

**Centre for Environmental Policy**

Silwood Park  
Ascot, Berkshire SL5 7PY  
United Kingdom

Tel: +44 (0)207 5942206  
Fax: +44 (0)207 5942308

[j.mumford@imperial.ac.uk](mailto:j.mumford@imperial.ac.uk)  
[www.imperial.ac.uk/environmentalpolicy](http://www.imperial.ac.uk/environmentalpolicy)  
[www.imperial.ac.uk/people/j.mumford](http://www.imperial.ac.uk/people/j.mumford)

**Professor J D Mumford**

Director/Professor of Natural Resource Management

STDF Secretary  
World Trade Organization  
Centre William Rappard  
Rue de Lausanne 154  
CH-1211 Geneva  
Switzerland

30<sup>th</sup> March 2010

**REF: PPG application on *Developing trade opportunities: an integrated systems approach for pest risk management***

Dear Mr Spreij,

We are pleased to present an application for a Proposal Preparation Grant (PPG) in partnership with the Queensland University of Technology (QUT) in Australia and the Malaysian NPPO. We are seeking US\$30,000 to support development of a full proposal for a project that will be coming out of the SE Asian region.

The objective of the project is to trial an emerging concept in pest risk management using simple modelling for estimating efficacy of phytosanitary measures. This improvement in the risk management phase of ISPM no. 11 will support selection of measures in proportion to the estimated risk. It also supports the use of Systems Approach (ISPM no. 14) and negotiation of equivalence of measures (ISPM no. 24). Most importantly, such an enhancement will boost the opportunities for trade from developing countries in cases when the full data on efficacy of a proposed phytosanitary measure is not available.

Please find enclosed in our application the following documents: the application cover form, Appendix 1 (including letters of support), 2 (CVs of the supporting technical team), 3 (rationale), 4 and 5 (a work plan with designated timing), and 6 (a detailed budget) as separate documents.

Yours sincerely,



Prof John Mumford

## PROJECT PREPARATION GRANT (PPG)

### APPLICATION FORM

1. PPG title  
Developing trade opportunities: an integrated systems approach for pest risk management
  
2. Theme 1, 2 and/or 3  
Major: **Theme 2**: Capacity building for public and private organizations, notably with respect to market access.  
Minor: **Theme 1**: SPS capacity evaluation and planning tools, including the need for and implications of international standards and their application.
  
3. Starting date  
15 July 2010
  
4. Completion date  
15 February 2011
  
5. Requesting organization(s)  
**Imperial College London (ICL)**  
**Centre for Environmental Policy (CEP)**  
**Silwood Park Campus**  
**Ascot, Berkshire, SL5 7PY**  
**United Kingdom**  
Contact: Ms Megan Quinlan, Research Fellow  
Phone: +44 (0)7590250436  
Email: m.quinlan@imperial.ac.uk  
  
**Cooperative Research Centre for National Plant Biosecurity (CRC NPB)**  
**Queensland University of Technology (QUT)**  
**GPO Box 2434**  
**Brisbane QLD 4001**  
**Australia**  
Contact: Dr Peter Whittle, Principal Research Fellow  
Phone: +61 (0)434 729 855  
Email: peter.whittle@qut.edu.au  
  
**Crop Protection and Plant Quarantine Division,**  
**Department of Agriculture**  
**Wisma Tani, Jalan Sultan Sallahuddin,**  
**50632 Kuala Lumpur**  
**Malaysia**  
Contact: Ms Wan Normah Wan Ismail

Chief Plant Protection Officer  
Phone: +6 03 88704185  
Email: wanis@doa.gov.my

**See Appendix 1** (attached) for letters from the above implementing organisations. Letters of support are included from NPPOs and other relevant bodies.

6. Proposed consultant(s)

All work will be conducted by team members of the lead applicant and partners, along with representatives from SE Asian National Plant Protection Organisations (NPPOs) participating in a planning workshop. No additional external consultants will be employed.

However, curriculum vitae of the lead technical experts have been included (**Appendix 2**, attached).

Imperial College London (ICL)

(<http://www.imperial.ac.uk/environmentalpolicy>) is a leading international technical university that carries out applied research contracts for the European Commission, international organisations including United Nations, national governments and industrial partners. ICL has substantial experience of technical and financial reporting on a regular basis. Annual financial audited reports are available upon request.

7. PPG background and rationale **See Appendix 3** (attached).

8. Resultant project objectives

The objectives of the resulting project will be to:

1. Trial the use of modelling for estimating efficacy of phytosanitary measures in proportion to the estimated risk to plant resources, in the SE Asian regional context.
2. Refine the harmonised tool for pest risk management based on regional testing and share with all countries in the region.
3. Disseminate to other regions, if successful in SE Asia.

If this is achieved, the pest risk management imposed by importing country NPPOs will be more transparent, consistent and justified as proportional to the estimated risk. Measures combined in Systems Approach will be more widely applied

without resorting to unnecessary redundancy. National goals to reduce use of chemical-based end point treatments can be advanced with this use of Systems Approach. Exporting countries with fewer resources will have the capacity to more confidently negotiate equivalence agreements to use measures better suited to their own conditions. These same countries also will have more options for managing the risk of plant pests entering their own national territories and causing environmental degradation or impacting exports.

#### 9. PPG outputs

Three principal outputs will be achieved under the auspices of the PPG:

- 1) a description of the needs and priorities for pest risk management evaluation and design in the region, based on feedback from participating NPPOs and other relevant sources;
- 2) a regionally developed plan for demonstration of an emerging pest risk management tool (working from control point approach to reviewing possible measures, with Bayesian Belief Network (BBN) modelling of efficacy) in up to three representative SE Asian exporting countries, including activities to disseminate regionally and globally if successful; and
- 3) a project proposal featuring a description of objectives and activities and a budget in the proper format for seeking support for the full project, including how results will be disseminated to others in the region and globally.

#### 10. PPG activities

A detailed Work Plan appears in **Appendix 4**, which defines all the substantive activities required to achieve the outputs of the PPG.

#### 11. Timetable

A Timetable showing the timing of each activity (**Appendix 5**) is presented in the same document file as the Work Plan (see above). Activities begin immediately following the STDF Work Group discussions in July. We are hoping for a proposal to be submitted in early 2011 to take advantage of other initiatives and encourage early harmonisation of an emerging tool.

