore, Nicholson) none of whom have expressed the desire to leave the Department. Students complete a practicum rather than a thesis, and the course offerings are not overly expensive. Although an overlap with the MPM program has been advocated, this has not materialized, and it is not clear that the proposed autonomy would benefit this program. Hence, the Department will maintain the popular MET program, even if the MPM degree is granted autonomy.

Future of the MPM program outside of the Department

There is no unanimous consensus in the Department how to proceed best with the Master of Pest Management degree. Several faculty would prefer to broaden the Center for Environmental Biology to reflect the faculty expertise present in the Department, and to maintain a streamlined MPM degree, with considerable overlap with MET. For the reasons outlined above, however, there is virtually no support among non-MPM faculty for an autonomous program within the Department. Most faculty agree with the findings of the review panel and the MPM faculty that the MPM degree, as it is currently offered, and its proposed revisions, are not possible without additional resources which cannot be provided by the Department. The stated goals of the revised MPM program, and its limited involvement in the Department as a whole, are not compatible with the goals and needs of the Department of Biological Sciences. Unfortunately, a detailed cost-benefit analysis was not carried out during the review. While the past success of the MPM program is not questioned, it is not clear whether the decline in student demand will be easily reversed. The reports are confident of the future potential of the degree program, but little evidence is provided to substantiate this. It is also questionable whether all the resources requested are essential and justified by the anticipated benefits to the University. There is a strong consensus, however, that the recommended changes cannot be achieved within the Department of Biological Sciences. We therefore recommend that the Dean of Science and the senior administration evaluate the proposed program and its benefits, and if desired provide the resources to make it successful independent from our Department, perhaps with greater links to the Resource Management program in the Faculty of Applied Science. This, however, cannot be done without assuring that the core teaching tasks of the Department are maintained, including partial faculty replacement that reflects the current undergraduate teaching contributions of the MPM faculty who opt to leave the Department.

Future of an MPM program within the Department

The Department feels compelled to accept the conclusion expressed by the reviewers that the MPM degree program, as it is currently taught, is not viable without the requested resources and administrative autonomy, especially since this view is unanimously supported by the MPM faculty. If those conditions cannot be met, the termination of a separate MPM program was strongly advocated by the MPM faculty and both external reviews. The Department, however, is not convinced that these are the only options. Given the wide range of expertise of our existing faculty, it is certainly conceivable to design an exciting pest management program with achievable costs and expectations that is carried by a wider range of faculty and is administered directly by the Department. Such a degree could carry fewer and less structured course requirements, and be more similar to an M.Sc. in its research focus (like the M.Sc. currently offered through the Behavioural Ecology Research Group). This follows option (b) of the Senate recommendation (see above), i.e. to offer "a research based program with standard fees for an M.Sc. degree". Since no MPM students have been accepted in the current year, a newly designed MPM degree could be planned in the coming year, and commence after the currently enrolled students have graduated.

SIMON FRASER UNIVERSITY
CENTRE FOR ENVIRONMENTAL BIOLOGY
DEPARTMENT OF BIOLOGICAL SCIENCES
MEMORANDUM

To: Laurie Summers
Director, Academic Planning

From: Dr. Z. K. Punja
Director, CEB

Subject: Response to External Review Reports
of Pest Management Program

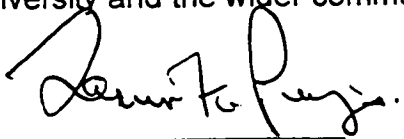
Date: 18 April 2002

I am pleased to enclose the response from the MPM faculty to the recent reports submitted by the External Review Committee on the MPM program at SFU. We have taken the opportunity to highlight and comment on some of the most pressing issues that were identified in the Reports, and we respond to the recommendation and concerns. A copy of this report has been forwarded to the Department of Biological Sciences for their comment, which should be submitted to your office by May 15, 2002.

We are optimistic that positive decisions regarding the future of the MPM program can be made at the higher administrative levels within the University prior to the Fall semester, 2002. We are currently not admitting any students until the status of the MPM program is finalized. In addition, since my term as Director of the Centre for Environmental Biology, which houses both the MPM and MET programs, will expire on August 31, 2002, arrangements will need to be made through the Dean of Science's office to identify someone who can implement the recommendations that will be forthcoming from the offices of the Vice President, Academic and the Dean of Science.

I would like to take this opportunity to thank the offices of the Vice President, Academic and the Dean of Science, together with the Dean of Graduate Studies and the Vice President, Research, and all of the faculty, adjunct faculty, students and staff in the Department of Biological Sciences for contributing to this review process.

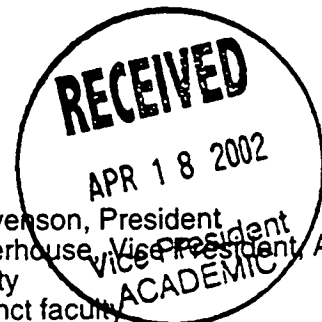
I am optimistic that the outcome of this External Review will be a positive one for the University and the wider community.



Zamir K. Punja, Ph.D.

cc: Dr. B. Clayman, VP Research
Dr. W. Davidson, Dean of Science
Dr. J. Driver, Dean of Graduate Studies
Dr. N. Haunerland, Chair, Biological Sciences
Dr. B. Krane, Associate VP, Academic

Dr. M. Stevenson, President
Dr. J. Waterhouse, Vice President, Academic
MPM faculty
MPM Adjunct faculty



**Response to the External Review Reports
of the
Master of Pest Management Program at SFU**

**Prepared by the Director, MPM program,
and the MPM faculty**

April 18, 2002

SUMMARY

In the following document, prepared in response to the 2 External Review reports of the Master of Pest Management (MPM) program, we review the major issues presented to the External Review Committee (ERC) for consideration, and we respond to the comments and recommendations of the ERC. The critical issues facing the MPM program that need to be addressed by the higher administration as an outcome of the review are highlighted. We hope that our response is viewed as an effort to revitalize and ensure the continued success of the MPM program, a flagship program for SFU that is on the brink of dissolution, and to provide direction for the future of the CEB.

The External Review Committee of the MPM Program has commented on the strengths of the program and has identified areas which require attention, specifically with regard to new faculty hirings, curriculum revisions, and the creation of an autonomous unit for the Centre for Environmental Biology. In addition, a number of specific recommendations regarding improvements in the overall program were made.

In this response to the External Reports, the MPM faculty 1) reiterate the long-standing need for additional faculty (a minimum of three by 2004) to teach the graduate curriculum and to provide research supervision and professional training to MPM students, and 2) provide the rationale for the creation of an independent administrative unit with autonomy in issues of hiring, budgetary matters and teaching assignments. We endorse most of the recommendations from the External Review Reports and also address all of the specific issues raised. The MPM program should retain its standing as a professional program with an original research project for students. The subject of differential fees needs to be discussed further.

PREAMBLE

The External Report by Dr. George G. Khachatourians (GK) and by Drs. Cynthia Scott-Dupree and Marcus Kogan (SD, MK) are considered concurrently. Where differences of opinion are apparent, these are highlighted for discussion. Quotations taken directly from the reports are identified as such and referenced as a footnote. It is our opinion that both reports must be given full consideration, despite the unusual circumstances that were precipitated by differences in philosophy and approaches to the preparation of the final report by the committee members. It is clear that both reports are insightful and they are similar and complementary in their assessment and final recommendations, and these views are not disparate with regard to the issues facing the MPM program. Although the submission of 2 reports from a 3-member team may have raised concerns in regards to the merit of the guidance that the review team could offer SFU, we see the 2 reports as a strength because they identify similar issues and recommend similar solutions, although their approach to achieve the goals sometimes differ.

I. THE ACHIEVEMENTS OF THE MPM PROGRAM

It should be convincingly evident from both reports that the MPM program, its faculty, students and staff, have made significant achievements in the areas of research and teaching in pest management at SFU. "These are exceptional researchers of national and international stature".¹ Furthermore, it is clear that the MPM program has become a nationally and internationally recognized program with considerable impact. "The MPM as an institution graduates the bulk of Canadian pest management practitioners".² This program has reflected favourably on SFU since its inception and has left an indelible mark.

The reports furthermore acknowledge the uniqueness of the MPM program.

"Today, the MPM remains unique not only in North America but in the world as a program that delivers a broadly comprehensive course of studies aimed at providing students with the opportunity to experience the practical application of pest management from the ecological and organismal perspective in combination with original research".³

The reports also acknowledge the extensive outreach of the MPM to the broader community.

"The program also reflects a deep and sustained commitment to service to the societal needs of Canada and other countries".⁴

The unique professional summer courses of the MPM program have benefitted extensively from a core of 140 volunteer guest instructors and a distinguished group of Adjunct faculty. "This is an incredible contribution that appears to be largely under-rated by the University as a whole".⁵

• There should be no question, therefore, that the MPM faculty have a vested interest in maintaining this high-calibre reputation, one that has taken almost 30 years to build. This view is strongly supported by the reports:

"The MPM program at SFU has made a significant contribution to professional training for over three decades. It is absolutely essential that a professional course of this type continue its evolution with the intent of maintaining and providing a program of the highest caliber to students. It has been demonstrated amply that graduates have become leaders and pest management practitioners who apply their skills around the world".⁶

Coupled with the "remarkably strong funding that MPM faculty attract"⁷, this program has fostered a widely recognized research environment at SFU in the area of pest management.

¹ GK, pg. 10, Section 7.2 - Faculty

² GK, pg. 7, Section 5 - Contextual history

³ SD, MK, pg. 14, Section 9a - 1. Unique Professional Degree

⁴ GK, pg. 10, Section 7.1 - Program

⁵ SD, MK, pg. 9, Section 7b - Adjunct Professors and Guest Lecturers

⁶ GK, pg. 9, Section 6.4 - Broad Spectrum of Outputs

⁷ GK, pg. 19, Section 10 - Potential Options and Actions

- We endorse the above External Review assessments, which accurately reflect the major achievements of the MPM program up to the present time.

II. THE DECLINE OF THE MPM PROGRAM

There is clear acknowledgement in both reports that the MPM program has witnessed a serious decline due to a lack of timely faculty replacements, in its recent student enrollments, especially internationally, and in the general morale of the individuals associated with the program. As one report states "it is astonishing as to how the state of past events have been tolerated and have lead to the present day conditions"⁸

It is pointless at this juncture to delve into the reasons behind this near demise, but as the reports state, the program has received declining administrative support and inadequate faculty replacements:

"Two key areas of support for the MPM program that have suffered in recent years are: 1) reduced administrative support from a rapidly expanding and financially pressured university; and 2) a reduced number of faculty that can continue to dedicate time and energy to teach the appropriate graduate core courses and provide research supervision to MPM graduate students".⁹

- We agree with this assessment.

It is clearly stated that the MPM program within the Department of Biological Sciences has presented "a clash of diverse cultures", resulting in part from a lack of acceptance or appreciation of the value of applied research that forms the basis of MPM-related projects.

The reports further acknowledge that these problems are not unique:

"At SFU, as in other similar institutions, there are unavoidable conflicts between the propensity to enhance certain fashionable areas of biological sciences (e.g. molecular biology) to the detriment of those perceived as more traditional, such as invertebrate physiology or systematics. This makes the administration of any program in Department of Biological Sciences (DBS)-like units very difficult. Shrinking financial resources generate antagonisms, conflicts of interest, and loss of objectivity in assessing the needs of certain programs. The result is that faculty splits into factions and students are caught in the middle. The appearance of such a schism was evident between DBS and MPM. This posture over years has undermined relationships and cannot be overlooked."¹⁰

Furthermore, the reports point out the potential outcome of such conflicts:

"Such dichotomies, if not buffered with considerable flexibility, may become barriers to collaboration and the cultivation of collegial interactions among staff and students in the various units. Throughout the review process, we witnessed expressions of concern about

⁸ GK, pg. 19, Section 10 - Potential Options and Actions

⁹ GK, pg. 9, Section 6.4 - Broad Spectrum of Outputs

¹⁰ SD, MK, pg. 13, Section 8a - MPM and the Department of Biological Sciences

decisions that were made at various administrative levels that might have been biased against the applied nature of the MPM Program".¹¹

- We endorse all of the above assessments to capture the essence of what has transpired over the past 10-15 years, resulting in the current state of affairs for the MPM program.

The reports conclude with serious predictions for the future of the MPM program:

"There has been tireless and strong scientific leadership in the MPM, which is in a danger of being abdicated forever".¹²

"The situation is critical and warrants serious and immediate attention by the SFU administration if the program is to maintain its high quality and reputation".¹³

III. MPM AND THE DEPARTMENT OF BIOLOGICAL SCIENCES

The integration of the initial group of 7 faculty into the Department of Biological Sciences in 1967 led to the formation of the MPM program in 1973 and the creation of the Centre for Pest Management, with an all-time high of 13 faculty in 1993. The MPM program has benefitted tremendously from having its home in the Department, which has provided all of the resources and support that were needed to maintain the vitality of the fledgling program and foster its growth. In turn, the MPM faculty have fostered interactions with many other faculty in the Department and have had a strong role in administration and conductance of Departmental and University affairs, as well as in teaching. "In addition, the MPM faculty are required to contribute to the teaching of courses associated with the general curriculum for the Department and supervision of MSc and PhD students".¹⁴

In recent years, however, the reports point out the emergence of problem areas:

"Given the diverse nature of the Department of Biological Sciences and the understandable conflict of interests among the various faculty groups, it has been difficult to build consensus and support within the Department for the needs of the MPM program in terms of faculty replacement. According to some MPM faculty, the situation is not likely to change unless there is greater input from the higher administration of the Faculty of Science and above, or a new administrative model is followed for the MPM program".¹⁵

- We agree with this assessment.

The turn-over in MPM faculty and hirings made in the Department of Biological Sciences over the period 1985-2002 are presented in Table 1. It is strikingly evident that over the past 12 years (1990-2002), only **two** new faculty (Drs. Gries and Lee) were added to the MPM program, and with Dr. Lee having resigned, one faculty was added/12 years (as an

¹¹ SD, MK, pg. 11, Section 8 - Interactions

¹² GK, pg. 19, Section 10 - Potential Options and Actions

¹³ SD, MK, pg. 10, Section 7b - Faculty

¹⁴ GK, pg. 10, Section 7.2 - Faculty, third paragraph

¹⁵ SD, MK, pg. 13, Section 8a - MPM faculty and the Department of Biological Sciences

NSERC Junior Industrial Chair). In contrast, hirings in areas other than pest management have totalled 15 faculty/12 years. It is remarkable that the MPM program has managed to survive in the absence of faculty renewal.

As clearly stated in the report, the lack of faculty replacements would lead to the demise of the program:

"By 2004, retirements will leave the complement of MPM faculty to deliver professional graduate course curriculum and research supervision in the program at an all time low of 5 faculty members. Loss of particular pedagogical and academic expertise in essential areas of pest management is crucial. The increased teaching demands in the core undergraduate curriculum in the Department of Biological Sciences, which must be shared by MPM faculty, has resulted in a reduction in frequency and number of MPM graduate course offerings. The assignment of teaching duties and teaching load becomes a critical factor for the survival of a course-based professional program."¹⁶

- We agree with this assessment.

Furthermore, the issue of teaching of professional courses was discussed:

"A point of contention has been the perception by non-MPM associated DBS faculty that the MPM faculty do not carry their fair share of Departmental courses. This perception seems to stem from the fact that there is no recognition for the demands of teaching professional graduate courses as compared to basic Biology courses. Although classes are much smaller in the professional courses, the intellectual demand from instructors is considerably greater. In addition, most MPM faculty, including the Director of the CEB, have taught introductory Biology courses."¹⁷

- We agree with this assessment.

The reports illustrate the need to hire faculty with special skills:

"The pedagogical and academic skills required to teach courses in a professional program are no less demanding than teaching large introductory undergraduate courses in Biology. A major difference lies in the fact that specialized faculty are required to teach professional courses while most Biology faculty can teach the introductory courses. It is apparent that faculty hired to participate in the MPM program must be dealt with equitably (pedagogically, academically, and scientifically), by the Department of Biological Sciences and the administration of the university, if they are to retain their services in the long-term".¹⁸

- We agree with this assessment.

With regard to MPM students, the reports comment on their concerns regarding the perception of MPM students:

¹⁶ GK, pg. 15, Section 8.2.2 - Faculty Complement

¹⁷ SD, MK, pg. 13, Section 8a - MPM faculty and the Department of Biological Sciences

¹⁸ GK, pg. 15, Section 8.2.2. - Faculty Complement

"The External Review Committee was particularly concerned by comments from current MPM students and graduates indicating substantial angst and dissatisfaction regarding their interactions with M.Sc./PhD students in the Department of Biological Sciences. There is some indication that the MPM program is considered substandard by those involved in the M.Sc. and Ph.D. programs in the Department, resulting in decreased morale and lack of Departmental connectedness. These problems need to be addressed immediately and with the utmost diplomacy by SFU and Department administration".¹⁹

- We agree that the above assessments accurately sum up the situation that has transpired over the past 10 years with regard to the status of the MPM program and its students in the Department of Biological Sciences. It is apparent that, even to the present day, the MPM program has not been viewed by some faculty in Biological Sciences to be a bona fide academic program with regard to its teaching and research contributions in applied biology, despite the proven academic record.