#### 12. Private/public sector

In the resultant project, it is possible that a trade association,

co-operation

private applied research group or other private entity will join as a participant. The development of the models to predict efficacy would benefit from the input of export/import or logistics industry already involved in application of phytosanitary measures.

### 13. Budget

The total PPG cost is US\$ 30,000, to complement in kind contributions from partners and other participants. A detailed breakdown of the proposed uses of the funds [\[1\]](#) appears in the attached **Appendix 6**.

Summary budget for PPG application *Developing trade opportunities: an integrated systems approach for pest risk management*

Item	Cost (US\$)	STDF Funding	Non-STDF funding*
Personnel services	<b>\$35,200.00</b>	\$5,000.00	\$30,200.00
Travel	<b>\$19,856.00</b>	\$19,856.00	\$0.00
Workshop costs	(incl mtg room, hotel, per diems for funded participants) <b>\$4,026.00</b>	\$4,026.00	\$0.00
General operating expenses	<b>\$1,118.00</b>	\$1,118.00	\$0.00
<b>TOTAL</b>	<b>\$60,200.00</b>	<b>\$30,000.00</b>	\$30,200.00

NB. several trips have already been funded by ICL and QUT

\* an estimate of in kind contribution from organisers and participants

### 14. Non STDF contributions

All three PPG partners are providing salaried staff time far beyond that covered by the requested grant. Office space, computers and other in kind contributions also are significant, although not calculated in the application. Furthermore, all NPPOs participating in the Workshop or other meetings are providing their staff time free of charge. This brings the total non STDF contributions to approximately US\$30,000, a similar funding level to that requested from STDF.

---

**Appendix 1:** Supporting letters (separate attachment)

---

**Appendix 2:** Curriculum Vitae and record of achievements (separate attachment)

---

**Appendix 3:** Description of PPG background and rationale (separate attachment)

---

**Appendix 4:** Work Plan and **Appendix 5:** Timetable (separate attachment)

---

**Appendix 6:** Budget (separate attachment)

---

**Appendix 7:** TORs for consultant(s) is not included, because external consultants are not employed. Appendix 4 refers to which partner will conduct each activity.

02/09

---

[1] Grant financing up to a maximum of US\$30,000 is available for project preparation.



JABATAN PERTANIAN  
( *Department of Agriculture* )  
BAHAGIAN PERLINDUNGAN TANAMAN DAN  
KUARANTIN TUMBUHAN  
( *Plant Protection & Quarantine Division* )  
WISMA TANI LAMA, JALAN SULTAN SALAHUDDIN,  
50632 KUALA LUMPUR  
Telefon: 03-20301400 Fax : 03- 26913530



*Harap sebutkan bilangan surat kami apabila menjawab*

Your ref :  
Our ref. : JP PTK 207/KIE/350/G (25)  
Date : 7 April 2010

STDF Secretary  
World Trade organization  
Centre William Rappard  
Rue de Lausanne 154  
Ch-1211 Geneva  
Switzerland

Dear Mr. Spreij,

**PPPG APPLICATION ON DEVELOPING OPPORTUNITIES : AN INTEGRATED SYSTEMS APPROACH FOR PEST RISK MANAGEMENT**

This is to indicate that the Department of Agriculture Malaysia is delighted to be a partner in the above cited application to STDF for a proposal preparation grant.

Our role will be as host of a small regional meeting of NPPO officials working on pest risk management. Experts from Imperial College London and Queensland University of Technology (QUT) are preparing the program and reviewing some case studies to further explain the methodology to be tested in our region under the future project.

The Department of Agriculture fully supports this initial discussion with the objective of preparing a proposal for a larger project. We ask that your staff and the Working Group agree to the support requested.

Yours sincerely,

**(WAN NORMAH WAN ISMAIL)**  
Director  
Crop Protection and Plant Quarantine Division  
For Director General  
Department of Agriculture Malaysia

c.c Director General of Agriculture Malaysia

Prof. John Mumford

Dr. Megan Quinlan

Mr. Piao Yongfan  
Executive Secretary APPPC, Bangkok

} Imperial College London

Ministry of Agriculture and Rural Development (MARD)  
Plant Protection Department (PPD)  
Plant Quarantine Diagnostic Centre (PQDC)  
149, Ho Duc Di, Dong Da, Ha Noi, Vietnam  
Tel/Fax: (84) 4 3851 3746  
Email: [duongminhtu@hn.vnn.vn](mailto:duongminhtu@hn.vnn.vn)

---

April 01<sup>st</sup>, 2010

STDF Secretary  
World Trade Organization  
Centre William Rappard  
Rue de Lausanne 154  
CH-1211 Geneva  
Switzerland

**REF: PPG application on *Developing trade opportunities: an integrated systems approach for pest risk management***

Dear Mr Spreij,

This is to indicate the interest of the Plant Protection Department (NPPO) of Vietnam is interested in participating in the proposal preparation process as outlined in the above cited application.

While we are using the Pest Risk Analysis approach, additional guidance on designing pest risk management plans for import and negotiating such plans for our exports is required and timely. In particular, the application of the ISPM 14 on Systems Approach is limited in our region due to lack of data on efficacy of measures.

I understand that this grant will be used to fund a meeting, supported by Imperial College London and its partners, to consider recent advances in a methodology for estimating the impact of phytosanitary measures in Europe and Australia, to see how these might be applied in our regional context. Based on this analysis, funding for a full project on this important issue will be pursued by a regional partnership.

Therefore, Plant Protection Department (NPPO) of Vietnam fully supports this meeting to discuss these concepts and prepare a proposal for a larger project. We ask that your staff and the Working Group agree to the support requested.

Yours sincerely,

  
Dr. Duong Minh Tu  
Head of PRA Unit  
Director  
Plant Quarantine Diagnostic Centre (PQDC)  
Plant Protection Department (PPD)  
Ministry of Agriculture and Rural Development (MARD)





**Australian Government**

**Department of Agriculture, Fisheries and Forestry**

STDF Secretary  
World Trade Organization  
Centre William Rappard  
Rue de Lausanne 154  
CH-1211 Geneva  
Switzerland

Dear Mr Spreij,

**RE PPG application on *Developing trade opportunities: an integrated systems approach for pest risk management***

This is to indicate that we at the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF) support the above cited application to the STDF by Imperial College London, in partnership with the Queensland University of Technology (QUT) and the hosting National Plant Protection Organisation of Malaysia.