To conclude, the reports reiterate the need for dialogue:

"It is essential to promote the dialogue that will resolve the issues of MPM faculty teaching of introductory biology courses, the misperception of the calibre of the MPM student population and the quality of their research by non-MPM students".²⁰

IV. THE NEED FOR FACULTY HIRINGS

It should be convincingly clear from the above discussion and the proposed revised MPM curriculum presented below, that there are currently insufficient MPM faculty to mount any type of credible professional degree program which is heavily course-oriented. As stated in the reports, additional faculty are needed in specific areas:

"Suggested revisions to the MPM graduate course curriculum, as presented in the document prepared by the MPM faculty, will necessitate the hiring of additional faculty in the areas of fungal biology, biological control and vegetation management in the near future. The hiring of three additional MPM faculty will bring the total faculty complement to 8 if the hiring is completed by 2004. This faculty complement will be adequate to deliver all of the graduate courses proposed in the document, while ensuring that MPM students are offered courses at a regular and dependable frequency to enable timely graduation. In addition, the complement of 8 faculty will ensure that a MPM faculty member is available to supervise the MPM students for their research component".²¹

- We agree with this assessment.

The reports further state that a clear commitment is needed on the part of the university:

"While maintaining the MPM program without additional investment and funding is laudatory, continuation of the MPM as an 'add-on' program is inappropriate and costly to the morale of all faculty, students and activities of the Department. It is clear that SFU and the

¹⁹ SD, MK, pg. 10, Section 7d - MPM Students

²⁰ SD, MK, pg. 18, Section 10 (D) - Recommendations

²¹ GK, pg. 15, Section 8.2.2. - Faculty Complement

Department has suffered profoundly from 'disinvestments.' The vitality of the unit depends on reinvestment in faculty resources. Faculty size and vigor are critical for teaching and research intensity, both within the MPM professional and scientific degree arenas. There are simply not enough faculty members to offer the diversity of course options presently in place. More faculty members alone, however, would not completely address the issue of extended flexibility in course offerings. In order for the Department to compete with similar Departments elsewhere, and perhaps expand its market base for recruitment and enrollment, additional and new faculty in key areas are required".²²

- We strongly endorse this assessment.

To conclude, the issue of faculty renewal is reiterated:

"The issue of faculty renewal warrants serious attention by the University. The External Review Committee heard repeatedly that "increase in the faculty complement and renewal" although under the rubric of MPM, "is really for the whole unit, all of the courses, professional or not".²³

- We strongly endorse the above recommendations regarding faculty renewal, which has been the most divisive issue facing the Department of Biological Sciences and the MPM program, and trust that the higher administration will recognize the value of immediate faculty replacements for the program. We must, however, emphasize the implementation of the 20:80 rule as stated in the report:

"The best nexus is to decide how to implement the hiring of new positions now with a caveat that such positions, if they must follow the 20:80 rule, 80% of the interest must reside in MPM proper and 20% in any one of the affiliate areas".²⁴

Further discussion of this recommendation can be found in Appendix I.

Of the 3 faculty hirings recommended in the report (Fungal Biology, Biological Control, and Vegetation Management), two can be found in the current Department of Biological Sciences Hiring Plan. These positions were identified previously to meet the recognized need for faculty replacements for the MPM program. Therefore, at least one additional faculty is needed outside of the Hiring Plan to meet the recognized projected needs of the MPM program (Table 2). These faculty replacements would need to be made a high priority.

To meet the demands for teaching in the undergraduate curriculum in Biology, these MPM-associated faculty may be required to teach, for example, courses such as BISC 303 - Microbiology and BISC 326 - Fungal and Algal Biology, for which there would be faculty demands after the retirements of Drs. Albright and Rahe. Course assignments would need to coincide with the new faculty member's area of expertise. The third faculty member's undergraduate teaching contribution could be established once the need has been identified. Additional discussion regarding faculty hirings for the CEB can be found in Appendix I.

²² GK, pg. 15, Section 8.2.2. - Faculty Complement

²³ GK, pg. 11, Section 7.2 - Faculty

²⁴ GK, pg. 18, Section 9 - The nexus: MPM, The Department, and the College

V. THE REVISED MPM CURRICULUM

The MPM faculty have proposed a revised MPM curriculum, based on the assumption that 3 new faculty hirings are made for the program (see also Table 2).²⁵ With this revised curriculum, 9 existing courses will be deleted and 5 new courses will be added; 6 existing courses will be revised. The External Review reports have spoken strongly in support of these revisions, including the addition of a course in biotechnology:

"The MPM faculty took several positive steps towards adjusting the program to the new realities within the University and the Department of Biological Sciences. These steps included a thorough revision of the curriculum to make it viable within the faculty limitations without sacrificing the quality of the training. It also added courses to make the curriculum more current in terms of recent developments in the science".²⁶

"The addition of an introductory course on Biotechnology for IPM and an Environmental Biology course, are a clear demonstration of the forward thinking approach that has distinguished the MPM faculty at SFU from other similar programs in North America".²⁷

"The current proposed revision of the curriculum is additional evidence of the willingness of the MPM faculty to adjust to changing intrinsic and extrinsic realities of the program itself, the Department of Biological Sciences, and the University as a whole".²⁸

The comments regarding the unique MPM summer courses are also extremely positive.

"These courses provide students with a field-oriented exploration of various approaches to pest management in selected urban, forest and agricultural environments. The summer courses are strongly based in the pedagogy of learner centeredness, hands-on skills and experiential learning. The courses rely heavily on participation of many guest lecturers situated at federal and provincial research facilities, private consulting firms, government agencies and academic institutions in western Canada. Many of the guest lecturers are graduates of the MPM program who contribute their time to the delivery of the professional course and supervision of MPM students in their research projects, free of charge to the university. Certainly this unique relationship, cultivated over many years, is the best community asset for MPM. It should be studied, enhanced and used for the program's development and growth".²⁹

Taken together, the External reports have expressed strong support for the proposed revised curriculum for the MPM. To conclude:

"The External Review Committee strongly supports the revised curriculum that is presented in the support documentation".³⁰

²⁵ Please refer to SD, MK, pg. 12, Table 1, for specifics on the proposed revisions

²⁶ SD, MK, pg. 3, Section 1 - Executive Summary

²⁷ SD, MK, pg. 11, Section 7e - Curriculum

²⁸ SD, MK, pg. 15, Section 9a - Program Strengths

²⁹ GK, pg. 13, Section 8.1.3 - Distinctive Summer Courses

³⁰ SD, MK, pg. 15, Section 7 - Curriculum Revision

VI. THE ROLE OF THE CEB AND ITS FUTURE

A description of the role of the CEB follows:

"In 1998, the Centre for Environmental Biology (CEB) was established at SFU as the home for the MPM and Master of Environmental Toxicology (MET) professional programs, subsuming the former Centre for Pest Management. The CEB was created in recognition of the need to broaden the type of pest management training provided to student practitioners in an effort to meet the changing demands of a 21st century society that is more environmentally conscious. The goals of the CEB are to enhance teaching and research in areas of ecological and sustainable management of pests, advance the understanding and management of terrestrial and aquatic environments, and improve productivity of agricultural, forest and aquatic environments exposed to stresses and/or toxic factors".³¹

The External Review reports have assessed the rationale for the creation of the CEB and have provided positive comments as well as some areas of concern (these will be addressed separately in Section VIII below).

The reports state that the creation of the CEB was a positive step:

"The creation of the Centre for Environmental Biology (CEB) was a positive step attempting to coordinate the programs of two professional courses, the traditional and long established MPM and the more recently formed Master of Environmental Toxicology. If successful, such coordination under the CEB would lead to greater efficiency in the running of both programs and would streamline administration".³²

"The MPM and MET seemed to us as complementary programs that would benefit greatly from close coordination in instruction and research. This view does not seem to be fully shared by the current Director of the MET. The complementarities of the programs offered the basis for the establishment of the CEB".³³

However, the report illustrates the difficulty of this administrative structure:

"Under the current organizational structure of the University, the MPM Program functions as a component, together with the Master of Environmental Toxicology Program, of a recently created CEB within the DBS, that is under the Faculty of Science. The administrative arrangements under such a structure are rather complex and are susceptible to clashes of diverse cultures. The Faculty, by definition, is focused on basic sciences, while another Faculty is identified as focused on Applied Sciences".³⁴

It is clear that the establishment of the CEB was deemed appropriate by the External Review Committee, but the reports state that its future direction and organization require additional discussion. These are presented below in Sections VII and VIII.

³¹ SD, MK, pg. 8, Section 6 - Historical Perspective on the MPM program

³² SD, MK, pg. 3, Section 1 - Executive Summary

³³ SD, MK, pg. 13, Section 8b - MPM and MET

³⁴ SD, MK, pg. 11, Section 8 - Interactions

VII. THE NEED FOR AUTONOMY OF THE CEB

It has been stated clearly in the report that the MPM program should receive a degree of autonomy:

"At present, the MPM program is unable to gain much ground within the Department of Biological Science with regards to faculty replacement, hiring priorities and control of their budget. Some administrative restructuring is required to overcome this problem or the program is likely to continue to lose ground in this area. The ERC views that greater support towards establishing operational autonomy must be negotiated and exercised for the MPM program".³⁵

Furthermore, the autonomy must be recognized at a higher level within the University:

"To succeed, the CEB must have a degree of autonomy from the DBS, direct access to the higher administration of the University, and greater control over priority staffing to replace retiring MPM faculty, without competing with priority staffing as set by the DBS as a whole".³⁶

- We strongly endorse this assessment.

The report concludes with the opinion that a separate administrative structure is needed for the CEB:

"Therefore, our recommendation is to establish an autonomous administrative structure running parallel to the administration of the Department of Biological Sciences. The Director of the Centre should have the rank and administrative status of a Department Head and have direct access to the Dean of the Faculty of Sciences. The CEB should be assigned the minimum number of FTEs necessary to conduct its functions and be allowed to determine priority staffing in consultation with, but not dependent upon, the DBS own agenda for priority staffing. Recruiting of new faculty by the CEB should comply with the standards of excellence set by the DBS and receive the input of DBS faculty as members of a selection committee".³⁷

- We strongly support this recommendation. While we do not advocate the installation of a Department Head for the CEB, we envision a Director who holds the rank and stature equivalent to a Department Chair. At present, the position of Director of the CEB comes with no administrative or teaching relief, and the compensation is at level "C". The present remuneration for the incoming Director of an autonomous CEB would be unacceptable, and must be accompanied with appropriate teaching and administrative relief if the Centre and the MPM program are to make any headway in their resurrection and program revisions.

The rationale, implications, academic and resource considerations and governance of the proposed independent program in Environmental Biology are described in more detail in Appendix I and Fig. 1. Careful consideration should be given to each of these aspects and the potential impact on the Department of Biological Sciences must be assessed. It is our firm contention that the allocation of future faculty positions for the MPM and MET programs alone by the higher administration, but with the continued retention of the CEB in the Department of

³⁵ GK, pg. 15, Section 8.2.3 - Administration and Autonomy

³⁶ SD, MK, pg. 4, Section 1 - Executive Summary

³⁷ SD, MK, pg. 18, Section 10 (E) - Recommendations

Biological Sciences as is the current situation, would be unacceptable. It is clear that the "clash of cultures" is heavily ingrained and an autonomous unit with an independent decision-making process that runs parallel to the Dept. of Biological Sciences (Fig. 1) is the only guarantee for a successful and viable future for these professional programs.

The creation of an autonomous CEB with primary teaching responsibilities in the professional programs and in the Environmental Biology undergraduate curriculum may impact the scheduling of some courses in the undergraduate course curriculum in Biology. All MPM and MET faculty are currently required to teach in the core undergraduate curriculum, as do most other Biology faculty, "at least once every two years". This requirement should not change if autonomy is granted to the CEB. However, the frequency of offering of some upper-division Biology courses may be affected. Perhaps the current University-wide revision of the undergraduate curriculum at SFU comes at a timely moment, permitting both the proposed program in Environmental Biology and the curriculum in Biology to be appropriately revised to meet the needs of the changing times.

VIII. RESPONSES TO SPECIFIC CONCERNS AND RECOMMENDATIONS FROM THE EXTERNAL REVIEW REPORTS

The following concerns and specific recommendations were identified in the reports, in addition to the larger issues discussed above. These concerns are paraphrased below and a response is provided.

1) "However, it is worthy to note that in terms of societal and governance aspects of pest management, the MPM graduates do not receive significant exposure. These are the two concept areas which are currently of great concern: pest management related to trade (e.g., sanitary and phytosanitary needs as determined by world governments and WTO); and governance issues on pest management product regulation, registration and intellectual property rights. The University may wish to explore these aspects of curricular deficiency in the future MPM curriculum. New orientation could be brought to some of the courses in the MPM program through inter-departmental or interdisciplinary approaches".³⁸

Due to the brief (1.5 day) review process, a detailed review of course content in the MPM program could not be conducted. In four current courses, BISC 601, 602, 603 and BISC 847, aspects of sanitary and phytosanitary regulation of movement of plant products, are discussed. In addition, pest management product regulation, registration and intellectual property rights are included in BISC 847, as are other relevant subjects, such as technology transfer, public policy, ethics and conflict resolution. Therefore, students are exposed to these very important issues of societal and governance aspects of pest management currently.

2) "A seminar on research progress may be suitable for integration of converging strands of interest".³⁹

³⁸ GK, pg. 12, Section 8.1.2 - Educational Spectrum

³⁹ GK, pg. 12, Section 8.1.2 - Educational Spectrum

This is a good recommendation and can be incorporated into one of the proposed new courses in the revised MPM curriculum, BISC 810-3 Fundamentals of Environmental Biology, a 3-credit required seminar course for students in both MPM and MET programs.

- 3) "The real market demand for MPM students was not presented. I feel strongly that the factual demand for the MPM graduates must be established. Also, the numbers of students inquiring and found to be eligible but turned away because of limitations (space, supervisors, other resources) must be expressed and dealt with".⁴⁰

This view by GK was contrasted by the views of SD and MK, as follows:

"We do not believe that it is possible to conduct a "market survey" to determine the potential employment base as a guide for the recruitment effort or resource allocation. Higher degree academic programs usually stand on their own merits to compete among peer institutions, within the pool of talent of college graduates. The MPM Program has the added benefit of attracting individuals who have been working in the field for a few years, thus representing a more mature student element. The job market itself provides the incentives (or disincentives) for candidates for any graduate studies program, including the MPM Program".⁴¹

The MPM faculty concur with the latter view on the issue of market demand. With regard to numbers of students inquiring, accepted and rejected, these statistics are maintained as a point of record currently. No request was made at the time of the review for these statistics.

- 4) "There is an apparent misconception that there is very little in common between the two disciplines represented by MPM and MET programs. This notion apparently is originated from the MET program and it undermines CEB, the home for both programs. This type of a misconception could reduce the quality of education for students in both programs. I believe that this could not be further from the truth. Many possibilities for linkages exist and the benefits would certainly be beneficial to CEB, the faculty, and students from both the MET and MPM programs. The successful interfacing of the environmental toxicology and pest management programs within the Department of Environmental Biology at the University of Guelph is one example of the potential benefits".⁴²

The above observation (also stated by SD, MK, pg. 16, Section 9b) reaffirms and underlines the whole premise for the initiation of the CEB - to bring together and enhance interactions between the MPM and MET programs. However, the MET program is a new program, initiated with the first cohort of students admitted in 2000. The MET faculty understandably want to ensure the program is well-established according to the mandate initially approved by Senate that represents their vision. There is every indication that the 2 programs will continue to foster interactions and sharing of some courses once the "growing pains" of a new program are resolved. The creation of an autonomous CEB with renewed commitments to the 2 programs would greatly enhance the opportunities for a much closer working relationship between the MPM and MET.

⁴⁰ GK, pg. 13, Section 8.1.4 - Demand

⁴¹ SD, MK, pg. 17, Section 10 (C) - Recommendations

⁴² GK, pg. 14, Section 8.2.1 MPM Within the DBS: "Equality" and Marginalization of Pedagogy

As stated in the report, enhanced interactions are needed:

"We strongly recommend greater coordination between courses in the MET and the MPM programs. We perceive many areas of common interest and such coordination will lead to more efficient use of the talent and expertise that exist in both programs to the greater benefit of the students".⁴³

- We agree with this recommendation. We have identified 3 courses which would serve both MPM and MET programs: Fundamentals of Environmental Biology, Chemical Control and Toxicology, and Pest Management in Practice (see pg. 12, SD, MK). These courses would be modified in content for both programs.

5) "The MPM program badly needs instruction in two areas, different from fungal biology, that is, commercialization and regulatory aspects of bioproducts including pest control agents. This is an academic void in Canada. The benefit of lateral thinking, in this instance, will add significantly to SFU's reputation in business-bioscience professional areas. This could also generate a stronger industry-academe-government linkage".⁴⁴

This issue has been discussed under item (1) above.

6) "The Department needs to strengthen its planning and record keeping. It was difficult, if not impossible, to obtain reliable data on enrollments and completion rates, and targeted goals and objectives for the graduate program remain elusive".⁴⁵

A request for this information was not made during the on-site review. The Department keeps accurate data on all of these aspects, including for the MPM program, and it could have been provided through the Department Graduate Studies Committee.

7) "The Department of Biological Sciences plan must set clear goals and targets for the MPM vs. M.Sc. graduate program for the next five years, not just in curriculum, but also in student enrollment, graduate training output, and adding of value to contemporary continuing professional education for pest managers. It is in this regard that faculty renewal, program evaluation, and funding must be planned, delivered and measured".⁴⁶

- We agree with this recommendation. The creation of an autonomous CEB with a mandate to enhance the 2 professional programs would greatly aid in this endeavour. We recommend that after a 5-year period following autonomy, that an External Review be conducted of the CEB, MPM and MET programs to determine the impact of progress made since the current review.

8) "We recommend that under the aegis of the CEB considerable attention be given to an expanded and improved Website and promotional materials. It is essential to promote the benefits of the MPM Program globally in an effort to attract those students who will serve as the next generation of pest management practitioners around the world. There is considerable

⁴³ SD, MK, pg. 17, Section 10 (B) - Recommendations

⁴⁴ GK, pg. 16, Section 8.2.4 - Currency of Curriculum

⁴⁵ GK, pg. 16, Section 8.2.5 - Program Effectiveness

⁴⁶ GK, pg. 17, Section 8.2.5 - Program Effectiveness

potential for recruiting of international students by enhancing contact with foreign governments and foreign aid agencies".⁴⁷

Visible promotion of the MPM program could clearly not be done in recent years, since it has been convincingly evident that promotion of a declining program, one which has not received faculty renewal in over a decade, and one in which the comment "The MPM program is falling apart" had begun to permeate outside the confines of SFU, would be inappropriate. A renewed commitment to the MPM program would allow the CEB to readvertise with the resources necessary to achieve an international stature. At present, new students are not being admitted to the program until the outcome of the review process is finalized. This has begun to affect student numbers in the short term, which have declined from an all-time high of 39 in 1997 to 22 in 2002.

9) "We believe that every student should be assigned a few nominal (*pro tem*) advisors, rather than a singular one (the Director), upon admission to the MPM program. The job of these faculty members is to mentor the students, to advise on course selection, and to help orient them in the early stages of their graduate program. Progress of all students should be carefully monitored and recorded. We recommend an annual progress assessment of all students, even and especially part-time students".⁴⁸

This is an excellent recommendation and will be implemented. The issue of annual progress assessment is moot, as this is current practice in the Dept. of Biological Sciences.

10) "The ERT heard expressions of concern about the duration of the MPM Program. In general, a full-time student enrolled in the MPM Program should be able to complete the course requirements in 5 semesters. With the research thesis option, most students should be able to complete the program in no more than 3 years. Special consideration should be given to students who hold full or part-time employment and are limited in the time available for course work and research".⁴⁹

We agree with this recommendation. As stated in the revised proposed course curriculum for the MPM program, "all efforts will be made to ensure that MPM students complete their degree programs within 3 years", or sooner.

11) "All courses should be fully integrated along disciplinary lines (entomology, plant pathology, and weed science) and to achieve this level of integration, it is essential to hire the minimum appropriate number of new faculty (3 new faculty). A most glaring deficiency in the current make up of the MPM faculty is the lack of a weed scientist".⁵⁰

We agree with this assessment.

⁴⁷ SD, MK, pg. 19, Section 10 (F) - Recommendation

⁴⁸ SD, MK, pg. 17, Section 10 (B) - Recommendation

⁴⁹ SD, MK, pg. 10, Section 7 (D) - MPM Program Structure Today

⁵⁰ SD, MK, pg. 17, Section 10 (B) - Recommendations

12) "The MPM program should be maintained as a professional program within the Dept. of Biological Sciences, with differential fees. This proposal is in accordance with the option (a) of the terms of reference".⁵¹

This view is contrasted by the report of SD, MK, as follows:

"We strongly disagree with the concept of charging differential fees to MPM students. Due to the nature of the program, these students incur substantially higher expenses to attend off-campus summer courses than do MSc students, who are solely based on-campus with course work and research. In addition, MPM graduates usually do not command any higher starting salary in a market place that is dominated by salary scales determined by public institutions. So, the issue of differential fees for MPM students must be viewed from a perspective of the reality of the profession, and not by analogy to other professional degrees that are prerequisite for access to the profession".⁵²

We agree with the latter assessment of SD, MK. If differential fees are to be implemented for the MPM program, there should be a guarantee of no additional out-of-pocket expenses for students in the summer field courses, i.e. the differential fees would offset the costs for the summer field courses through the CEB budget. An upper limit must be set so as not to discourage applications from international students.

13) "It is crucial to begin alumni tracking data. Such data are important instruments for alumni relationships and assessment of life long career development of graduates".⁵³

Tracking of alumni was initiated several years ago with the commemoration of the 25th Anniversary of the MPM program (1998) and is almost complete.

14) "We recommend that current mutual misgivings between MPM and non-MPM faculty within the DBS be resolved through the mediation of an external facilitator in a Department wide retreat, attendance to which should be encouraged by the higher administration of the college".⁵⁴

We are not optimistic that a Department retreat will assist the professional programs in any manner. However, we are open-minded to the possible merit of a Departmental retreat if it is intended to formulate consensus regarding vision and implementation of Departmental curriculum at all levels, including professional programs. The potential for success of such a retreat would depend in large part on willing and open-minded participation by a substantial majority of faculty, and if it is done expeditiously.

⁵¹ GK, pg. 20, Section II - Recommendations

⁵² SD, MK, pg. 16, Section 10 (A) - Recommendations

⁵³ GK, pg. 16, Section 8.1.7 - Graduate Student Success

⁵⁴ SD, MK, pg. 18, Section 10 (D) - Recommendation

IX. CONCLUSIONS

The external reviews affirm the serious issues facing the MPM program that have been recognised by MPM faculty for several years. We agree with most major recommendations and offer attentive solutions for other points raised. The MPM faculty urge the Administration to act quickly at least on the critical recommendations to ensure survival of the program. Because we do not know if the program will receive the support that it must have, we have turned away applicants for the present time. As well, MPM faculty could be asked in the interim to succumb to other teaching and administrative duties that will draw them even further from the core mission of the MPM program and goals of the Centre for Environmental Biology.

We draw upon some remarks from each of the 2 reports that summarize the current and future prospects of the MPM program at SFU. We strongly endorse these statements to represent our views for the future of the MPM program.

George Khachatourians:

"In the absence of a similar program in Canada and inappropriateness of comparison with any M.Sc. degree, I am short of stating categorically that the program has all the potential requirements for a vibrant graduate program: courses, faculty and staff mentorship, a significant peer group, university learning resources, access to centers of learning and apprenticeship and career growth, employability and mobility".⁵⁵

"The MPM program remains a unique program that delivers a broadly comprehensive course of studies with a particular focus on practical application of pest management in combination with original research".⁵⁶

"The administrative hierarchy at SFU needs to be deliberative in its approach, clear and detailed in planning a course for MPM. Offering of the degree in the near short term will require recruitment of faculty with clear acceptance of the dual purpose of their role, the instructional role and the research and scholarship role expected of a major university. My overall view is one of calculating the risk, realizing the opportunities, building from strength and acting now in a timely and aggressive manner".⁵⁷

Cynthia Scott-Dupree and Marcos Kogan:

"We strongly endorse the preservation of a professional degree in Pest Management at SFU. The model established by this program demonstrates that an MPM program that offers a strong, relevant, and current curriculum, coupled with the option of a research or a literature survey-based thesis has been extremely effective. Our assessment of the effectiveness of the program is based on a record of over 30 years of extraordinary success in terms of alumni achievements, employer's satisfaction, continued societal demands, and testimonials of all

⁵⁵ GK, pg. 10, Section 7.1 - MPM Program

⁵⁶ GK, pg. 13, Section 8.1 - Strengths

⁵⁷ GK, pg. 17, Section 8.2.5 - Program Effectiveness

those associated with the program, We see no conflict with the parallel option of a regular thesis-based MSc program in IPM".⁵⁸

"We, therefore, recommend that the University endorses the preservation of the MPM Program at a par with the best graduate programs within the University".⁵⁹

"The role of administrators above the Departmental level, unmistakably stating their position in regard to the program, will be crucial to guarantee the success of the program and the stability and functionality of the DBS".⁶⁰

⁵⁸ SD, MK, pg. 16, Section 10 (A) - Recommendations

⁵⁹ SD, MK, pg. 18, Section 10 (C) - Recommendations

⁶⁰ SD, MK, pg. 19, Section 11 - Concluding Remarks

Table 1. Faculty retirements and hirings in the MPM program, and hirings in the Dept. of Biological Sciences, over the period 1985-2002.

Faculty retirements/departures from the MPM program (1985-2002)			Faculty hirings in the Department of Biological Sciences (1985-2002)		
<u>Year</u>	<u>Faculty</u>	<u>Expertise</u>	<u>Year</u>	<u>Faculty</u>	<u>Expertise</u>
1987	K. Nair	Insect physiology	1988	*R. Nicholson	Pesticide Biochemistry/Toxicology
1993	P. Belton	Disease vectors/ parasitology	1989	*N. Haunerland ²	Insect Biochemistry
1994	G. Anderson ¹	Forensic entomology	1989	*Z. Punja	Plant Pathology
1998	M. Mackauer	Biological Control	1990	M. Moore	Microbiology
2001	J. Webster	Nematology	1991	A. Kermode	Plant Cell Biology
2001	S. Lee ³	Plant Physiology	1992	*G. Gries ³	Forest Entomology
			1992	K. Delaney	Animal/Cell Physiology
			1992	B. Crespi	Evolutionary Biology
			1993	C. Kennedy	Environmental Toxicology
			1993	L. Bendell- Young	Environmental Toxicology
			1994	A. Plant	Plant Biology
			1994	T. Williams	Avian Physiological Ecology
			1995	S. Lee ⁴	Plant Physiology
			1998	E. Verheyen ⁵	Genetics
			1999	L. Quarmby	Cell Biology
			1999	E. Elle	Plant Evolutionary Ecology
			2000	A. Mooers	Biodiversity
			2001	I. Novales- Flamarique	Animal Physiology
			2002	J. Mattsson	Plant Physiology
			2002	E. Pallson	Computational Biologist
			2002	Avian Population Biologist ⁶	
			2002	Cell Physiologist ⁶	

*MPM-related hirings

¹Limited-term position. Currently, Associate Professor, Criminology

²No longer associated with MPM program

³Initial hiring made on NSERC Junior Industrial Chair

⁴Resigned from SFU in 2001

⁵Transferred to DMBB

⁶Searches currently in progress

APPENDIX I

THE PROPOSED INDEPENDENT ADMINISTRATIVE AND ACADEMIC UNIT FOR THE CEB

— A PROGRAM IN ENVIRONMENTAL BIOLOGY —

As has been clearly stated in the External Review reports of the MPM, the issue of hiring new faculty in a broad Department such as Biological Sciences has been one of the most challenging issues in recent years because of the demands imposed by curriculum changes, and conflicting needs of research groups with those of professional programs. For the future of the MPM and MET programs to be guaranteed, there must be sufficient faculty who are committed to teach in the areas of pest management and environmental toxicology. A prioritization of these teaching needs can only be achieved through the creation of a separate academic and administrative unit with autonomy to decide its priorities. Difficulties (a clash of cultures) that have arisen in the past within the Department of Biological Sciences regarding establishing hiring priorities have already been identified in the External Review reports. A separate administrative unit would guarantee that the future teaching needs of the professional programs are met, and should secure the necessary autonomy in hiring priorities to ensure the continued excellence of the MPM and MET programs over the next 5-10 years.

We therefore propose that a separate administrative unit for Environmental Biology (a Program) be created to oversee the two professional programs in Biology and potentially an undergraduate program in Environmental Biology. The Program would have the authority to prioritize hiring and faculty replacements to meet its changing needs and have a separate budgetary allocation (see Fig. 1). This program would report to the Dean of Science. Faculty members in the Program in Environmental Biology would be members of the Department of Biological Sciences and normally, over a 2-year cycle, teach one undergraduate course in the core curriculum of Biology, 1-2 upper division courses in the area of research of the faculty in Environmental Biology, and 1-2 professional graduate courses. The average teaching load would be 2 formal courses/year. The program in Environmental Biology can effectively run parallel to and be affiliated within the context of the Department of Biological Sciences as in Figure 1 to maintain and foster continued interactions amongst the faculty at large and provide resources for teaching in the core curriculum.

The implications of a separate unit

The need to create a distinct Program in Environmental Biology is timely and appropriate, and it presents a unique opportunity to establish a Program with increased focus that capitalizes on uniting specific faculty strengths. This restructuring is achievable and would be a positive step forward for SFU if constructive dialogue is initiated with the Department, the Dean of Science, and the Office of Vice President, Academic. We urge the adoption of this Program in Environmental Biology by Fall, 2003 to incorporate the strengths and excellence of the MPM (and MET program) as identified in the External Review reports. In the absence of such an independent Program, the professional programs in the Department of Biological Sciences are unlikely to grow over the next 5 years, despite an initial investment of faculty positions, and the growth of the Centre for Environmental Biology is also likely to be limited, as is the current situation. The Program in Environmental Biology would continue to support

initiatives leading to the establishment of Endowed Chairs or Professorships, such as in Biological Control and IPM, secure CRC Chairs in Environmental Biology, and also encourage industry participation in areas of research deemed to be important to Canada and the University. Other initiatives, such as a Plant Growth Research Facility, will also be actively pursued.

Program in Environmental Biology (PEB)

a) Academic considerations

Faculty members in this program would have dual teaching responsibilities, with a primary teaching responsibility in PEB (75% commitment) and a secondary responsibility in Biology (25% commitment). Teaching responsibilities would be established principally by the Director of PEB, in consultation with the Associate Chair of Biology (or the Course Planning Group) and should, on average, include one core undergraduate course in Biology every 2 years. Graduate professional courses and the supervision of professional students would be governed by the PEB graduate curriculum. At the undergraduate level, a stream in Environmental Biology should be mounted. This stream could provide a platform for students wishing to enter the graduate program, as well as providing academic training in this area. These courses would be cross-referenced as Biology courses, thereby increasing the course options available to Biology majors. As well, the Environmental Toxicology minor program can be included under the administrative umbrella of the PEB.

b) Resource considerations

As proposed in Figure 1, the PEB will entail some additional costs, but no new staffing needs are envisioned for the administration of the program. The position of a Director and a Program Assistant (currently in the Centre for Environmental Biology) would be maintained. In addition, a 0.5-time Lecturer position must be allocated solely for support of the professional programs. As stated in the report:

"The MPM Program has a number of resource staff that provide much needed support to the teaching and research requirements of MPM faculty and students. The professional staff is extremely important in ensuring the smooth and efficient operation of the MPM program now and in the future".⁶¹

As stated in the response to the External Review reports, the re-prioritization and filling of 3 faculty into PEB from Biological Sciences must be accomplished prior to 2004 to fulfill the teaching needs of the MPM program (see Table 2). In addition, an upgraded operating budget will be required for costs incurred for offering the MPM and MET programs and for costs associated with the undergraduate program in the PEB. The specific dollar amounts are yet to be established and may range from \$60,000-\$70,000 annually. Currently (2002), there are 44 MPM and MET students in the Department of Biological Sciences, representing around one-third of the graduate student population. A detailed economic analysis of the potential impact of the PEB and of the continued success of the MPM and MET programs is beyond the scope of this proposal. The dollar costs of mounting an independent Program in Environmental Biology are minimal considering the potential positive impact this area of research and teaching can have in the future. It would entail a reallocation of resources and budget items

⁶¹ SD, MK, pg. 10, Section 7c - Professional Staff

from the current allocation to Biological Sciences for the MPM and MET programs, and additional support from the Dean of Science. The details of the cost-benefit analysis can only be addressed when the approval for such an initiative is granted.

c) The governance of the PEB

Faculty members in the PEB would remain members of the Department of Biological Sciences and contribute to teaching, research and administrative duties as appropriate. An appropriate size of faculty members within the PEB should be 10. In the long term, additional faculty should be added to both the MPM and MET programs, as needed. Other faculty members whose teaching and research interests are aligned with the proposed Program may join as full or Associate members, as appropriate, to facilitate interactions and communication. The Director would be elected by a majority of faculty within the Program and should have a voice equal to that of a Chair in the Dean's Advisory Committee. There would be one Departmental Tenure Committee in Biological Sciences for all faculty and the Program Director would provide written recommendations to the DTC and the Dean of Science for members in the PEB for promotion/salary considerations. There would be one DGSC in Biological Sciences for all graduate students but the PEB would make its recommendations as to the suitability of applicants for the professional programs. The PEB may specify its own entrance requirements in accordance with University regulations. Applicants for private scholarships hosted within the PEB would be ranked by the Program Director and submitted directly to the Dean of Graduate Studies. The assignment of graduate fellowships (GF) and T/A ships would be made by the Department of Biological Sciences as is currently done.