Australia has a very keen interest in the development and adoption of systems approaches to phytosanitary management in trade, and has had several systems adopted by trading partners in support of exports including apples and cherries and domestic trade including citrus. The development of ISPM 14 *The use of integrated measures in a systems approach for pest risk management* started in Australia with an IPPC expert working group meeting that Australia hosted.

Like other countries, we are still exploring how to best integrate the recognition of good agriculture production practice into regulatory systems for phytosanitary pests. We are actively working with industry and state regulators on practical considerations of developing and adopting systems in preparation for an anticipated change in use patterns of some key post harvest pesticides later this year. The methodology to be presented in the proposed working meeting in Kuala Lumpur is one that we are pursuing, including key issues of coping with a lack of data and presence of uncertainty in regulating a pest risk management system. We have been sharing thoughts on this topic with the Imperial College experts and the QUT over the past two years and feel it is time to widen the discussion to include trade partners from SE Asia.

The creation of a harmonised methodology for implementing ISPM 14, of which estimating the impact of phytosanitary measures to achieve an appropriate level of protection is a key issue, will allow countries with fewer resources to communicate more effectively with the NPPOs of their target markets and improve their trading options. We consider that there will be generic elements of any system that could be standardised internationally based on their known efficacy, for example, end point inspection, efficacy of integrated pest management programs and field baiting. This would go a long way to addressing the lack of data for system components and lead to a more consistent international approach to acceptance of systems in international trade.

With pressure increasing on end point treatments such as methyl bromide and pesticides, adoption of systems approaches for phytosanitary risk management that no longer discourage use of non-chemical alternatives is of significant international benefit.

DAFF fully supports this initial discussion with the objective of preparing a proposal for a larger project. We ask that your staff and the Working Group agree to the support requested.

Yours sincerely

**Lois Ransom**  
Chief Plant Protection Officer

9 April 2010

18 Marcus Clarke Street Canberra City ACT GPO Box 858 Canberra ACT 2601 ph +61 2 6272 3933 fax +61 6272 3008 [www.daff.gov.au](http://www.daff.gov.au) ABN24 113 085 695

**DEPARTMENT OF AGRICULTURE, FISHERIES AND FORESTRY**



**Queensland University of Technology**  
Brisbane Australia  
Mathematical Sciences

31<sup>st</sup> March

STDF Secretary  
World Trade Organization  
Centre William Rappard  
Rue de Lausanne 154  
CH-1211 Geneva  
Switzerland

GPO Box 2434  
Brisbane  
Queensland 4001  
Australia

Dear Sir/Madam,

*Developing trade opportunities: an integrated systems approach for pest risk management*

This is to confirm that Queensland University of Technology (QUT) was consulted in the preparation of the above proposal to be submitted to the Standards and Trade Development Facility.

QUT fully supports this project and will collaborate with STDF and project co-investigators during the preparation of the full proposal and actual implementation of the project once funded. We look forward to STDF's positive consideration for the support requested.

Yours faithfully,

A handwritten signature in black ink, appearing to read 'I. W. Turner'.

**Professor Ian Turner**  
**Head of Discipline Mathematical Sciences**

A handwritten signature in black ink, appearing to read 'A. Herington'.

**Professor Adrian Herington**  
**Portfolio Director of Mathematical Information and Physical Sciences**



09 June 2010

**Mr. MELVIN SPREIJ**  
STDF Secretary  
World Trade Organization  
Centre William Rappard  
Rue de Lausanne 154  
CH-1211 Geneva  
Switzerland

**REF: PPG Application on Developing Trade Opportunities: An Integrated Systems Approach for Pest Risk Management**

Dear Mr. Spreij,

This is to inform you that the Bureau of Plant Industry (BPI) of the Philippines is interested to participate in the proposal preparation process as outlined in the above cited application.

The Philippines acknowledges its need to adopt systems approach for phytosanitary risk management in the PRA Process. This is in support to the implementation of ISPM 14 *The use of integrated measures in a systems approach for pest risk management*. However, like other developing countries, additional guidance on designing pest risk management plans is required due to lack of full data on efficacy of phytosanitary measures.

We understand that this grant will be used to fund a meeting to discuss a common framework estimating efficacy of phytosanitary measures and supporting Systems Approach in pest risk management plans.

Hence, the BPI fully supports this initial discussion with the objective of preparing a proposal for a larger project. We ask that your staff and the Working Group agree to the support requested.

Thank you and regards.

Truly yours

  
**LARRY R. LACSON, PhD**  
Director

**PPG application:** Developing trade opportunities: an integrated systems approach for pest risk management

Alan MacLeod  
The Food and Environment Research  
Agency  
Sand Hutton  
York  
YO41 1LZ

To: Marlynne Hopper  
STDF Secretariat  
World Trade Organization  
Centre William Rappard,  
Rue de Lausanne 154,  
CH-1211 Geneva,  
Switzerland

E-mail: [alan.macleod@fera.gsi.gov.uk](mailto:alan.macleod@fera.gsi.gov.uk)  
Fax: +44 (0) 1904 462250  
Tel: +44 (0) 1904 462350

Date: 25<sup>th</sup> May 2010

Dear Ms. Hopper,

The International Advisory Group for Pest Risk Analysis (IAGPRA) has considered the concept proposal put forward by The Centre for Environmental Policy, Imperial College London in partnership with Queensland University of Technology and the NPPO of Malaysia to apply for a Proposal Preparation Grant from the Standards Trade and Development Facility (STDF) to support the work they have been doing on an integrated systems approach for pest risk management in the context of the EU-funded PRATIQUE initiative. We have discussed this proposal and have the following comments.

- We recognize that the risk management portion of PRA is often the portion that is the least developed and that tools for risk management would be a useful contribution to PRA.
- We feel that any work towards this goal could potentially be of value to Parties Contracting to the IPPC.
- Recognizing that not all details of the project's objectives, nor the steps to be taken are fully available to us at present, IAGPRA nevertheless provisionally support the proposal by Imperial College, with the recommendation that the IAGPRA or the IPPC Secretariat continue to have a role in the project's direction as it develops.
- IAGPRA members could review and provide input into the initial application to ensure that it meets the needs of the IPPC and may subsequently provide input into the implementation of the work as it is conducted, if the proposal is funded by the STDF. In this way IAGPRA would provide guidance and some direction to the project while ensuring that it follows the general principles of the IPPC.

Yours sincerely,



Dr. Alan MacLeod

Chairman of IAGPRA

No. AC 2303/ 1465



National Bureau of Agricultural Commodity  
and Food Standards,  
Ministry of Agriculture and Cooperatives,  
50 Phaholyothin Rd. Ladyao, Chatuchak,  
Bangkok 10900, Thailand.  
Tel (662) 561-2277 Fax (662) 561-3373

23 June B.E. 2553 (2010)

Dear Mr. Spreij,

**Ref : PPG application on Developing trade opportunities: an integrated systems approach  
for pest risk management**

This is to indicate the interest of the IPPC Contact Point of Thailand in participating in the proposal preparation process as outlined in the above cited application.

While we are using the Pest risk Analysis approach, additional guidance on designing pest risk management plans for import and negotiating such plans for our exports is required and timely. In particular, the application of the ISPM 14 on System Approach is limited in our region due to lack of data on efficacy of measures.

We understand that this grant will be used to fund a meeting, supported by Imperial College London and its partners, to consider recent advances in a methodology for estimating the impact of phytosanitary measures in Europe and Australia, to see how these might be applied in our regional context. Based on this analysis, funding for a full project on this important issue will be pursued by a regional partnership.

Therefore, IPPC Contact Point of Thailand fully supports this meeting to discuss these concepts and prepare a proposal for a large project. We ask that your staff and the working Group agree to the support requested.

Yours sincerely,

(Mr. Niwat Sutemechaikul)  
Secretary General  
National Bureau of Agricultural  
Commodity and Food Standards



Professor of Natural Resource Management  
Director  
Centre for Environmental Policy  
Faculty of Natural Sciences, Imperial College London,  
Silwood Park, Ascot, Berkshire, SL5 7PY  
United Kingdom  
Tel: +44 (0) 207 594 2206 (or 9301)  
Fax: +44 (0) 207 594 2308  
Email: [j.mumford@imperial.ac.uk](mailto:j.mumford@imperial.ac.uk)  
Web: [www.imperial.ac.uk/people/j.mumford](http://www.imperial.ac.uk/people/j.mumford)

---

**Professional profile:**

- John Mumford works at the interface of applied ecological management and social/economic management of environmental and development issues, agricultural pests and invasive species, fisheries, and in the development of environmental risk management systems. He is an authority on economic, decision and policy analyses for biosecurity and resource management risks. He has led international missions to determine environmental risk management research, training and implementation priorities and is and has been a member of advisory bodies for UK and UN technical cooperation agencies in agricultural and environmental development. Within the Centre for Environmental Policy he has been responsible for research groups in applied ecology; environmental management; environmental chemistry; and nuclear reactor administration. He has been responsible for implementation and evaluation of integrated pest management programmes in cocoa, coffee, rice, cotton, fruit and other crops and for migratory and other public sector pest control programmes, such as eradication, suppression and quarantine. The management and evaluation of risk in the environment is an area of particular concern, with applications in biosecurity fisheries, resource management and environmental governance. His teaching covers the interactions of economics and ecology in many aspects of applied resource management, environmental risk and pest management. He has been Director, Centre for Environmental Policy, Faculty of Natural Sciences, Imperial College London, UK since October 2006 and is a member of the Executive Board of the Imperial College Institute of Security Science and Technology.

---

**Qualifications:**

- BS, 1974 (Agriculture, Purdue); PhD Applied Entomology, 1978 (London) [Zoology and Applied Entomology, Imperial College]
- Professional bodies: Agricultural Economics Society; Royal Entomological Society (past Vice President and past Member of Council); Entomological Society of America; European Association of Agricultural Economics

---

**External Research/Advisory Committees and Commercial Roles:**

- Great Britain Non-Native Species Risk Analysis Panel (Chair 2007-2010) (supports DEFRA, Scottish Executive, Welsh Assembly decisions on management of non-native species threats)
- United Kingdom Department for International Development Crop Protection Programme Advisory Committee (1999-2005)
- International Atomic Energy Agency Standing Advisory Group on Technical Assistance and Cooperation (United Kingdom Representative 2001-2004; continuing as advisor to UK DECC on nuclear technology applications 2005)
- Marshall Aid Commemoration Commission, UK Foreign & Commonwealth Office (Alumni Observer 2001)
- Natural Resources International Foundation (Chairman 2004-2010; Trustee 2003-2004)

---

**Awards:**

- UK Department for International Development Renewable Natural Resources Research Prize 2000 (a prize independently judged to be the best project within DfID's annual £25 million portfolio of international natural resources research, £253,000 awarded)
- John V Osmun Distinguished Alumni Award 2006, Purdue University, USA
- Distinguished Agricultural Alumni Award, Purdue University, USA 2010

---

**Selected recent journal articles:**

1. Carrasco, L.R., Harwood, T.D, Toepfer, S., MacLeod, A., Levay, N., Kiss, J, Baker, R.H.A., Mumford, J.D., and Knight, J.D. (2010) Dispersal kernels of the invasive alien western corn rootworm and the effectiveness of buffer zones in eradication programmes in Europe. *Annals of Applied Biology*, 156:63-77. <http://www3.interscience.wiley.com/cgi-bin/fulltext/122665677/PDFSTART>
2. Carrasco, L.R., Baker, R., MacLeod, A., Knight, J.D., and Mumford, J.D. (2009) Optimal and robust control of invasive alien species spreading in homogenous landscapes. *Journal of the Royal Society Interface*, 15:63-77. <http://rsif.royalsocietypublishing.org/content/early/2009/09/08/rsif.2009.0266.full>