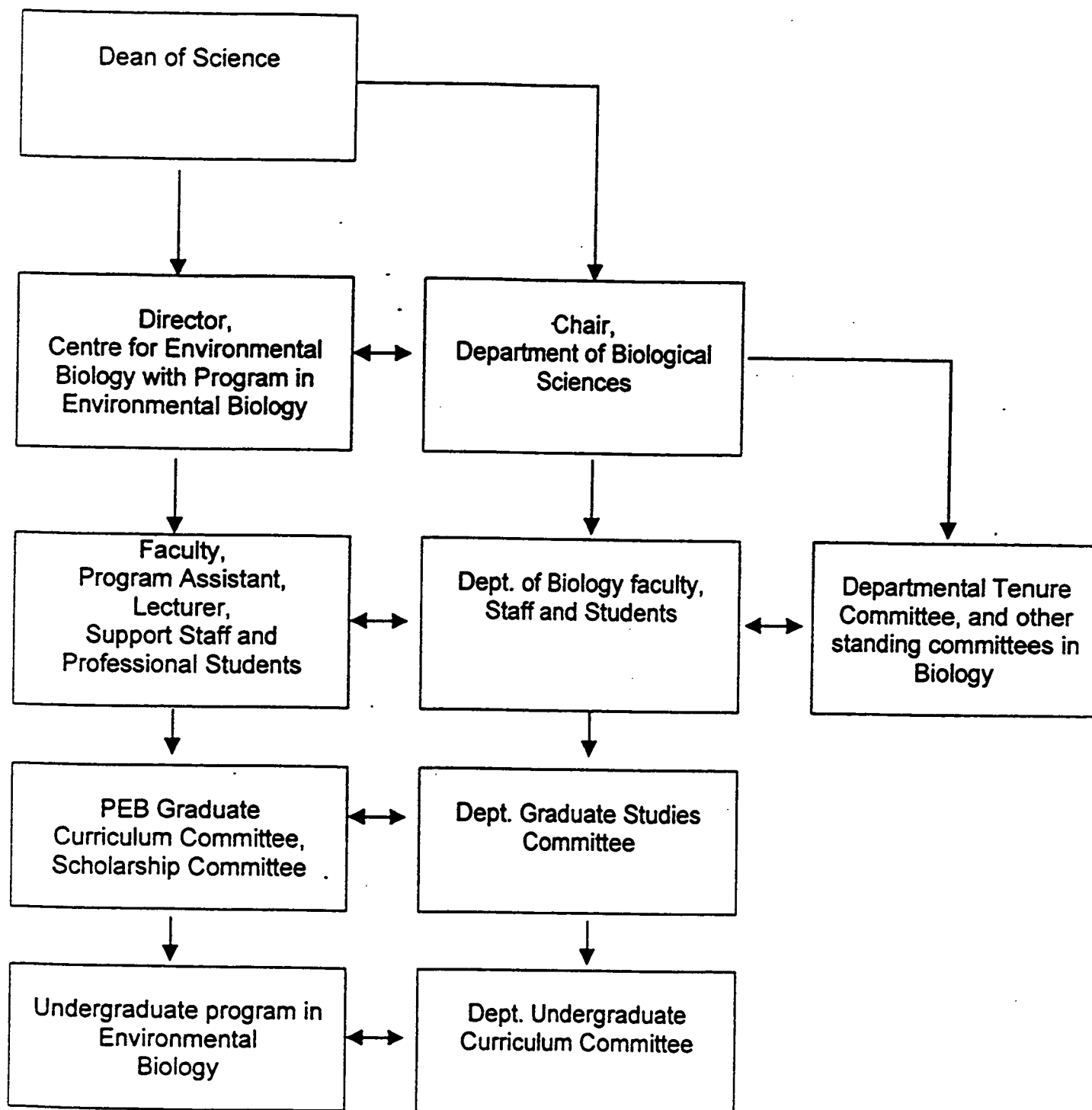
With regard to faculty hirings, recommendations for new faculty positions to meet the needs of the MPM and MET programs would be presented to the Dean of Science for consideration and approval after comment from the Department of Biological Sciences. The Director of CEB would chair these search committees, with representation by a majority of CEB faculty (75%) and one representative from the Dept. of Biological Sciences (25%). The procedure currently in practice for faculty searches in the Department would be adhered to. The appointment of Adjunct faculty members would be made at the discretion of the CEB following approval by the Dean of Science.

Table 2. General research/teaching areas for faculty that are needed to mount the proposed revised MPM curriculum.

<u>Area</u>	<u>Faculty member</u>	<u>New hires needed</u>
Forest Entomology	Gries/Borden	No
Wildlife Biology	Harestad	No
Pesticide Biochemistry	Nicholson	No
Plant Pathology/Biotechnology	Punja	No
Plant Pathology/Fungal Biology	Rahe	Yes*
Pest Population Dynamics	Roitberg	No
Biological Control	None available	Yes*
Weed Biology/Vegetation Management	None available	Yes*
Urban Pest Management	None available	Yes*

*These represent the specific identified hirings needed for the MPM program through to 2004. Additional positions may be created through CRC chairs or Endowed Professorships in the PEB to fulfill these needs. These replacements are critical for the continued success of the program.

**Figure 1. Restructuring of the Department of Biological Sciences
to create a Program in Environmental Biology (PEB)**



**A Review of
the Masters in Pest Management
at
Simon Fraser University**

**by
Cynthia Scott-Dupree - University of Guelph
Marcos Kogan - Oregon State University**

**Submitted on
March 5, 2002**

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Preamble

The review of the MPM Program was impeccably organized by Dr. Zamir Punja and his staff, and counted with the generous investment in time and thought from MPM faculty, emeriti, students, and adjunct professors. The personal involvement of higher administration officials in the review process was evidence of the importance they ascribe to the program and it was an expression of their support for a fair and constructive assessment of the future of the MPM Program at Simon Fraser University (SFU). The participation of the Department of Biological Sciences (DBS), Environmental Toxicology Program, and the School of Resource and Environmental Management administrators was essential for a balanced view of the current status of the MPM Program from their perspectives. Unfortunately, time did not allow meeting a larger representation of the non-MPM Program associated faculty or MSc and PhD students in the DBS.

We regret the inexcusable delay in submitting the report of the External Review Committee (ERC) and the disagreement between us (Drs. Kogan and Scott-Dupree) and the chair (Dr. Khachatourian). The disagreement stemmed mainly from procedural and style issues, and only in a few instances on conclusions or recommendations. Where those disagreements exist they will be evident. We recognize the inconvenience that a split report represents for SFU administrators, faculty and students, but we trust that you will interpret our stance as a demonstration of our long-standing regard for the MPM Program and SFU, and the seriousness with which we approached our task.

The following is our report that draws freely from a few portions of Dr. Khachatourians' report where we agreed with the contents and feel comfortable with the form.

1.Executive Summary

A review of the Master of Pest Management Program at Simon Fraser University was made necessary because of the slow decline in the ability of the MPM faculty to sustain the program at its traditionally high professional standards. This decline was the result of: a) a reduction of MPM faculty to about 8 from a peak of 13 due to retirement and attrition; b) conflicting interests between the Department of Biological Sciences and the MPM program for priority staffing; and c) a general decay in the moral of the remaining MPM faculty that felt disenfranchised within a large and diverse department that viewed the applied nature of the program with a degree of contempt. Students were caught in the midst of the debate about the relevance of the program and the lack of support for its continuity.

The MPM faculty took several positive steps towards adjusting the program to the new realities within the University and the DBS. These steps included a thorough revision of the curriculum to make it viable within the faculty limitations without sacrificing the quality of the training. It also added courses to make the curriculum more current in terms of recent developments in the science. The creation of the Centre for Environmental Biology (CEB) was another positive step attempting to coordinate the programs of two professional courses, the traditional and long established MPM and the more recently formed Master of Environmental Toxicology. If successful, such coordination under the CEB would lead to greater efficiency in the running of both

programs and would streamline administration. To succeed, however, the CEB must have a degree of autonomy from the DBS, direct access to the higher administration of the University, and greater control over priority staffing to replace retiring MPM faculty, without competing with priority staffing as set by the DBS as a whole.

The MPM Program historically has had remarkable success but it cannot sit on its laurels. To achieve continuity of the program and to garner the support of the SFU higher administration, and to gain the respect of peers within DBS, the MPM leadership should enhance visibility of the program within the University, and the global IPM community. It should engage its graduates in aggressive but selective recruiting to bring to the program the highest quality students capable of academically competing with favour against the best of the MSc and PhD students within the DBS. Finally, all parties concerned should work towards improving communication and mutual understanding. It seems that the areas that could be substantially improved are the assessment of the teaching loads of the MPM faculty and the scientific nature of the research theses of MPM students.

This report reflects our perception of the issues and our recommendations are certainly biased by our personal experiences and backgrounds. We recognize that one and half days are too short a time to grasp the complexities of the interactions that triggered the need for this review. Some of our recommendations may appear trivial; others may be impractical given the realities of the University, the DBS, and the nature of the personalities involved. All of them, however, are offered in the spirit of finding a constructive solution that will assure the continuity of the MPM Program and the normalization of interdepartmental relations.

2. Introduction

The review of the MPM Program by the ERC at the DBS was authorized as part of the SFU Program Review originally scheduled for September 13 and 14, 2001 and finally conducted on November 27 and 28, 2001.

The review commenced with an organizational meeting on the morning of November 27, 2001, following which the members of the ERC visited facilities at SFU utilized by the MPM Program. Various stakeholder groups, individuals, affiliates and adjunct professors were interviewed on the 27th and the 28th. At the end of the 2-day review there was an exit interview and de-briefing during which we expressed our overall impressions. This report represents our findings and final recommendations.

3. Terms of Reference and the Mandate of the Committee.

The terms of reference for the ERC are provided in a document dated (July 30, 2002, and updated August 2, 2002). The terms of reference indicate the following.
" The external review for the Master of Pest Management Program (MPM) is being conducted at the request of Senate as a result of an earlier external review of the Department of Biological Sciences. Specifically, Senate recommended that the Department of Biological Sciences should review the Master of Pest Management Program to determine whether to offer a:

- a) *course-based professional program, possibly with differential fees, for an MPM degree, and/or*

- b) *research based program with standard fees for an MSc degree.*

As part of this examination, the Department of Biological Sciences was asked to consider what would constitute realistic expectations of requirements for course work and original research as well as the role of work experience in relation to the two types of programs being explored. The Dean of the Faculty of Science has extended the list of issues to be investigated including an assessment of:

- a) faculty complement required to adequately cover the program*
- b) numbers of students that could be recruited and into what types of degree programs*
- c) general resources, including space, required to mount the program*

The Review Committee will assess the totality of the Master of Pest Management Program, both past and present, and comment on its strengths and weaknesses, on opportunities for change and/or improvement, and on quality and effectiveness. The Review Committee should make essential, formal, prioritized recommendations based on its opinions and concerns.

Additional issues of particular interest to the University that we would like the Review Team to consider during the review are:

- a) the proposed revised curriculum for MPM*
- b) the impact of the revised Master of Pest Management Program's proposal on the Department of Biological Sciences*
- c) the proposal for the creation of an independent administrative unit for the Centre for Environmental Biology*
- d) demand for graduates of the program*

Other areas that may be important to consider by the Review Team include:

1. Program

- size, structure, breadth, depth, requirements and reputation of the graduate programs.*
- graduate student progress, completion time frames, and financial support.*
- enrolment issues at the graduate level.*

2. Faculty

- size and quality of the faculty complement in relation to the Program's responsibilities and workload.*
- teaching, research and service contributions of faculty members, including the level of external research support.*

3. Administration

- size of the administrative and support staff complement, and the effectiveness of the administration of the Program.*
- adequacy of resources and facilities provided to support teaching and research, including library resources, laboratory space and equipment, computing resources, office space for students, faculty and staff, and faculty and staff complements.*

4. Connection of the Program within and outside the University

- *the Program's concept and plan for teaching and research and relationship within the Centre for Environmental Biology, and its relationship with the Department of Biological Science and other units within the University.*
- *relationship with the community outside the University*
- *relationship with alumni/ae."*

4. Facilitation Process

The original ERC consisted of Chair – Dr. George Khachatourians (University of Saskatchewan), Dr. Marcos Kogan (Oregon State University), Dr. Cynthia Scott-Dupree (University of Guelph) and Dr. Keith Slessor (Simon Fraser University – Internal Representative to the ERC). Dr. Khachatourians has chosen to submit a separate and independent report on the MPM Program. On November 27th the ERC met with the Associate Vice-President Academic, the Dean of Graduate Studies, the Dean of Faculty of Science and the Director of Academic Planning, and Professor Keith Slessor. This initial meeting was followed by a briefing from Dr. Zamir Punja, Director of the CEB and a tour of the research labs and facilities. A series of sessions with Dr. Haunerland - Chair of the DBS and each of the eight faculty members of MPM Program (Drs. Borden, Rahe, Moore, Harestad, Gries, Winston, Nicholson and Punja) was interspersed with meetings with Drs. Williams and Law, Director of the School of Natural Resources and Environmental Management and Program Coordinator for the Master of Environmental Toxicology, respectively. In the afternoon of the November 27th, we met with the MPM graduate students. On November 28th Centre for Environmental Biology staff, Adjunct Faculty members (Drs. G. Judd, D. Gillespie and R. Vernon) and Professors emeriti - T. Finlayson, M. Mackauer and J. Webster provided input to the ERC. The format of the November 27th and 28th sessions consisted of an open discussion and interchange between the ERC members and MPM faculty, support staff, and graduate students.

Finally, at the exit meeting, an oral report of our first impressions and initial conclusions was presented to the Vice President Academic and his colleagues.

5. Conceptual Basis of IPM

During the course of the review the issue a shifting IPM paradigm was raised apparently in view of recent developments in genetic engineering. Since much of the nature of the MPMP future hinges on a common understanding of our conceptualization of IPM, we felt it necessary to add the following text that expresses our (C. S-D. and M.K.) views on this matter.

Many technological advances account for the success of agriculture in staying ahead of growing human population demands. Some of the most significant factors are those related to the genetic improvement of crop varieties, most notably the high yielding varieties of wheat and rice cultivars that ushered in the green revolution. Other contributing factors were advancements in fundamental production system components, including nutrient and water management, and agricultural mechanization. As for the newer techniques of plant genetic engineering, it is too early in their development to clearly assess impacts. These technological advances, however, would have been insufficient to guarantee production increases if the crop protection disciplines of

entomology, plant pathology, and weed science had not engaged in the overall production research and development effort, mainly because many of the aforementioned advances tended to exacerbate pest problems. Classic examples of the risk of overlooking potential pest impacts following introduction of new technologies are offered by, among many others, the outbreak in the U.S.A. of Southern corn leaf blight in 1973, and the nearly disastrous effects of "green revolution" varieties, some of which were extremely vulnerable to insect pests and diseases .

In the past 30 years the fundamental paradigm in plant protection has been Integrated Pest Management (IPM). A major contribution of IPM to agriculture was the demonstration of the need to base all phases of the production system on sound ecological principles, with the ultimate goal of "designing" agro-ecosystems that are economically and ecologically sustainable. Despite progress in IPM, however, it is estimated that pre- and post-harvest losses caused by the aggregate impact of all pest categories remains about 30 percent, the same as it was at the beginning of the XXth century. Furthermore, pesticide use worldwide has not significantly declined; in fact, in some regions it has increased. And, despite efforts to integrate all protection disciplines in IPM research and implementation, IPM is still perceived by many as entomologically biased which has led to some recent criticism of the IPM concept.

As often happens with successful conceptual constructs, IPM has been subjected to both constructive criticisms as well as vain "revisions". Unfortunately, some critical revisions run the risk of becoming damaging attacks. A committee of the U.S. National Research Council, sponsored by the National Academy of Sciences , in its final report proposed a "new paradigm", "Ecologically Based Pest Management" (with the acronym EBPM), to replace IPM. The main criticisms raised by the report were: a) that IPM programs have tended to focus on insect pests overlooking disease and weed management; and b) that IPM has been dominated by an approach that uses scouting and economic thresholds to improve timing and effectiveness of pesticide applications, without promoting alternative biological control approaches. Those deviations of the original IPM concept, however, resulted from actions of misguided practitioners, not because IPM was flawed as a concept.

Regrettably, replacing the term "Integrated" with "Ecologically Based" removed from IPM its most fundamental conceptual foundation. **Integration** is the key pillar of IPM, not necessarily the term "management" which remains untranslatable into most occidental languages. After almost 30 years of usage, IPM has achieved remarkable, virtually instantaneous name recognition, thus replacing the acronym in the guise of a new paradigm would only dilute IPM's hard-won gains.