3. Mumford, J., Quinlan, M. M., Beech, C. J., Alphey, L., Bayard, V., Capurro, M. L., Kittayapong, P., Knight, J. D., Marrelli, M. T., Ombongi, K., Ramsey, J.M., and Reuben, R. (2009) MosqGuide: A project to develop best practice guidance for the deployment of innovative genetic vector control strategies for malaria and dengue. *AsiaPacific Journal of Molecular Biology and Biotechnology*, 17:93-95 <http://www.msmbb.org.my/apimbb/html173/173cont.htm>
4. Beech, C. J., Vassan, S. S., Quinlan, M.M., Capurro, M.L., Alphey, L., Bayard, V., Bouare, M., McLeod, M.C., Kittayapong, P., Lavery, J.V., Lim, L.H., Marrelli, M.T. Nagaraju, J., Ombongi, K., Othman, R. Y., Pillai, V., Ramsey, J., Reuben, R., Rose, R.I., Tyagi, B. K., and Mumford, J. (2009) Deployment of innovative genetic vector control strategies: Progress on regulatory and biosafety aspects and development of bestpractice guidance. *Asia Pacific Journal of Molecular Biology and Biotechnology*, 17:75-85. <http://www.msmbb.org.my/apimbb/html173/173cont.htm>
5. Mumford, J.D., Leach A. W., Levontin P., Kell L. (2009) Insurance mechanisms to mediate economic risks in marine fisheries. *ICES Journal of Marine Science*, 66:950-959; doi:10.1093/icesjms/fsp100
6. Copp, G.H., Vilizzi, L., Mumford, J., Fenwick, G.V., Godard, M.J., Gozlan, R.E. 2008. Calibration of FISK, an invasiveness screening tool for nonnative freshwater fishes. *Risk Analysis*, 29:457-467.
7. Waage, J.K., Mumford, J.D. (2008) Agricultural biosecurity. *Philosophical Transactions of the Royal Society B*, 363:863876
8. Leach, A.W. and Mumford, J.D. (2007) Pesticide Environmental Accounting: A method for assessing the external costs of individual pesticide applications. *Environmental Pollution*, 151:139-147. ISSN 02697491
9. Mumford, J.D. (2007) Compensation payments for quarantine breaches in plant health? *Phytoparasitica*, 35:219-221
10. Stonehouse, J.M., Mumford, J.D., Verghese, A., Shukla, R.P., Satpathy, S., Singh, H.S., Jiji, T., Thomas, J., Patel, Z.P., Jhala, R.C., Patel, R.K., Manzar, A., Shivalingaswamy, M.S., Mohanatha, A.K., Nair, B., Vidya, C.V., Jagadale, V.S., Sisodiya, D.B., Joshi, B.K. (2007) Villagelevel areawide fruit fly suppression in India: Bait application and male annihilation at village level and farm level. *Crop Protection*, 26:788-793.
11. Fraser, R.W., Cook, D.C., Mumford, J.D., Wilby, A., and Waage, J.K. (2006) Managing outbreaks of invasive species: Eradication vs suppression. *International Journal of Pest Management*, 52:261-268. <http://www.informaworld.com/smpp/content-content=a758283498-jumptype=rss>
12. Mumford, J.D. (2005) Community actions to improve productivity, quality and markets in fruit and cocoa pest management in Asia. *Aspects of Applied Biology* 75:47-52.

---

### Books edited/book chapters

1. James, A.A., Mumford, J.D., James. S.L., Toure, Y.T. (2010) Progress and prospects for the use of genetically modified mosquitoes to inhibit disease transmission. WHO, Geneva, Switzerland. 64pp. ISBN 978 92 4 159923 8 <http://apps.who.int/tdr/publications/trainingguidelinepublications/gmmreport/pdf/gmmreport.pdf>
2. Kovaleski, A., Mumford, J.D. (2007). Pulling out the evil by the root: The codling moth eradication program in Brazil. In: Vreysen M.J.B., Robinson A.S., Hendrichs J. (eds.) *AreaWide Control of Insect Pests: From Research to Field Implementation*, Springer, Dordrecht, Netherlands. pp581-590. ISBN 9781402060588
3. Mumford, J.D. (2007). Model frameworks for strategic economic management of invasive species. In: Lansink, A.O. ed. *Economics of Plant Health*. 202pp. Springer, Dordrecht, Netherlands. pp181-190. ISBN 1402058268

---

### Agency and Other Reports

1. Mumford, J.D., Knight, J.D., and Kenyon, L. 2009. Honeybee health (risks) in England and Wales. National Audit Office, London, UK. 89pp. [http://www.nao.org.uk/publications/0809/the\\_health\\_of\\_livestock.aspx](http://www.nao.org.uk/publications/0809/the_health_of_livestock.aspx)
2. Parrot, D. Roy S, Baker R, Cannon R, Eyre D, Hill M, Wagner M, Preston C, Roy H, Beckmann B, Copp, G.H., Edmonds, N., Ellis, J., Laing, I., Britton, J.R., Gozlan, R.E., and Mumford, J. 2009. Horizon scanning for new invasive non-native animal species in England. Natural England Commissioned Report NECR009, Natural England, Sheffield, United Kingdom. 22 May 2009. 114pp. <http://naturalengland.etraderstores.com/NaturalEnglandShop/product.aspx?ProductID=260f0d5feefe-4b5c905192d43b7456c1>
3. Leach, A.W., Mullie, W.C., Mumford, J.D., Waibel, H. (2008). Spatial and historical analysis of pesticide externalities in locust control in Senegal. FAO, Rome, Italy. 91pp.
4. Quinlan, M.M., Mumford, J.D., Knight, J.D. and Stonehouse, J.M. (2008). Model Business Plan for a Sterile Insect Production Facility. IAEAMB. International Atomic Energy Agency, Vienna, Austria. 386pp. ISBN 9789201100078 <http://wwwpub.iaea.org/MTCD/publications/PubDetails.asp?pubId=7130>
5. Waage, J.K., Mumford, J.D., Leach, A.W., Knight, J.D., Quinlan, M.M. 2007. Responsibility and costsharing in quarantine plant health. Department for Environment, Food and Rural Affairs, London, United Kingdom. 126pp
6. Brader, L., Mumford, J., Naider, K., SauvinetBedouin, R., Holleran, E. 2007. Independent evaluation of the workings of the International Plant Protection Convention and its institutional arrangements, FAO, Rome, Italy. 73pp. ([www.ippc.int](http://www.ippc.int))
7. Cook, D.C., Waage, J.K., Mumford, J.D., Fraser, R.W., Wilby, A. 2006. The benefits of potato ring rot exclusion from the United Kingdom. Foresight. Infectious Diseases: preparing for the future. T8.11. Office of Science and Innovation, Department of Trade and Industry, London, United Kingdom. DTI/Pub 8268/Sk/04/06/NP. URN 06/760. 20pp. [http://www.foresight.gov.uk/Detection\\_and\\_Identification\\_of\\_Infectious\\_Diseases/Reports\\_and\\_Publications/Final\\_Reports/](http://www.foresight.gov.uk/Detection_and_Identification_of_Infectious_Diseases/Reports_and_Publications/Final_Reports/)
8. Mumford, J.D. (2005) Economic analysis of role of sterile insect technique for management of codling moth (*Cydia pomonella*) in Brazil. International Atomic Energy Agency, Vienna, Austria. 14pp.
9. Mumford, J.D. (2005) Implications for controls on New Organism Releases under the HSNO Act. Environmental Risk Management Agency, Wellington, New Zealand. 17pp.
10. DEFRA (2005) UK Nonnative Organisms Pest Risk Assessment Scheme. DEFRA contract CR0293. DEFRA, London, UK. 83pp plus annexes. <http://www.defra.gov.uk/wildlifecountryside/resprog/findings/nonnativerisks/pdf/usermanual.pdf>
11. Waage, J.K., Fraser, R.W. Mumford, J.D., Cook, D.C., and Wilby, A., (2005) A new agenda for biosecurity. DEFRA, London, UK. 198pp.

# Mary Megan Quinlan

---



## **Research Fellow**

Centre for Environmental Policy  
Faculty of Natural Sciences  
Imperial College London  
Silwood Park Campus  
Ascot, Berkshire, SL5 7PY

Tel: +44 (0)7590250436

Email: [m.quinlan@imperial.ac.uk](mailto:m.quinlan@imperial.ac.uk)

Web: <http://www3.imperial.ac.uk/people/m.quinlan>

---

## ***Professional Profile***

Expert on the policies, institutional structures and methodologies of regulatory sciences for plant products. Work has often involved coordinating people and resources from the private sector with government programs in combined efforts towards development, trade and environmental objectives.

- Contractor or employee of Imperial College London; CAB International Associate: 2000-current
  - InterConnect Associates, owner and consultant: 1990-2000
  - USDA employee: 1985-1990 (FAS in Guatemala, OICD in Washington, DC)
- 

## ***Worked with a range of pest risk management issues over the past 25 years, examples include:***

**Harmonised approaches to PRA:** Member of IPPC Expert Working Group that drafted supplements to ISPM no. 11, PRA for Quarantine Organisms, on Invasive Species and Living Modified Organisms. (Vienna, 2001; Ottawa, 2002); hosted initial discussions on draft ISPM on efficacy of phytosanitary measures (Wye, England, 2002).

**Systems approach:** Developing enhanced section in the EPPO PRA scheme to support use of systems approach (2008-2010). Member of upcoming IAEA/FAO Expert Consultation (June 2010).

**Commodity treatment:** Coordinated research by various Latin American research teams and USDA/ARS approval process for hot water treatment on mango. (US, Guatemala, Mexico, 1987-1993). Advised controlled atmosphere private company on possible uses for quarantine (US, 1999-99). Achieved recognition of research on vapor heat for tropical fruits as equivalent to HWT.

**Shipping corridors and host status:** Commercial banana as a host of Carambola fruit fly in South America (US, Suriname, 1990-93). Increased “admissibles list” for entry to the US through both limited port/state entry agreements and host research. Supported team to first open Japanese market to Central American fruits of minor host level to fruit flies (PROEXAG and EXITOS projects, USAID funded, Central America, 1990-95).

**Preclearance and inspection:** Member of Safeguarding Review team of USDA/APHIS (1999). Review of host national operations of USDA preclearance in Dominican Republic (1991).

**HACCP and systems analysis:** Expert Consultation IAEA/FAO on transboundary movement of sterile insects (Vienna, 2001). Liaison for banana industry with US FDA for agreeing protocol to



continue shipping from cholera epidemic zone (Peru).

---

### *Examples of Technical References*

1. Quinlan MM, Knight J, Holt J, Mumford JD, Leach AW, Baker R, Petter F (2010). PRATIQUE. An EU Framework 7 Research Project: Enhancements of Pest Risk Analysis Techniques. Deliverable No. 4.5: **Specification for Systems Approach component analysis in PRA**. 19pp.
2. Quinlan MM, Knight J, Holt J, Mumford JD, Leach AW, Baker R, Petter F (2010). PRATIQUE. An EU Framework 7 Research Project: Enhancements of Pest Risk Analysis Techniques. Milestone No. 4.8: **First version of the Systems Approach module for PRA developed and tested**. 28pp.
3. Quinlan MM & Ikin R (2009). PRATIQUE. An EU Framework 7 Research Project: Enhancements of Pest Risk Analysis Techniques. Deliverable No. 4.2: **A review of the application of Systems Approach to risk management in plant health**. 69pp. Available at: <https://secure.fera.defra.gov.uk/pratique/index.cfm>.
4. Waage JK, Mumford JD, Leach AW, Knight JD, Quinlan MM (2007). **Responsibility and cost-sharing in quarantine plant health**. Report to Department for Environment, Food and Rural Affairs, London, United Kingdom. Publisher: DEFRA. pp1-26.
5. Quinlan MM and Larcher-Carvalho A (2007). **Tools of the Trade: The International Business of SIT**. pp425-48. In: Vreysen MJB, Robinson AS and Hendrichs J (eds). Area-Wide Control of Insect Pests: From Research to Field Implementation. Springer Publishing, Netherlands. 789pp.
6. Day RK, Quinlan MM and Ogutu WO (2006). **Analysis of the Application of the Phytosanitary Capacity Evaluation Tool**. Report to the Secretariat of the International Plant Protection Convention.
7. Kairo MTK, Cock MJW and Quinlan MM (2003). **An Assessment of the Use of the Code of Conduct for the Import and Release of Exotic Biological Control Agents (ISPM No. 3) since its endorsement as an international standard**. Biocontrol News and Information 24, 15N-27N.
8. Murphy ST, Wilde ISH, Quinlan MM, Soetikno S and Odour G (2001). **Alien Invasive Species: Review of Activities and Programmes on Prevention, Early Detection, Eradication and Control**. Commissioned by the Convention on Biological Diversity for the Sixth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) in March, 2001. Document UNEP/CBD/SBSTTA/6/INF/5.
9. FAO (2001). **The State of Food and Agriculture, special chapter on Economic Impacts of Transboundary Pests**. Co-author. Rome, 2001. pp199-267. Available at: <ftp://ftp.fao.org/docrep/FAO/003/x9800e/x9800e00.pdf>
10. Hallman G and Quinlan MM (1996). **Synopsis of Postharvest Quarantine Treatment Research**. In: McPherson BA and Steck GJ (eds). Fruit Fly Pests: A World Assessment of Their Biology and Management. St Lucie Press, Delray Beach, Florida. pp473-477.