Unquestionably the IPM concept and its practical application should be constantly subjected to constructive critical reviews. Considerable progress has been made in multidisciplinary integration but much more needs to be accomplished. The most pressing need is for multidisciplinary integration at the research and outreach levels. To achieve such levels of integration, however, it is essential to start with the integrated teaching of IPM (a realm in which the Master of Pest Management (MPM) program at Simon Fraser University (SFU) remains an uncontested pioneer). In light of mounting concern with products of biotechnology, preservation of biodiversity, food safety and global food trade issues, IPM implementation will assume an even greater role in XXIst century agricultural systems. But IPM is not restricted to its agricultural applications; the concept is equally fundamental for the protection of humans, and farm

and domestic animals against vectored diseases, and in the preservation of the structural integrity of human constructions. For the last 35 years IPM has remained a robust concept, always evolving as new technologies open up new tactical options. But, at the same time, IPM has remained intrinsically stable in its basic premise, i.e. of fostering multidisciplinary integration across all levels of the ecological scale, from the population to the ecosystem. Because of its well-tested ecological foundation and integrative approach, IPM has served as a most effective model for sustainable agriculture.

6. HISTORICAL PERSPECTIVE ON THE MPM PROGRAM

In 1967, seven research scientists from the Belleville Biological Control Research Station¹ joined the faculty at SFU. This original nucleus of researchers formed the Centre for Pest Management providing the direction and focus for more than three decades of teaching and research in this important scientific discipline. From the beginning the Centre was and continues to be recognized for the its unique degree in the MPM, the first professional program of its kind to be offered at an academic institution in North America. The MPM program is a broadly comprehensive course of studies aimed at providing students with the opportunity to experience the practical application of pest management from the ecological and organismal perspective in combination with original research.

In 1998, the CEB was established at SFU as the home for the MPM and Master of Environmental Toxicology (MET) professional programs, subsuming the former Centre of Pest Management. The CEB was created in recognition of the need to broaden the type of pest management training provide to student practitioners in an effort to meet the changing demands of a 21st century society that is more environmentally conscious. The goals of the CEB are to enhance teaching and research in areas of ecological and sustainable management of pests, advance the understanding and management of terrestrial and aquatic environments, and improve productivity of agricultural, forest and aquatic environments exposed to stresses and/or toxic factors.

7. MPM PROGRAM STRUCTURE TODAY

a. The Program

The goals of the MPM program are to provide an intensive, practical and theoretically structured, course-based curriculum with a professional paper on an original research topic (library or laboratory-based) that can be completed in two years. The MPM program has three unique characteristics: 1) Multidisciplinary nature - providing students with a breadth of knowledge second to none; 2) Professional summer courses - providing the students with the practical skills to become accomplished field and lab IPM specialists; and, 3) Research experience - that prepares students for a career which often positions them as the liaison between the research and lay community or as IPM researchers in their own right.

Students receive an MPM degree upon successful completion of a minimum of 41 credit hours that presently involves 4 (18 credit hours) professional summer courses, plus BISC 847 (3 credits) and a minimum of 4 courses (12 credit hours) selected from

¹ Brian Beirne, Manfred Mackauer, Jack Barlow, Thelma Finlayson, Karum Navar, Peter Belton, and A.L. Thurnbull.

graduate course offerings. The remaining credits are acquired through a research thesis (either original laboratory research or an library-based literature review). The professional summer courses are a key component of the MPM program. Their existence and continued high standard are primarily due to the on-going commitment of a superb cadre of Adjunct Professors. Since the inception of the MPM program in 1973, over 225 students from 30 countries have graduated and successfully obtained employment in fields in or related to pest management (i.e.. private consulting, industry, academia, research, and government). Twenty-five percent of the graduates have gone on to higher degrees, primarily Ph.D. degrees. The accomplishments of these graduates are primarily responsible for the worldwide reputation that the MPM program has today.

b. Faculty

Current faculty: The MPM faculty is presently composed of Dr. Zamir Punja, Director of the CEB and six professors - Drs. John Borden, Gerhard Gies, Alton Harestad, Russell Nicholson, Jim Rahe, and Mark Winston. All faculty are strongly committed to the: 1) teaching of a rigorous professional MPM curriculum; 2) supervision of MPM students in original research projects or library based literature reviews; 3) teaching of courses associated with the Department of Biological Sciences curriculum; 4) supervision of M.Sc. and Ph.D students; and, 5) the maintenance of high calibre - world renown research programs. The faculty is highly motivated and committed to excellence in education and research. This conclusion was based on Impressions received during the interview process, review of course material, Indications of innovative approaches to teaching, awards of distinction received by MPM faculty, extensive scientific publications in their specific disciplines, the research funding base, current student comments, and former students' letters of support.

Professors Emeriti- Thelma Finlayson, Manfred Mackauer and John Webster remain active and committed to the program that they helped to established over 30 years ago. They strongly advocate the continuation of the MPM Program in the long-term. As was Indicated In a previous section the MPM Program also relies heavily on the support It receives from Its Adjunct Professors particularly In the areas of lecturing during the professional summer courses and graduate student supervision In research projects. The Adjunct Professors In the MPM Program are in the same frame of mind as the Professors Emeriti In terms of the future of the program.

Adjunct Professors and Guest Lecturers: 140 guest lecturers and Adjunct Professors, many of whom are graduates of the MPM Program provide the foundation for the summer professional courses. These Individuals receive no remuneration for their participation as lecturers In the summer courses and often further their connection with the MPM program by becoming members of student supervisory committees for their research projects. This is an incredible contribution that appears to be largely under-rated by the university as a whole.

Faculty, Professors Emeriti and Adjuncts Professors are all distressed about the future of the MPM program. Despite the increasing awareness and mounting needs of society for effective pest management to address food safety and environmental quality issues - support for the MPM program continues to wane at SFU. Two key areas for the continued viability of the MPM program that have suffered in recent years are: 1) reduced administrative support from a rapidly expanding and financially pressured university; and, 2) a reduced number of faculty capable of continuing investment in time

and energy to teach the appropriate core courses and provide research supervision to MPM graduate students. Given the age of the MPM program and career profiles of current faculty, professorial renewal should have been initiated several years ago. The situation is critical and warrants serious and immediate attention by SFU administration if the program is to maintain its high quality and reputation.

c. Professional Staff

The MPM Program has a number of resource staff that provide much needed support to the teaching and research requirements of MPM faculty and students. The professional staff is extremely important in ensuring the smooth and efficient operation of the MPM program now and in the future.

d. MPM Students

The ERC was particularly concerned by comments from current MPM students and graduates indicating substantial angst and dissatisfaction regarding their interactions with M.Sc./PhD students in the Department of Biological Sciences. There is some indication that the MPM program is considered substandard by those involved in the M.Sc. and Ph.D. programs in the department resulting in decreased morale and lack of departmental connectedness. These problems need to be addressed immediately and with the utmost diplomacy by SFU and DBS administration.

The ERT heard expressions of concern about the duration of the MPM Program. In general a full-time student enrolled in the MPM Program should be able to complete the course requirements in 5 semesters. With the research theses option, most students should be able to complete the program in no more than 3 years. Special consideration should be given to students who hold full or part-time employment and are limited in the time available for course work and research.

It is our understanding that MPM students incur in extra out of pocket expenses to attend the summer courses that are taught out of campus in various distant locations in British Columbia and in Alberta. Furthermore, it is our experience that most IPM practitioners serve in public institutions that have a fixed salary scale. Job opportunities with the industry usually do not reward differentially job candidates with a MPM versus students with a MSc. So, the issue of differential fees for MPM students must be viewed from a perspective of the reality of the profession, and not by analogy to other professional degrees that are prerequisite for access to the profession.

Both current students, based on a meeting of the ERT with a majority of them, and MPM alumni, through their letters of support, expressed their satisfaction with the program and their appreciation for the quality of the instruction they received and the dedication and professionalism of the faculty. A major concern of both groups was the perceived threat to the preservation of the program under the current University and DBS administrations.

e. Curriculum (see Table 1)

Students admitted to the MPMP are expected to have an undergraduate training that includes the following courses or equivalent: BISC 304 Animal Ecology; BISC 317 Insect Biology; BISC 404 Plant Ecology; BISC 407 Population Dynamics; BISC 417 Entomology; BISC 430 Plant Pathology; BISC 432 Chemical Pesticides and the Environment; BISC 435 Introduction to Pest Management. Candidates for the MPM deficient in some of these areas can, conceivably, be admitted conditionally. This

undergraduate training provides a solid platform upon which to build the curriculum for the MPMP. The combination of a sequence of courses that provide the conceptual foundations IPM, a broad overview of the disciplinary areas of crop protection (Entomology, Plant Pathology, and Weed Science), and basic tools for IPM (biological, cultural, chemical control, and host plant resistance), with the practical exposure of students to the real world through a series of summer courses and internships, have been the hallmark of the MPM program.

When fully staffed the MPMP offered a sequence of 15 courses (Table1). The revised curriculum reduces the offerings to 11 courses. It is expected that students will be exposed to weed, vertebrate pest, and nematode IPM, and IPM for vectors of animal diseases (4 of the deleted courses) under the new course sequence "Biology and Management of Pest of Plants, Plant Products, and Animals". This will represents a real challenge for the instructors of that sequence. Under the new proposed curriculum all courses should be fully integrated along disciplinary lines (see section on the conceptual basis of IPM above) and this will be one of our strong recommendations. The addition of an introductory course on biotechnology for IPM and environmental biology, are a clear demonstration of the forward thinking approach that has distinguished the MPM faculty at SFU from other similar programs in North America.

8. Interactions

Under the current organizational structure of the University, the MPM Program functions as a component, together with the Master of Environmental Toxicology Program, of a recently created CEB within the DBS, that is under the Faculty of Science. The administrative arrangements under such structure are rather complex and are susceptible to clashes of diverse cultures. The Faculty, by definitions is focused on basic sciences as another Faculty is identified as focused on Applied Sciences. Such dichotomies if not buffered with considerable flexibility may become barriers to collaboration and the cultivation of collegial interactions among staff and students in the various units. Throughout the review process we witnessed expressions of concern about decisions that were made at various administrative levels that might have been biased against the applied nature of the MPM Program. The following is our perception of the status of the interactions.

Table 1. Basic courses offered under the MPM Program.

Historical Course Offerings	Revised/New Courses	Status	Instructor	
			Current	Proposed ²
	Principles of Integrated Pest Management	New		Roitberg
Urban Pest Management	Urban Pest Management	Revised	Borden	Winston
Forest Pest Management	Forest Pest Management	Revised	Borden	Gries
Agricultural Pest Management	Agricultural Pest Management	Revised	Rahe	New Fac. #1
Orchard Crop Pest Management		Deleted		
Management of Animal Disease Vectors		Deleted		
Biology and Management of Forest Insects		Deleted		
	Biology and Management of Pests of Plants, Plant Products, and Animals - I	New	Rahe & Lee	New Fac. #1 & #3
	Biology and Management of Pests of Plants, Plant Products, and Animals - II	New	Rahe & Lee	New Fac. #1 & #3
	Biotechnology for Pest management	New		Punja
Plant Disease Development and Control		Deleted		
Insect Development and Reproduction		Deleted		
Biological Control	Biological Control	Revised		New Fac. #2
Chemical Control and Toxicology	Chemical Control and Toxicology	Revised	Nicholson	Nicholson
Pest Management in Practice	Pest Management in Practice	Revised	Winston	Winston
	Fundamentals of Environmental Biology	New		? ³
Nematology		Deleted		
Weed Biology and Control		Deleted		
Vertebrate Pests		Deleted		
Medical and Veterinary Entomology		Deleted		

² New faculty as follows: New Fac. #1 – Fungal Biologist; New Fac. #2 – Co-evolutionary Biologist/ Biological Control; New Fac.#3 – Vegetation Management.

³ Unclear who will teach this course.

a. MPM and the Department of Biological Sciences

The DBS has never fully reconciled with the impact of the "Group of Seven" who transferred to SFU from Belleville Biological Control Research Station in 1967 and eventually established the MPM Program in 1973. From a peak of 13 faculty dedicated to the program, the MPM faculty is now reduced to 8, 2 of whom are retiring within the next 2-3 years. The DBS is a large (about 53 faculty in the SFU-2001-2002 Calendar) and complex unit with a highly diverse faculty with national and international reputation in Behavioral Ecology, Wildlife Ecology, Environmental Toxicology, and, of course, Applied Ecology through its IPM group. The DBS recently spawned the Department of Molecular Biology and Biochemistry, with the transfer of several DBS faculty to that new unit. We were informed that SFU fosters a great deal of departmental autonomy, including priority staffing. Given the diverse nature of the DBS and the understandable conflict of interests among the various faculty groups, it has been difficult to build consensus and support within the DBS for the needs of the MPM Program in terms of faculty replacement. According to some MPM faculty the situation is not likely to change unless there is greater input from the higher administration of the Faculty of Science and above, or a new administrative model is followed for the MPM Program.

At SFU, as in other similar institutions, there are unavoidable conflicts between the propensity to enhance certain fashionable areas of biological sciences (e.g. molecular biology) to the detriment of those perceived as more traditional such as invertebrate physiology or systematics. This makes the administration of any program in DBS-like units very difficult. Shrinking financial resources generate antagonisms, conflicts of interest, and loss of objectivity in assessing the needs of certain programs. The result is that faculty splits into factions and students are caught in the middle. The appearance of such a schism was evident between DBS and MPM. This posture over years has undermined relationships and cannot be overlooked. In many of the faculty interviews, the expression of the notion of a "clash of cultures" was evident. MPM-faculty stated that they could no longer compromise filling of new positions without sacrificing the quality of instruction.

A point of contentions has been the perception by non-MPM associated DBS faculty that the MPM faculty do not carry their fair share of Departmental courses. This perception seems to stem from the fact that there is no recognition for the demands of teaching professional graduate courses as compared to basic biology courses. A significant difference between teaching professional courses and introductory undergraduate courses lies in the fact that specialized faculty are needed to teach professional courses while most Biology faculty can teach introductory undergraduate courses. Although classes are much smaller in the professional courses, the intellectual demand from instructors is considerably greater. In addition, most MPM faculty, including the Director of the CEB have taught introductory Biology courses. If there is a misperception, it should be dispelled by properly releasing to entire faculty the teaching loads of each member of the DBS.

b. MPM and the Master of Environmental Toxicology Program (MET)

The MPM and MET seem to us as complementary programs that would benefit greatly from close coordination in instruction and research. This view does not seem to

be fully shared by the current Director of the MET. The complementarities of the programs offered the basis for the establishment of the CEB.

c. MPM and the Center for Environmental Biology (CEB)

The CEB was recently created to replace the former Centre for PM. Dr. Zamir Punja has been appointed as the first Director of the CEB. The mandate of the CEB is to "promote research and teaching and to enhance expertise in the areas of pest management and environmental toxicology". The CEB operates within the Department of Biological Sciences as an autonomous unit but without support for independent priority staffing or other matters of key importance for the governance of the unit. There seems to be some support from the 22 faculty associated with the CEB for greater autonomy from the DBS.

9. ERC ASSESSMENTS

It was essential during the MPM review process to access the strengths and weaknesses of the program in an effort to identify a strong foundation on which to build its future. With this in mind, the ERC has identified what appears to them to be the most evident positive and negative attributes of the MPM program.

a. Program Strengths

1. **Unique Professional Degree** – When the MPM program was initiated in 1973, it was the only professional program of its kind to be offered at an academic institution in North America. Today, the MPM remains unique not only in North America but in the world as a program that delivers a broadly comprehensive course of studies aimed at providing students with the opportunity to experience the practical application of pest management from the ecological and organismal perspective in combination with original research.
2. **Professional Summer Courses** – In the past, 5 professional summer courses have been offered as part of the requirements of the program (BISC 600-3, BISC 601-3, BISC 602-3, BISC 604-3 and BISC 605-5). Note: Due to MPM faculty retirements BISC 604-3 – Management of Animal Disease Vectors has been terminated. These courses provide students with a field oriented exploration of various approaches to pest management in selected urban, forest and agricultural environments. They are strongly based in the pedagogy of learner centredness – with hands-on skills and experiential learning being a high priority. The voluntary contribution from the over 140 guest lecturers (see above) situated at federal and provincial research facilities, private consulting firms, government agencies and academic institutions in western Canada can not be over-emphasized. .
3. **Committed MPM Faculty** – MPM faculty are presently committed to teaching the rigorous professional curriculum associated with the program, as well as supervising MPM students in their original research projects. In addition, MPM faculty are required to contribute to the teaching of courses associated with the general curriculum for the DBS and supervision of M.Sc. and Ph.D. students.

4. **Research Experience** – MPM graduate students have the option to undertake an original scientific research project under the supervision of full-time and/or adjunct MPM faculty. The students develop an experimental protocol on a topic of original research associated with some aspect of pest management, initiate the research and defend a thesis in a 2 year period. The alternate research pathway is directed at a library-based literature review on a topic associated with integrated pest management.
5. **Employability of Graduates** – To date, the MPM program has graduated 225 students, 25% of which have gone on to higher degrees, mainly Ph.D.'s. Almost all are employed in fields directly or indirectly related to pest management. Their successful accomplishments are primarily responsible for the outstanding, high calibre reputation that the MPM program has maintained for over 30 years.
6. **Program Dynamics and Flexibility** – Student training needs, the fundamental science of IPM and societal demands require that programs evolve over time. The MPM program has demonstrated its ability to adjust to these changing requirements by adjusting its course offerings and the selection of research topics. The current proposed revision of the curriculum is additional evidence of the willingness of the MPM faculty to adjust to changing intrinsic and extrinsic realities of the program itself, the DBS, and the University as a whole.
7. **Curriculum Revision** – The report prepared by the MPM faculty proposes a revised curriculum that will be attractive and useful to students and of major importance to Simon Fraser University and to society in the next century. The suggested restructuring is timely for two reasons:
Faculty retirements without replacement have resulted in the cancellation of some of the summer professional courses. With additional faculty retiring from now to 2004 this trend in course cancellation is likely to continue. In order to maintain the quality of the course requirements for the MPM program curriculum The ERC feels strongly that revision is essential at this point.
Although MPM program has and is likely always to be primarily focused on the ecological and organismal aspects of pest management it is also important for students to be introduced to biotechnology for its potential usefulness in future pest management systems. The revised curriculum, as proposed by the MPM faculty, strives to deal with the present inadequacies in the curriculum by recommending the inclusion of courses that deal with the biotechnology-pest management interface. The ERC strongly supports the revised curriculum that is presented in the support documentation.

b. Program Weaknesses

1. **Faculty Uncommitted to MPM Program** – The pedagogical and academic skills required to teach courses in a professional program are no less demanding than teaching large introductory undergraduate courses in biology. A major difference lies in the fact that specialized faculty are required to teach professional courses while most Biology faculty can teach the introductory courses. It is apparent that faculty hired to participate in the MPM program must be dealt with equitably (pedagogically, academically, and scientifically), by the Department of Biological Sciences and SFU administration, if they are to retain the services of current and new faculty in the long-term.

2. **Lack of Autonomy** – At present the MPM program is unable to gain much ground within the Department of Biological Science with regards to faculty replacement, hiring priorities and control of their budget. Some administrative restructuring is required to overcome this problem or the program is likely to continue to lose ground in this area.
3. **Poor Marketing of MPM Program** – In recent years the MPM program has not been marketed or promoted very effectively by the university at either a national or international level. Brochures are badly outdated as are the websites and other forms of promotional material. It is essential to promote the benefits of the MPM program globally in an effort to attract those students who will serve as the next generation of pest management practitioners around the world. There is great opportunity for recruiting of international students if contact with foreign governments and NGO's is established in the near future.
4. **Lack of Linkages with MET Program** – There is an apparent misconception from within the MET program that the formation of the CEB, which is the home for both the MPM and MET programs, has resulted in a reduction in the quality of education received by students from both programs because there is very little in common between the two disciplines. We believe that this could not be further from the truth. Many possibilities for linkages exist and, if properly exploited, such linkages would greatly benefit the CEB, faculty and students from both the MET and MPM programs. The successful interfacing of the environmental toxicology and pest management programs within the Department of Environmental Biology at the University of Guelph is one example of the potential benefits.

10. RECOMMENDATIONS

The following recommendations are grouped in a way that they address, as closely as possible, the main topics contained in the document "Terms of Reference and Mandate of the Committee".

- A) *Should the DBS offer a course-based professional program, possibly with differential fees for an MPM degree, and/or a research based program with standard fees for an MSc degree.*
- We strongly endorse the preservation of a professional degree in Pest Management at SFU. The model established by this program demonstrates that an MPM program that offers a strong, relevant, and current curriculum, coupled with the option of a research or a literature survey-based thesis has been extremely effective. Our assessment of the effectiveness of the program is based on a record of over 30 years of extraordinary success in terms of alumni achievements, employer's satisfaction, continued societal demands, and testimonials of all those associated with the program. We see no conflict with the parallel option of a regular thesis-based MSc program in IPM.
- We strongly disagree with the concept of charging differential fees to MPM students. Due to the nature of the program these students incur in substantially higher expenses to attend off-campus summer courses than do MSc students who are solely based on on-campus course work and research. In addition, MPM graduates usually do not command any higher

starting salary in a market place that is dominated by salary scales determined by public institutions.

B) Faculty complement required to adequately cover the program and revised curriculum.

- Faculty retirements without replacement will continue to be a threat to the Integrity of the MPM program. We recommend that 3 new MPM faculty be hired in the next 2 years to provide the critical professorial mass necessary to ensure that the MPM curriculum and student supervision are effectively carried out.
- To maintain the quality of the course requirements for the MPM program, the curriculum revision and its immediate implementation are essential. We support the revised curriculum presented by the MPM faculty. All courses should be fully integrated along disciplinary lines (entomology, plant pathology, and weed science) and to achieve this level of integration it is essential to hire the minimum appropriate number of new faculty (3 new faculty). A most glaring deficiency in the current make up of the MPM faculty is the lack of a weed scientist.
- Although the MPM Program has and will likely always to be primarily focused on the ecological and organismal aspects of pest management it is also important for students to be introduced to biotechnology which is likely to become one of the key components of modern IPM programs. One noteworthy component of the revised curriculum is the inclusion of a course that exposes students to the biotechnology-pest management interface
- We strongly recommend greater coordination between courses in the MET and the MPM programs. We perceive many areas of common interest and such coordination will lead to more efficient use of the talent and expertise that exist in both programs to the greater benefit of the students.
- We believe that every student should be assigned a few nominal (*pro tem*) advisors, rather than a singular one (the Director), upon admission to the MPM program. The job of these faculty members is to mentor the students, to advise on course selection, and to help orient them in the early stages of their graduate program. Progress of all students should be carefully monitored and recorded. We recommend an annual progress assessment of all students, even and especially part-time students.

C) Numbers of students that could be recruited and into what types of degree programs.

The demand for graduates of the program.

General resources, including space, required to mount the program

- We do not believe that it is possible to conduct a "market survey" to determine the potential employment base as a guide for the recruitment effort or resource allocation. Higher degree academic programs usually stand on their own merits to compete among peer institutions, within the pool of talent of college graduates. The MPM Program has the added benefit of attracting

individuals who have been working in the field for a few years, thus representing a more mature student element. The job market itself provides the incentives (or disincentives) for candidates for any graduate studies program, including the MPM Program.

- It does not seem to us that the MPM Program requires any facilities or imposes any demands on resources beyond those of faculty time, laboratory and class-room space that are typical for any graduate program. The extra onus of the summer traineeships and internships are born by volunteer instructors who cost nothing to the University and represent an incredible resource in terms of practical training of students, exposure to job opportunities, and a valuable link of these professionals with the University at large. We, therefore, recommend that the University endorses the preservation of the MPM Program at a par with the best graduate programs within the University.

D) The impact of the revised Master of Pest Management Program's proposal on the Department of Biological Sciences.

- The MPM has been a most visible program within the DBS. The Web page of the DBS showcases the MPM as one of its strengths. However, this fact does not seem to permeate throughout the faculty. We recommend that current mutual misgivings between MPM and non-MPM faculty within the DBS be resolved through the mediation of an external facilitator in a Department wide retreat, attendance to which should be encouraged by the higher administration of the college. It is essential to promote the dialogue that will resolve the issues of MPM faculty teaching of introductory biology courses, the misperception of the calibre of the MPM student population and the quality of their research by non-MPM students.

E). The proposal for the creation of an independent administrative unit for the Center for Environmental Biology

- We believe that a functional Centre for Environmental Biology, encompassing both the MPM and the MET programs is a positive step. Our recommendation is to establish an autonomous administrative structure running parallel to the administration of the DBS. The Director of the Centre should have the rank and administrative status of a Department Head and have direct access to the Dean of the Faculty of Sciences. The CEB should be assigned the minimum number of FTEs necessary to conduct its functions and be allowed to determine priority staffing in consultation with but not dependent upon the DBS own agenda for priority staffing. Recruiting of new faculty by the CEB should comply with the standards of excellence set by the DBS and receive the input of DBS faculty as members of a selection committee.

F) Relationship with the community outside the University and relationship with alumni/ae."

- We recommend that under the aegis of the CEB considerable attention be given to an expanded and improved Website and promotional materials.
- It is essential to promote the benefits of the MPM Program globally in an effort to attract those students who will serve as the next generation of pest management practitioners around the world. There is considerable potential for recruiting of international students by enhancing contact with foreign governments and foreign aid agencies.
- Once the future of the program is assured through a commitment to the recruiting of three new faculty and the sanctioning of an independent administrative structure for the CEB, we suggest that a commemorative symposium be convened to celebrate the achievements of the program over the past 30 years, to acknowledge the contributions of the Professors Emeriti, to celebrate the impending retirements of two MPM distinguished professors (Rahe and Borden), and to acknowledge the contributions of the adjunct and volunteer instructors. All alumni of the MPM Program would be invited, as well as representatives from the agricultural and industrial communities that are the beneficiaries of the labour of trainees of the program.

11. CONCLUDING REMARK

The MPM Program at SFU is a unique program for the training of professionals in the various aspects of crop, human and animal health, and structural protection against pests, i.e., arthropod, other invertebrate and vertebrate animal pests, weeds, and pathogens. Trainees fill an important niche in the IPM community as capable technicians who execute field-based IPM tasks, consultants, farm advisors, educators, field researchers, and administrators. Several have proceeded to complete a PhD and now occupy high-level University positions in teaching, research and training of future generations of IPM students. The program has a rich tradition that has brought distinctions and honours to SFU and the DBS. The impediments to the continuation of the program do not seem to be insurmountable. It is, however, essential to cultivate improved communication among members of the faculty within DBS and promote mutual respect and support. The role of administrators above the departmental level, unmistakably stating their position in regard to the program, will be crucial to guarantee the success of the program and the stability and functionality of the DBS.

**The Report of the Chair of the External Review Team
For the**

Masters in Pest Management

**At
Simon Fraser University**

**By
George G. Khachatourians
University of Saskatchewan**

February 18, 2002

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1. INTRODUCTION

The review of the Masters in Pest Management (M.P.M.) by an External Review Committee (ERC) at the Department of Biological Sciences (DBS, the Department) was authorized as part of the Simon Fraser University (SFU) Program Review for September 13 and 14, 2001 but conducted on November 27 and 28, 2001.

Following an organizational meeting in the morning of November 27, 2001, the members of the ERC visited the facilities of the program on November 27th morning and through 27 and 28th of November interviewed various stake holder groups, individuals, affiliates and adjuncts. At the end there was an exit interview and briefing of our first impressions. This report represents the findings.

It is, of course, difficult for someone coming from another institutions to develop a deep understanding of the work of an academic department in a short visit. For example, observation of the type or quality of teaching is impossible. Uncovering of the research and scholarly culture of the unit is transparent but its depth is inferential. Consequently, all internal documents and reports with personal disclosures and sharing of history assume strategic importance in highlighting key issues. The challenge for the ERC was to determine whether the internal documentation and personal comments/expressions accurately depicted the strengths, weaknesses and opportunities of the M.P.M. program. In the absence of threats from without, we were reasonably sure that unless fractures from within posed serious challenge, we did not engage in the topic. Thus the ERC team attempted briefly to probe beyond the parameters of the self-study and did not identify larger contentious or substantive issues to probe.

As the Chair of the ERC team, I was satisfied with the data available. I would have preferred to have received particular quantitative data on the parameters, e.g. student demand, industry surveys supporting it and a global forecast of trends in the area. For example, I left without being clear about how many students will be actually needed by industry- and government- research establishments (IREs and GREs) or in private consultancy professions. In terms of financing the M.P.M. graduates, the Chair of the Departmental Graduate Studies Committee indicated that "M.P.M. was not a drain on graduate support resources" and that "there was no supporting evidence for the detrimental effect of support to M.P.M. graduate student." I also did not see a detailed presentation of the financial resource implications, either in operating or capital planning sense. Nor were there any models for the revenue posture for the program over the past and next five years under fixed or differential fee models.

While these questions were outside the ERC terms of reference, they certainly had a restricting effect on my juxtaposing of input against the recommendations. Also, the weaknesses in the university's role in proper positioning of the M.Sc. versus M.P.M. created a perception that the graduate students in the latter lacked a defined statement of mission, vision and values. Nonetheless, the lack of any administrative system for tracking students' feelings or concerns on a systematic basis could become a serious concern. Although we received qualitative data from student questionnaires and group discussion I have no idea whether the qualitative comments provided were biased in their selection or could have been mirrored differently from the M.Sc., students.

These difficulties notwithstanding, I present herein my personal impressions of the M.P.M. program. I chose to begin with some general observations before turning to the specific areas on which I was asked to provide comment.

2. TERMS OF REFERENCE AND THE MANDATE OF THE COMMITTEE

The terms of reference for the ERC were given in a document dated (July 30, 2001, and updated August 2, 2001). These terms of reference indicate the following.

"The external review for the Master of Pest Management Program (MPM) is being conducted at the request of Senate as a result of an earlier external review of the Department of Biological Sciences. Specifically, Senate recommended that the Department of Biological Sciences should review the Master of Pest Management Program to determine whether to offer:

- a) a course-based professional program, possibly with differential fees, for an MPM degree, and/or
- b) a research based program with standard fees for an MSc degree.

As part of this examination, the Department of Biological Sciences was asked to consider what would constitute realistic expectations of requirements for course work and original research as well as the role of work experience in relation to the two types of programs being explored. The Dean of the Faculty of Science has extended the list of issues to be investigated including an assessment of:

- a) faculty complement required to adequately cover the program
- b) numbers of students that could be recruited and into what types of degree programs
- c) general resources, including space, required to mount the program

The Review Committee will assess the totality of the Master of Pest Management Program, both past and present, and comment on its strengths and weaknesses, on opportunities for change and/or improvement, and on quality and effectiveness. The Review Committee should make essential, formal, prioritized recommendations based on its opinions and concerns.

Additional issues of particular interest to the University that we would like the Review Team to consider during the review are:

- a) the proposed revised curriculum for MPM
- b) the impact of the revised Master of Pest Management Program's proposal on the Department of Biological Sciences
- c) the proposal for the creation of an independent administrative unit for the Center for Environmental Biology
- d) demand for graduates of the program

Other areas that may be important to consider by the Review Team include:

1. Program

- size, structure, breadth, depth, requirements and reputation of the graduate programs.
- graduate student progress, completion time frames, and financial support.
- enrollment management issues at the graduate level.

2. Faculty

- size and quality of the faculty complement in relation to the Program's responsibilities and workload.
- teaching, research and service contributions of faculty members, including the level of external research support.

3. Administration

- *size of the administrative and support staff complement, and the effectiveness of the administration of the Program.*
- *adequacy of resources and facilities provided to support teaching and research, including library resources, laboratory space and equipment, computing resources, office space for students, faculty and staff, and faculty and staff complements.*

4. *Connection of the Program within and outside the University*

- *the Program's concept and plan for teaching and research and relationship within the Center for Environmental Biology, and its relationship with the Department of Biological Science and other units within the University.*
- *relationship with the community outside the University*
- *relationship with alumni/ae."*

3. FACILITATION PROCESS.

The ERC met initially with the Associate Vice-President Academic, the Dean of Graduate Studies, the Dean of Faculty of Science, the Director, Academic Planning, and internal member to the ERC, Professor Keith Slessor. This initial meeting was followed by a briefing by the Director for the Centre for Environmental Biology (Dr. Zamir Punja) and a tour of his research labs and facilities. A series of sessions with Dr. Hunerland, the Chair of the Department of Biological Sciences and each of the eight faculty members of MPM (On the 27th, Drs. Borden, Rahe, Moore and Harestad and on the 28th Drs. Gies, Winston, Nicholson and Punja) was interspersed with meeting Drs. Williams and Law, respectively Director of School of Resources and Environmental Management, and Program Coordinator, Master of Environmental Toxicology. In the afternoon of the November 27th, we met with the MPM graduate students. Centre for Environmental Biology Staff and Adjunct Faculty members (Judd, Gillespie and Vernon) were interviewed on the November 28th. Professors emeriti, Finlayson, Mackauer and Webster, kindly shared their views on the second day. The meeting format for these sessions consisted of an open forum with all individual faculty, support staff and other named members or groups with the ERC and Professor Slessor.

Finally an exit meeting was arranged, where we met the Vice President Academic, and his colleagues on the afternoon of the November 28th to present our initial conclusions.

4. SCOPE OF THE REPORT

This report begins with a brief assessment of the MPM history, its past and present, completes our discovery process and analysis and ends with the recommendations of the review team.

5. CONTEXTUAL HISTORY OF IPM (GLOBAL TO LOCAL)

In evaluating the MPM at SFU it is important to underscore the unique situation that the ERC finds itself. Generally such an assessment(s) is made in a context of comparisons within terms of comparable programs in Canada. Such a comparison was not made, as the MPM is the only one of its kind. It would be unfair to compare the program at the SFU with the top echelon of graduate programs with a M.Sc. or M.Sc. + Ph.D. offerings, as this is not the request that was made of ERC.