---

### *Qualifications*

- Bachelors Degree (cum laude) – Botany (1981), Duke University, Durham, North Carolina.
- Masters of Science - Tropical Crop Production (1984), Centro Agronómico Tropical de Investigación y Enseñanza (CATIE), Turrialba, Costa Rica, Central America.

# CURRICULUM VITAE

## KERRIE MENGERSEN

### Qualifications

- Bachelor of Arts (Honours 1<sup>st</sup> class), University of New England, 1985
- PhD in Statistics, University of New England, 1989

### Employment History

- Commercial statistical consultant, Siromath Pty Ltd, 1987-1989
- Assistant Professor in Statistics, Bond University, 1989-1990
- Lecturer/Senior Lecturer in Statistics, Central Queensland University, 1990-1992
- Visiting Associate Professor in Statistics, Colorado State University, USA, 1993
- Lecturer/Senior Lecturer in Statistics, QUT, 1993-2000
- Professor and Head of Discipline in Statistics, University of Newcastle, 2001-2004
- Research Professor, QUT, 2004-
- Director of Faculty of Science Research Centre, Associate Dean of Research 2005-2007.

### Awards and Prizes

- QUT Vice-Chancellor's Awards for Research Excellence (Individual and Team) 2009
- CRC National Plant Biosecurity Award for Research Translation to Industry (Team) 2009
- QUT Faculty of Science award for outstanding research, 2007
- Tweedie Medal, ISBA MCMCSki Conference, 2008

### Professional Service

- Elected Fellow of Institute of Mathematical Sciences 2005 and Royal Statistical Society 2004
- Executive Member of the International Society for Bayesian Analysis 2005-2008 and Statistical Society of Australia 2004-2009
- Inaugural President of the Australasian Chapter of ISBA 2004-2009
- Member of the International Biometrics Society and International Environmetrics Society.
- Managing Editor for the *Australian and New Zealand Journal of Statistics* (2005-2009)
- Past member of the Advisory Panel for the *Journal of Bayesian Analysis*
- Past Associate Editor for *Biometrics*
- Programme Chair for 2 ISBA World Meetings and 5 Annual ASBA Workshops 2004-2010
- Programme Committee for 6 national/international conferences 2002-2010
- Board member of the Wesley Research Institute 1998 to 2000, 2005-

### Consultancy and Short Courses

- Experience as fulltime consultant statistician with Siromath Pty Ltd (1986-1989), Coordinator of the Statistical Consulting unit at QUT (1995-2001) and co-Director of Newstat Ltd at The University of Newcastle (2001-2004).
- Consultancy project for over 20 industry and government client organisations in the past 5 years.
- Design and delivery of 1-5 day short courses for commercial clients and academic organisation on topics ranging from industrial statistics to frontier research; 22 courses in five Australian states and four countries in 2004-2009.

### Selected Publications 2005-2010

#### Invited Book Chapters and Major Reviews (11)

LEE, K., MENGERSEN, K.L., MARIN, J.-M., ROBERT, C.P. (2008) Bayesian inference on mixtures of distributions. In *Perspectives in Mathematical Sciences I: Probability and Statistics*. Editors N.S.N. Sastry, T.S.R.K. Rao, M. Delampady, B. Rajeev. Statistical Science and Interdisciplinary Research Volume 7, World Scientific Press.

DENHAM, R.J. and MENGERSEN, K.L. (2007) Geographically assisted elicitation of expert opinion for regression models. *Bayesian Statistics* 8. Edited by J.M. Bernardo, M.J. Bayarri, J.O. Berger, A.P. Dawid, D. Heckerman, A.F.M. Smith, M. West. Oxford University Press. ISBN-13:978-0-19-921465-5.

MARIN, J.-M., MENGERSEN, K., ROBERT, C.P. (2005) Bayesian Mixtures. *Handbook of Statistics Vol. 25, on Bayesian Statistics*. Editors D. Dey and C.R. Rao. Elsevier. (50 pp.)

### **Refereed International Journal Articles` - Accepted (49)**

STANAWAY, M., REEVES, R., MENGERSEN, K. (2010) Hierarchical Bayesian modelling of early detection surveillance for plant pest invasions. *J. Environmental and Ecological Statistics*. Acc. 03/10.

HU, W., CLEMENTS, A., WILLIAMS, G., TONG, S., MENGERSEN, K. (2009) Bayesian spatiotemporal analysis of socio-ecologic drivers of Ross River virus transmission in Queensland, Australia. *American Journal of Tropical Medicine and Hygiene*. Acc. 12/09.

JARRAD, F.C., BARRETT, S., MURRAY, J., PARKES, J., STOKLOSA, R., MENGERSEN, K., WHITTLE, P. (2009) Improved design method for biosecurity surveillance and early detection of non-indigenous rats. *New Zealand Journal of Ecology Special Issue*. Acc. 10/09.

JOHNSON, S., HAMILTON, G., FIELDING, F., MENGERSEN, K. (2009) An integrated Bayesian Network approach to Lyngbya majuscula bloom initiation. *Marine Environmental Research*. Acc. 07/09.

BARRETT, S., WHITTLE, P., MENGERSEN, K., STOKLOSA, R. (2009) Biosecurity threats: the design of surveillance systems, based on power and risk. *Environmental and Ecological Statistics*. Online DOI 10.1007/s10651-009-0113-4

JAMES, A., LOW CHOY, S., MENGERSEN, K. (2009) Elicitor: an expert elicitation tool for ecology. *Environmental Modelling and Software*. Acc. 07/09. <http://dx.doi.org/10.1016/j.envsoft.2009.07.003>

FALK, M., DENHAM, R., MENGERSEN, K. (2009) Estimating uncertainty in the revised universal soil loss equation via Bayesian melding. *J. Agricultural, Biological and Environmental Statistics*. Acc. 03/09.