At some point however, a comparison of the two educational and training programs (MPM vs. M.Sc.) will be made. The context however, at this point will be to examine relationships and synergism. I distinguish the purposes of the two programs to be distinct in spite of some instruments of pedagogy that are shared here. The MPM as an institution graduates the bulk of Canadian pest management practitioners. It is more appropriate to compare the SFU program with other institutions elsewhere (USA or Europe) whose graduate programs reflect a similar profile of combining research and professionally oriented programs.

It is also important to note that the primary target market is extensions of the pest management school that arose in the late 70s and early 80s¹. As the Chair of the ERC, I believe strongly that this mandate was created primarily to provide resource training, which addressed the needs identified decades ago. Thus, the context and the stage in which the concepts of pest-host interactions and their management have changed. During the last 20 years, there have been changes and advancements in science and technology, global climate, diversification of agri-food-forestry, concepts and commodification of our food production and various aspects of transportation industry.

What is important is to contextualize the MPM viewpoint in specific terms that relate to demographic and geographic terms for the highly qualified human resource market. Given the limited human resources available to the MPM, it is clear that developing a critical mass of students is important yet problematic.

1. Mackauer, M. Entomol. Soc. Canada Bull. 21: 132-136 (1989).

6. HISTORICAL PERSPECTIVE ON THE MPM PROGRAM

6.1. Program Beginning

In 1967, seven research scientists from the Belleville Biological Control Research Station joined the faculty at SFU. This original nucleus of researchers formed the Centre for Pest Management providing the direction and focus for more than three decades of teaching and research in this discipline. From the beginning the Centre has been recognized for its unique degree in the MPM, the first professional program of its kind to be offered at an academic institution in North America. The MPM program is a broadly comprehensive course of studies aimed at providing students with the opportunity to experience the practical application of pest management from the ecological and organismal perspective in combination with original research.

In 1998, the Centre for Environmental Biology (CEB) was established at SFU as the home for the MPM and Master of Environmental Toxicology (MET) professional programs, subsuming the former Centre for Pest Management. The CEB was created in recognition of the need to broaden the type of pest management training provide to student practitioners in an effort to meet the changing demands of a 21st century society that is more environmentally conscious. The goals of the CEB are to enhance teaching and research in areas of ecological and sustainable management of pests, advance the understanding and management of terrestrial and aquatic environments, and improve productivity of agricultural, forest and aquatic environments exposed to stresses and/or toxic factors.

6.2. Mandate and Goals

The concept and the mandate behind the MPM program was to provide an intensive, practically and theoretically structured, course-based curriculum with a professional paper on an original research topic (library or laboratory-based) that could be completed in two years.

6.3. The Curriculum

Students are awarded a Master of Pest Management by SFU upon successful completion of their program of studies. The program of studies is made of a series of 600 and 800 level course work, and a project-based thesis. While there are no professional licensure examinations or accreditation for the graduates, the industry in general recognizes the value of their education and training. The curriculum has a reasonable scope, breadth and depth. The graduates are employed because of the framework of curricular offerings, both in conceptual and practical sense, and its strengths. The program offers a variety of practical and summer training experiences in many streams and thesis options, again to suit the needs of students.

In comparison to many other curricula dealing with insect pathology or weed science and integrated pest management which offer a research and course based M.Sc., the MPM curriculum has very intensive summer and field instruction and learning experiences. The program through its Adjunct faculty has put considerable effort into meeting the needs of a broad and diverse student body. Over the years many of these students have traveled long distances to attend this program. Students have reflected in their letters and spoken highly of the MPM curriculum.

The program must be recognized for its continued emphasis on 'real and experiential' pest management. The MPM program is to be commended for its commitment to addressing the demand for developing leaders in the pest management industry.

6.4. Broad Spectrum of Outputs

Since the inception of the MPM program, over 225 students from 30 countries have graduated and successfully obtained employment. The breakdown of these students in terms of their career is shown in Table 1. The accomplishments of those graduates continuing in the profession are in part responsible for the reputation that the MPM program has today. However in the last several years at SFU there appears to be a waning level of interest for the MPM program in the areas of academic and financial support despite the increasing awareness and changing needs of society with regards to pest management and environmental issues. Two key areas of support for the MPM program that have suffered in recent years are: 1) reduced administrative support from a rapidly expanding and financially pressured university; and, 2) a reduced number of faculty that can continue to dedicate time and energy to teach the appropriate core courses and provide research supervision to MPM graduate students.

Table 1. Post graduation Affiliation of the MPM Graduates 1975-2001a

Rank	Graduate Student #s	Professional Affiliation^b
1	65	GE mgr. or specialist
2	35	Private sector (own or others)
3	26	Instructor or professor
4	25	Unknown
5	22	RA, PDF and Ph.D. candidate
6	21	Research Scientist/Technician
7	16	Entomologist
8	10	IPM Specialist
9	3	Medical Students
10	3	Homemaker
11	3	Deceased
12	1	Grower/farm mgr.
Total	230	
Notes:		
a Extracted from Section XI		
b GE-Government Establishment; mgr.-manager		

The MPM program at SFU has made a significant contribution to professional training for over three decades. It is absolutely essential that a professional course of this type continue its evolution with the intent of maintaining and providing a program of the highest caliber to students. It has been demonstrated amply that graduates have become leaders and pest management practitioners who apply their skills around the world.

7. MPM NOW

7.1. Program

The MPM program reflects a university-centered and theory-practical approach to education and training on the subject matter. Students are offered flexibility and choice, and are provided with a great deal of individual attention, especially during their MPM research and summer courses. As a result, the students in general are highly submerged in their professional practice and should be satisfied with the program. The program also reflects a deep and sustained commitment to service to the societal needs of Canada and other countries. These attributes are hallmarks of good research-training activity, in general and contributing or augmenting faculty research productivity. In the absence of a similar program in Canada and inappropriateness of comparison with any M.Sc. degree I am short of stating categorically that the program has all potential requirements for a vibrant graduate program: courses, faculty and staff mentorship, a significant peer group, university learning resources, access to centers of learning and apprenticeship and career growth, employability and mobility.

7.2. Faculty

The MPM faculty is presently composed of Dr. Zamir Punja, Director for the Centre for Environmental Biology and six professors, John Borden, Gerhard Gies, Alton Harestad, Russell Nicholson, Jim Rahe, and Mark Winston.

i. Faculty. All faculty are strongly committed to teaching. Whether professional or not, the curriculum is associated with the course subject area. There was no evidence that courses are particular to MPM students and not other graduates. These professors train M.Sc. and other post-graduate students, as much as well as supervising MPM students through their original research projects/interests. The faculty is highly motivated and committed to excellence in education. These conclusions were based on the following: interview processes, review of course material, innovative approaches to teaching and administering of the MPM and M.Sc. programs, publications in the area, and MPM student comments.

Faculty continues to provide outstanding community service within and external to the College and the University (Department Chairs, Dean, and a Vice-President) and worldwide. Faculty is also engaged in leadership activities. More importantly, the faculty in the past 12-15 years has been recognized for their scientific/teaching accomplishments (perhaps not necessarily for MPM program alone) as Fellows - the Royal Society of Canada (Borden) and Entomological Society of America (Borden), Killam Research Fellowship (Borden and Winston), NSERC Industrial Chair (Borden) and Senior Industrial Fellow (Winston). Manning Award of Distinction for Innovation (Winston), University Excellence in Teaching awards (Gries and Harstead), professional society offices (Punja) and a number of professional awards (Borden, Punja, Rahe, Roitberg, Webster and Winston). Over 50% of these awards come from outside the University.

There is a strong faculty commitment to the quality and quantity of research and CVs from the materials provided confirm our view. These are exceptional researchers of national and international stature. In addition, the faculty is required to contribute to the teaching of courses associated with the general curriculum for the Department of Biological Sciences and supervision of M.Sc. and Ph.D. students.

As the Chair of the ERC, I also observed faculty to be in various states of distress so far as the MPM program is concerned. The interview process revealed varying responses. The terms "a moribund program" which is facing up to the question of "saving or not and if so how?" was the gist of some presentations. The faculty is sensitive to the choices placed before them as though it is a top down approach and that "democracy was lacking." The view of choice of options communicated by the Senate of the University was deemed to be a formula for salvation, but which can be expanded into a "modified or hybrid and considered as an acceptable alternative." Given the age of the program, current faculty and

their career profiles, professorial renewal should have occurred much earlier than now. This sentiment was clearly and loudly articulated. The issue of faculty renewal warrants serious attention by the University. The ERC heard repeatedly that "increase in the faculty complement and renewal" although under the rubric of MPM, "is really for the whole unit, all of the courses, professional or not."

It is understandable there will be some variability within and among individual faculty members in their collaboration with colleagues (at SFU or Adjuncts). However, collaborations are valuable as these help renew commitment to the MPM program and to the spirit of training opportunities through partnerships. My experience as an external reviewer would suggest that the commitment to collaboration provides many gains for all involved, and also includes a significant sense of community for faculty. These feelings of loss have to be recognized and accepted to allow faculty and staff to move forward in collaboration.

The sympathy and leadership offered to the MPM by the current College/University administration must be acknowledged.

ii. **Professors Emeriti.** The faculty has three professors emeriti, Thelma Finlayson, Manfred Mackauer and John Webster, who continue to be strongly interested in the program and its affairs. Dr. Webster, still is involved in the program. Dr. Mackauer, felt strongly that the "nematology position must be regained." This group has a tremendous desire to see continuation of the "good and viable program" that they came to work for and contribute. This sentiment had one particularly strong advocate, Dr. Finlayson who has considered an endowment for the institution.

iii. **Adjunct Faculty.** At this time there are four Adjunct Faculty members - David Gillespie, Mark Goettel, Gary Judd, and Robert Vernon - representing Federal Government Research Establishments in British Columbia and Alberta. These faculty contributors have also been recognized for their contributions to the planning and presentation of one or two lectures, e.g., in the Summer 2001 Biological Sciences 603-5 lectures. Certainly, greater use should be made of Adjunct affiliates. Over the course of history, 140 guest lecturers participated in the instruction of the MPM professional courses annually, at no charge to the university. This contribution is not one-sided. The University benefits and so do the Adjuncts who, through association become eligible for NSERC grants (strategic and operating) and National Centers of Excellence awards (e.g. Goettel).

7.3. MPM Connections

The intent of the MPM program is worthwhile pedagogically and in research pursuits. Academically, it brings the field to the classroom experience. Through associations with practitioners in the field, the MPM program helps with the currency of the need to discover and translate discovery to applications. Again, there are huge opportunities to draw from and contribute to this symbiotic relationship.

There appears to be some ambiguity between "who listens/heard the validity and value of MPM." The ERC gathers that some 10-15 years ago, a similar conundrum existed with the biotechnology initiative. The sustainability of MPM ought not be questioned from one connection, i.e. the necessity to focus and produce M.Sc. and Ph.D. graduates at a time of limited faculty resources. The issue is how the College and the University could collect better returns in future from the MPM program. Graduate Studies and the Faculty of Science have to determine how to contextualize the three professional degrees, the MPM in relation to MET and MRM. Are these degrees a single genre or are they different, therefore incomparable? Secondly, the MPM and M.Sc. degrees dealing with subject areas of pest control sciences must have differentiated features beyond the basis of or type of thesis. If the professional degree work is to be distinctive then that must be presented properly. Otherwise, it creates the impression that students either because of choice of career or fearfulness of a science thesis and its project work, proceed through the particular program. This is a situation that does not help with MPM students' sense of identity.

8. ASSESSMENTS

The MPM program review process assessed the strengths and challenges of the program. The ERC performed this task and deliberated upon it in an effort to identify a strong foundation on which to build its future. It is my view that the people interviewed were largely conveying a message illustrated best by the metaphor, "we got a Ferrari, but needs fixing." With this in mind, as a member of the review committee I will identify what appears to be the primary positive and negative attributes of the MPM program.

The MPM program has a number of positive attributes that should be clearly defined at this time:

8.1. Strengths

The MPM program remains a unique program that delivers a broadly comprehensive course of studies with a particular focus on practical application of pest management in combination with original research.

8.1.1. Uniqueness

The MPM faculty and guest lecturers are committed to teaching the rigorous professional curriculum associated with the program and to supervising MPM students in their original research projects. From institutional perspectives, MPM faculty are also required to contribute to teaching in general subject areas for the Department of Biological Sciences and supervision of M.Sc. and Ph.D. students.

8.1.2. Educational spectrum

i. **Revised MPM Curriculum and its Future.** The focus of MPM clearly delineates specific directions for the program. This choice is distinctively different from the M. Sc. option. Therefore the choice in terms of developing leadership in generic 'pest management' curriculum versus that of contemporary research tools and concepts employed in basic or applied scientific development must be very clear. Some students use the MPM degree as a stepping-stone for other (M.Sc. Ph.D. and M.D.) degrees. Rarely if any of the M.Sc. graduates enter the MPM degree program in order to gain professional practice or enhance employment. The focus for the future must be a clear enhancing of either or both MPM/M.Sc. knowledge and skills through pedagogy but for distinct and differentiated needs.

ii. **Course Content.** It is stated that the proposed new MPM curriculum will create 5 new courses, and result in the termination of 9 courses. The net reduction of 4 courses is stated to be inevitable (because of the loss of faculty through retirements).

The proposed courses (BISC 600-800) listed in Document II reflect current scientific scholarship and are well designed. Other current courses (BISC 600-3, BISC 801-5, BISC 802-5, BISC 803-3, BISC 810-3) and the revised courses to be offered (BISC 601-3, BISC 602-3, BISC 603-5, BISC 844-3, BISC 846-3, and BISC 847-3) will provide foundational knowledge and skills. However it is worthy to note that in terms of societal and governance aspects of pest management, the MPM graduates do not receive significant exposure. These are the two concept areas which are currently of great concern: pest management related to trade (e.g., sanitary and phytosanitary needs as determined by world governments and WTO); and governance issues on pest management product regulation, registration and intellectual property rights. The University may wish to explore whether these aspects of curricular deficiency in the future MPM curriculum. New orientation could be brought to some of the courses in the MPM program through inter-departmental or interdisciplinary approaches.

iii. **Course Sequence.** Sequencing of courses looks good, especially the intent to offer core courses at the outset of the program for purposes of introducing the students into the culture of 21st century pest

management options. A seminar on research progress may be suitable for integration of converging strands of interest.

iv. **Thesis/Project.** The inclusion of this scholarly, creative element in the program is very laudable. However, there are a modest number of student's thesis awards.

v. **Collaboration.** The MPM faculty is to be commended for making good use of collaborative opportunities for interdisciplinary work and joint publications.

8.1.3. Distinctive Summer Courses

In the past, 5 professional summer courses have been offered as part of the requirements of the program (BISC 600-3, BISC 601-3, BISC 602-3, BISC 604-3 and BISC 605-5). One immediate concern is the termination of Management of Animal Disease Vectors (BISC 604-3) due to MPM faculty retirement. These courses provide students with a field oriented exploration of various approaches to pest management in selected urban, forest and agricultural environments. The summer courses are strongly based in the pedagogy of learner centeredness, hands-on skills and experiential learning. The courses rely heavily on participation of many guest lecturers situated at federal and provincial research facilities, private consulting firms, government agencies and academic institutions in western Canada. Many of the guest lecturers are graduates of the MPM program who contribute their time to the delivery of the professional course and supervision of MPM students in their research projects, free of charge to the university. Certainly this unique relationship, cultivated over many years, is the best community asset for MPM. It should be studied, enhanced and used for the program's development and growth.

8.1.4. Demand

The real market demand for MPM students was not presented. I feel strongly that the factual demand for the MPM graduates must be established. Also, the numbers of student inquiring and found to be eligible but turned away because of limitations (space, supervisors, other resources) must be expressed and dealt with. It is true that to date, the MPM program has graduated 225 students, but the expected range and specifics on prospective students are undefined. While almost all are employed in fields directly or indirectly related to pest management the market pull was not presented to the Review Team. The manner in which the demand for the MPM program has been or will be maintained needs to be studied and useful criteria arising from it must be put to planning needs. Nearly any projections for the continuation of the MPM have to include the methodology for realistic forecast of trends over next 5 to 7 years.

8.1.5. Professional and Administrative Support

It is clear that there is a very strong community relationship here. The Department has a number of resource people who provide much a needed insectarium with 20+ species of insects that serve various teaching and research needs for everyone. It was suggested that because of "budgetary situation, the MPM program was the primary user of the insectarium, although it serves the entire Department." The professional staff also helped students with various papers or presentations. The students and professional staff also spoke of the professional support to students that facilitate educational needs. Students with whom we spoke also enthusiastically praised the efforts of the CEB's office staff on their behalf. Support staff also remarked "MPM Graduate Teaching Fellows were highly knowledgeable and motivated." "They brought tremendous value to the teaching assistantship functions of the unit" and that "the same value from a number of the DBS graduates."

8.1.6. Student Experience

Faculty, present and retired, and students expressed their pride in the program. Students in the allotted interview time expressed their positive feelings toward the program. They valued the professional aspects of the training, especially for employment in the 'real world' Students from foreign countries were very positive about the program and all students remarked on their appreciation of the

holistic training they were receiving. There were no negative issues in selecting project advisors or the flexibility of the program.

The ERC also noted students' remarks about innuendoes from other students in the Department intimating the "mickey mouse" nature of the MPM thesis research. As a result, a great deal of angst and dissatisfaction was expressed about the culture of the MPM vs. M.Sc./Ph.D. students. Most of these experiences were interpersonal and possibly vary with personality types. The M.Sc. students' relationship with their MPM cohort seems to be unworkable. Rumors intimated by the graduate students that "at MPM program everything is falling apart" must be dealt with in a clear communication. Whether these are the optics or particular incidents, they do not help the morale or the health of the program. Students need to work well. This will require deliberative change. The DBS must consider constructive change of the total environment and experience of all post graduate students, both part-time and full-time. It appears that the present relationships wreak havoc with students. It is crucial that the faculty takes a leadership role to eliminate such problems.

The program provides considerable flexibility to students to address their perceived professional needs and allow for exploration of equity, gender and interdisciplinary issues through an array of electives. This is one of the unique characteristics of programs at SFU.

8.1.7. Graduate Student Success

The ERC was given a list of accomplishments while the MPM students were at SFU. The ERC found MPM graduates were successful in many enterprises, including post secondary educational institutions GRE and IRE settings and their own firms since they left SFU. Additional inferences for their success were drawn from the 41 letters of support from MPM graduates and 39 from employers or interested parties. It is crucial to begin alumni tracking data. Such data are important instruments for alumni relationships and assessment of life long career development of graduates.

8.2. Challenges

The MPM program also has a number of negative attributes that need to be discussed in order to develop a protocol for continued improvement and evolution of the program as the needs of society change:

8.2.1 MPM Within the DBS: "Equality" and Marginalization of Pedagogy

The report prepared by the MPM faculty proposes a revised curriculum that will be attractive and useful to students. There is no question that this posture is one of major importance to the University and to society. As the Chair of the ERC, I conclude that proposed program restructuring now is timely for three reasons:

First, faculty retirements without replacement will continue to be a threat, resulting in the cancellation of some of the summer professional courses. With additional faculty retiring from now to 2004 and continuation of the course cancellation, the program reputation will be harmed. In order to maintain the quality of the course requirements for the MPM program, curriculum revision and its immediate implementation is essential at this point.

Second, although the MPM program has and is likely to be primarily focused on the ecological and organismal aspects of pest management it is also important for students to be introduced to biotechnology, an essential prerequisite to modern pest management. The revised curriculum, as proposed by the MPM faculty, strives to deal with the present inadequacies in the curriculum by recommending the inclusion of courses that deal with the biotechnology-pest management interface.

Third, there is an apparent misconception that there is very little in common between the two disciplines represented by MPM and MET programs. This notion apparently is originated from MET program and it undermines CEB, the home for both programs. This type of a misconception could reduce

the quality of education for students in both programs. I believe that this could not be further from the truth. Many possibilities for linkages exist and the benefits would certainly be beneficial to CEB, the faculty and students from both the MET and MPM programs. The successful interfacing of the environmental toxicology and pest management programs within the Department of Environmental Biology at the University of Guelph is one example of the potential benefits.

8.2.2 Faculty Complement

It is apparent that there are a number of problems related to the number of faculty that are dedicated to teaching and supervising graduate students in the MPM program. By 2004, retirements will leave the complement of MPM faculty to deliver professional graduate course curriculum and research supervision in the program at an all time low of 5 faculty members. Loss of particular pedagogical and academic expertise in essential areas of pest management is crucial. The increased teaching demands in the core undergraduate curriculum in the Department of Biological Sciences, which must be shared by MPM faculty, has resulted in a reduction in frequency and number of the MPM graduate course offerings. The assignment of teaching duties and teaching load becomes a critical factor for the survival of a course-based professional program. Several factors must be dealt with in order to overcome the problems associated with the complement of MPM faculty available to deliver the program successfully.

Suggested revisions to the MPM graduate course curriculum, as presented in the document prepared by the MPM faculty, will necessitate the hiring of additional faculty in the areas of fungal biology, biological control and vegetation management in the near future. The hiring of three additional MPM faculty will bring the total faculty complement to 8 if the hiring is completed by 2004. This faculty complement will be adequate to deliver all the graduate courses proposed in the document while ensuring that MPM students are offered courses at a regular and dependable frequency to enable timely graduation. In addition, the complement of 8 faculties will ensure that a MPM faculty member is available to supervise the MPM students for their research component.

While maintaining the MPM program without additional investment and funding is laudatory, continuation of the MPM as an 'add-on' program is inappropriate and costly to the morale of all faculty, students and activities of the Department. It is clear that SFU and the Department has suffered profoundly from 'disinvestments.' The vitality of the unit depends on reinvestment in faculty resources. Faculty size and vigor are critical for teaching and research intensity, both within the MPM professional and scientific degree arenas. There are simply not enough faculty members to offer the diversity of course options presently in place. More faculty members alone, however, would not completely address the issue of extended flexibility in course offerings. In order for the Department to compete with similar departments elsewhere, and perhaps expand its market base for recruitment and enrollment, additional and new faculty in key areas are required.

The pedagogical and academic skills required to teach courses in a professional program are no less demanding than teaching large introductory undergraduate courses in biology. A major difference lies in the fact that specialized faculty are required to teach professional courses while most Biology faculty can teach the introductory courses. It is apparent that faculty hired to participate in the MPM program must be dealt with equitably (pedagogically, academically, and scientifically), by the Department of Biological Sciences and the administration of the university, if they are to retain their services in the long-term.

8.2.3 Administration and Autonomy

At present the MPM program is unable to gain much ground within the Department of Biological Science with regards to faculty replacement, hiring priorities and control of their budget. Some administrative restructuring is required to overcome this problem or the program is likely to continue to lose ground in this area. The ERC views that greater support towards establishing operational autonomy must be negotiated and exercised for the MPM program.

The Department of Biological Sciences, where MPM program is housed is a comprehensive department. They cover several concentrations of academic foci. We were told that there are some 650 students in the majors and 25 graduate students, and 80+ courses taught per year. The MPM and MET programs generate 140 M.Sc. enrollment and some 60 to 75 professional degree students. Administration of the MPM within such a complex organization is special.

At SFU as elsewhere there are the inescapable complexities of ever increasing scope of pedagogy in extension of certain areas of biological sciences (e.g. molecular biology) contrasted with the relative or real shrinkage of those in foundational areas (e.g. invertebrate physiology). The 'vogue' nature of certain disciplinary areas creates in general a clash of cultures. This makes the administration of any program in DBS-like units very difficult. On one hand are the shrinking financial resources or their allocation and on the other, the notion of "replace me with like me" person. Where such clashes of cultures occur, the University control over its larger mandate, when absent, leads to major issues of governance and divisions. The net result is that faculty become divided amongst themselves and so do the students. Although the appearance of such a schism is evident between DBS and MPM, its full outcome has not as yet manifested itself. This posture over years has maligned relationships and cannot be overlooked. In many of the faculty interviews, the expression of the notion of the 'clash of cultures' was self-evident. Finally, our impression of the MPM faculty posture was that they could no longer compromise hiring of positions where 'cannibalization' of MPM pedagogy occurs. As stated during the interview, "[we] can't assign the teaching of weed science to a plant ecologist." This captures the extended argument of the interdisciplinary connection of subjects versus delivery of specialty knowledge.

8.2.4 Currency of Curriculum

Although the idea of the revised curriculum is an excellent one, there is one issue that should be addressed. First, hiring of a fungal biologist is of greater value to enhancing the strong focus that exists between Dr. Punja and others at the University. Perhaps, the particular candidate whose CV was made available to the ERC, as a Canada Research Chair is just to have such an outcome. I question the particular choice of subject focus and person. The MPM program badly needs instruction in two areas, different from fungal biology, that is, commercialization and regulatory aspects of bioproducts including pest control agents. This is an academic void in Canada. The benefit of lateral thinking, in this instance will add significantly to SFU's reputation in business-bioscience professional areas. This could also generate a stronger industry-academe-government linkage than that suggested in the Canada Research Chairs application. Second, it seems that new faculty hiring would benefit from an enlarged core of courses that also solidify key areas of knowledge that in this case should create fundamental research suitable for use in the M.Sc./Ph.D. programs. Third, an increased faculty complement must be considered in the context of a 20-30 year span.

The noble intent of maximizing scientific coverage by a science unit is well understood under the rubric of curriculum. However, the students in this professional course need to be brought into the real world context. Certain flexibility of course, foci, program and advisory committee selection would allow students to be better educated in specific areas of professional and employment interest. It is a necessity for core understandings of social/economic/softer environmental and policy knowledge and perhaps other skills in management in order for MPM professionals to develop the capacity to "deliver the goods." This suggestion does not mean a smorgasbord approach to courses but the choice of electives through rational planning.

8.2.5 Program Effectiveness

The Department needs to strengthen its planning and record keeping. It was difficult, if not impossible, to obtain reliable data on enrollments and completion rates, and targeted goals and objectives for the graduate program remain elusive. Without a more systematic approach to planning and record

keeping, it will become increasingly difficult for the Department to respond to a rapidly changing external environment, and to secure the resources it needs to meet its objectives.

There has been an understandable tendency to look back at "the golden years." However there have been and will continue to be major changes in the national and SFU contexts for enhancing the research intensity needs of SFU as a major national university.

There is a noticeable lack of deliberative MPM program planning. The ERC inferred how the initial decades of planning occurred; the founding faculty brought a clear sense of mission and execution. Now however, we have to infer or assume that there was planning or the lack of it, which has resulted in the current predicament. The administrative hierarchy at SFU needs to be deliberative in its approach, clear and detailed in planning a course for MPM. Offering of the degree in the near short term will require recruitment of faculty with clear acceptance of the dual purpose of their role, the instructional role and the research and scholarship role expected of a major university. There is an impression of an asymmetry of focus between MPM and M.Sc. degrees from faculty perspectives. If so, any current and near term faculty recruits would judge program versus career development goals and help or hinder the value of the MPM over the next few years.

In particular, the DBS plan must set clear goals and targets for the MPM vs. M.Sc. graduate program for the next five years, not just in curriculum, but also in student enrollment, graduate training output, and adding of value to contemporary continuing professional education for pest managers. It is in this regard that faculty renewal, program evaluation, and funding must be planned, delivered and measured. This plan should be based on a careful analysis of market needs, areas of pest management technology development and labor attrition. The entire area of the MPM and its disciplinary constituents are constantly changing as impact of technology and end user's changing demands from industry and government become available. While we saw evidence that faculty are individually aware of some of these issues, the notion of a changing environment of pest management was one of the "good old days." The implications for the program were not adequately addressed in the self-study document (see: Document II). Without additional refinements in the self study plan, it will be impossible to ensure that existing and/or new faculty appointments and existing and/or new courses will meet the needs of the program and retention or surpassing of its goals and hence bring justification to the global resources that the university must avail.

8.2.6 Recruitment of MPM Students

In recent years the MPM program has not been marketed or promoted very effectively by the university at either a national or international level. Brochures are badly out-dated as are the web sites and other forms of promotional material. It is essential to promote the benefits of the MPM program globally in an effort to attract those students who will serve as the next generation of pest management practitioners around the world. There is great opportunity for recruitment of international students if contact with foreign governments and NGOs is established in the near future.

8.2.7 Duration of MPM Degree

For program rationalization a specific time frame or point could be established as mandatory. The thesis/project has been identified as a strength of the program. Presumably in choosing the research or thesis option a student is considering possibilities such as employment choices, or further graduate work. This direction should be made clear in program descriptions. Whether or not it is desirable to allow students to transfer from one stream to the other remains to be configured. Transfer from the MPM to the M.Sc. should not be encouraged.

9. THE NEXUS: MPM, THE DEPARTMENT, AND THE COLLEGE

It is apparent that a shared vision and declaration of values would be a first requirement for the management of the health and contextual growth of the MPM. There was acknowledgment by the Dean of Science that "MPM is a strong program" and I agree. However, there is a lack of ownership of the program compounded with the style of leadership that has not built coalitions to help preserve the program at this juncture given the financial transition state of SFU. The best nexus is to decide how to implement the hiring of new positions now with a caveat that such positions, if they must follow the 20:80 rule, 80% of the interest must reside in MPM proper and 20% in any one of the affiliate areas.

In the face of the complex and circumstantial issues have created the "problem" and from the top to bottom of the hierarchy we can either look for the blame or the solutions. To begin with, to create new solutions for this program, all parties must work harder to maintain communication. Thus, the negative innuendoes to the students, both MPM and M.Sc. should not be tolerated. The Dean's Office must ensure that appropriate mechanisms are in place to monitor and report student progress and that there is compliance with required procedures. We saw evidence of breakdown in communication between students and faculty, between faculty along disciplinary lines, and between the Department and the program. We believe that every student should be assigned a few nominal (*pro tem*) advisors, rather than a singular (the Director), upon admission to the MPM program. The job of these faculty members is to meet with the student, to advise on course selection, and to help steer the student through the administrative and community landscape. Progress of all students must be carefully tracked and reported to upstream. We recommend an annual assessment of progress of all students, even and especially part-time students.

There was a significant cultural dissonance between the Departments' MET and MPM programs. While the situation is particularly acute with respect to MPM, we believe that the problem is wider and more systemic. The MET program director held strong but questionable views on what pest management represented or how it differed from toxicology. Perhaps this is a passing sentiment, but the ERC was unimpressed by a view that the demise of one community would help the growth of the other. The origins of the dissonance may have come from the clash of the interface of traditional graduate education (M.Sc.) with education for professional (MPM) development. Graduate programs need to serve not only students destined for an academic career, but also those seeking professional updating and renewal. The needs of such students are different from those destined for research and university teaching. The needs of students requiring continuing post-graduate education do not appear to be adequately recognized, understood or served by the current offering.

Dissonance, misunderstanding and miscommunication have arisen partly because of the lack of systematic planning in all program developments. Careful planning is required, including enrollment targets for the various programs, the balance between thesis and project students, and the balance between full-time and part-time students. Such planning can guide admissions and supervisor assignments, and provide a basis for the assessment of outcomes. Effective planning can buttress the case for MPM, a professionally oriented graduate program.

10. POTENTIAL OPTIONS AND ACTIONS NEEDED FOR NEW DIRECTIONS

Both Colleges have the fiduciary duty, if not legal responsibility to the President and the BOG to take the first steps: hire now, lead to rebuilding of the community, create a coalition, stabilize the program and begin a strategy development process to develop a 5 year plan. One faculty member indicated "there were very few seminars last year and that faculty don't talk much." In my view it is astonishing as to how the state of past events have been tolerated and have lead to the present day conditions.

Let me reiterate, I see an academically strong faculty, typically individualistic, who have created a strong graduate (and MPM) programs renown nationally and internationally. They have remarkably strong funding. There has been tireless and strong scientific leadership in the MPM, which is in a danger of being abdicated forever. Then there is a serious situation with the next generation, the students, whose recruitment has been neglected, whose culture is weak and whose overall experience is moderation between despair and hope for a better day.

All areas of strength must be named, maintained and excelled. These are, (1) caliber of the faculty, (2) intensification of team work and incentives for synergies between MPM and M.Sc. experiences, (3) provision of a new identity to each of the graduate MPM and M.Sc. programs, (4) charting of new growth for the hard earned reputation of MPM (5) and vigorously promoting the program's leadership through external linkages in order to generate new solutions for the pest management industry. Finally, integrate well.

Outcomes to pursue immediately are (1) put all of your students first, (2) create a community focus for every graduate student irrespective of their earned degree, (3) recognize that connectivity of graduate and undergraduate students is the only vehicle that creates a strong program, faculty, department, college and university, and (4) make linkages with other programs (REM, MRM etc.) through focused partnership with GREs and IREs that have provided MPM adjuncts who can not be taken ad hoc or for granted.

My overall view is one of calculating the risk, realizing the opportunities, building from strength and acting now in a timely and aggressive manner.

11. RECOMMENDATIONS

In my judgment, SFU has the opportunity here to build a new MPM. This will necessitate taking the opportunity to:

1. recreate the governance of pest management practice through training professionals who go beyond current concepts and vocabulary
2. create awareness of how future practitioners will need to include technical, scientific, political and philosophical considerations
3. look ahead for the next 30 years to position the MPM program for what is coming, to anticipate change, and to expand and integrate new pest management practice.

If there is a willingness to factor these elements into a new MPM program, SFU can safely resume its leadership position in this field. In this instance, *the MPM program should be maintained as a professional program within the DBS, with differential fees.* This proposal is in accordance with the option (a) of the terms of reference.

Specific recommendations to attain this are:

1. Planning - strategic, vision, goals
2. Clarification of administration of the MPM within the DBS
3. Creation of a new environment of respect and cooperation within and between programs and departments
4. Review and implementation of the proposed curriculum, to include new areas of teaching/research
5. Faculty recruitment
6. Student recruitment
7. Support for linkages and collaboration
8. Evaluation - program, students, outcomes

If, however, there is no interest or commitment to this course, then *the MPM program should be disbanded as it stands, and be integrated in the M.Sc. program with standard fees.* This proposal would be in accordance with the option (b) of the terms of reference.