LOW CHOY, S., O'LEARY, R.A., MENGERSEN, K. (2008) Elicitation by design in ecology: using expert opinion to inform priors for Bayesian statistical models. *Ecology*. Acc. 05/08.

### **Refereed International Journal Articles - Published (46)**

STRICKLAND, C., DENHAM, R., MENGERSEN, K. (2009) Efficient Bayesian estimation of multivariate state space models. *Computational Statistics and Data Analysis*. 53, 4116-4125.

DENHAM, R., MENGERSEN, K. (2007) Eliciting expert opinion for regression models with geographical data. *J. Bayesian Analysis*. 2(1), 99-136.

### **Selected Publications prior to 2005**

#### **Refereed Conference Publications (20)**

#### **Refereed International Journal Articles - Published (46)**

MARTIN, T.G., KUHNERT, P.M., MENGERSEN, K., POSSINGHAM, H.P. (2004) The power of expert opinion in ecological models: A Bayesian approach examining the impact of cattle grazing on birds. *Ecological Applications*. 15 (1): 266-280.

BESAG, J., GREEN, P., HIGDON, D., MENGERSEN, K. (1995) Bayesian computation and stochastic systems. *Statist. Science* 10, 3-66.

# Curriculum vitae – Dr Peter Whittle

---

## Personal details

*Full name:* Peter James Latimer Whittle

*Born:* 7 June 1960, Adelaide, Australia. *Nationality:* Australian

*Home address:* 1/3 Shottery St, Yeronga QLD 4104, Australia

*Phone:* +61 (0) 434 729 855. *Email:* [peter.whittle@qut.edu.au](mailto:peter.whittle@qut.edu.au)

## Employment

Principal Research Fellow, Faculty of Science and Technology, Queensland University of Technology

GPO Box 2434, Brisbane QLD 4001

## Qualifications

Bachelor of Agricultural Science, University of Adelaide, 1984

Doctor of Philosophy, Faculty of Natural Resource Sciences, University of Adelaide, 1993

Master of Business Administration, University of Queensland, 2003

## Work history

2007-present Principal Research Fellow - Cooperative Research Centre for National Plant Biosecurity, QUT – *developing biosecurity surveillance system designs, collaborating on risk analysis research*

2003 –2007 Principal Scientist, Biosecurity Queensland, Department of Primary Industries and Fisheries, Brisbane – *key state and national roles in biosecurity science, policy, regulatory services, management*

2000 – 2003 Principal Scientist, Animal & Plant Health Service, Department of Primary Industries, Cairns – *managing projects in agricultural and remote area biosecurity of animals and plants. Preparedness, surveillance, emergency response, eradication, market access*

1994 - 2000 Plant Pathologist, Bureau of Sugar Experiment Stations, Brisbane, Qld – *operating sugarcane quarantine and biosecurity, domestic and international; industry services in crop disease management; research in diagnostic systems and nematology*

1992-1993 Special Projects Officer, Research Office, Queensland University of Technology

1985 – 1991 Plant Pathologist, South Australian Research & Development Institute – *research and industry services on fungal and nematode root diseases of wheat and barley; PhD studies.*

## Appendix 3 RATIONALE

### The target problem

International trade and travel can introduce exotic pests that pose a threat to both natural plant resources and managed crop and forest production. An effective plant health protection scheme, operating in each country and region, can prevent the introduction of exotic plant pests while still allowing movement of goods and people without undue restriction.

A critical factor in this system of balances is the use of restrictions and management measures that are justifiable and in proportion to the threat posed. Restrictions beyond this point are considered to be non-tariff trade barriers. Under the harmonised regimes of the International Plant Protection Convention (IPPC) and the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS), the National Plant Protection Organisations (NPPOs) use Pest Risk Analysis (PRA) to estimate the risk from specific trade or other ventures and to propose phytosanitary measures to reduce that risk to an acceptable level.

The *raison d'être* for the PRA process, however, is to find the management options that will keep free trade "safe". The International Advisory Group on PRA (IAGPRA) to the IPPC recognizes that the Pest Risk Management phase is often the weakest. This phase consists of evaluation of management options and selection of the best phytosanitary measure, or combination of measures, to apply to trade or other pathways to achieve an appropriate level of protection (ALOP). There has been relatively little support for capacity building in the *decision making process* for the Pest Risk Management phase of PRA since the advent of the harmonised PRA approach.

Historically, guidance on Pest Risk Management has been general, as in the International Standard on Phytosanitary Measures (ISPM) nos. 2 and 11 on the overall PRA process, or more focused as in the ISPM no. 4 on pest free areas (FAO, 1995) or ISPM no. 14 (FAO, 2002) on the use of Systems Approach. Although more detailed, ISPM no. 14 in particular has proved challenging to implement. This is largely due to the perceived complexity of calculating a combined impact of measures when the efficacy of each measure is not well known. Importing country NPPOs therefore have been more likely to select the highly documented, end-point treatments (e.g. commodity treatments) that were developed under laboratory conditions to achieve a measurable impact on the described risk, even when such treatments have other disadvantages.

Now, the days of relying on such end-point treatments to "clean up" infested products are past. Importing countries' national objectives and consumer demands align more closely with Good Agricultural Practices (GAP) in the field, confirmatory targeted pest trapping, controlled handling along the chain from farm to fork and non-chemical interventions, rather than sole reliance on pesticides and fumigants. Yet the challenge remains for the importing NPPO to justify a requirement for such combined measures.

Exporting countries also may prefer these combined measures over sole reliance on pesticides and fumigants. Currently when the exporting country's NPPO opposes restrictions or proposes equivalent options, many times there are years of delays and opaque processes before the importing NPPO reaches some decision.

An agreed framework for evaluating the impact or efficacy of phytosanitary measures (especially those other than end-point treatments) will support increased trade, while maintaining evidence-based restrictions.

### The impact of a project on Pest Risk Management

The project resulting from this PPG will lead to more sustainable trade opportunities in plant products/commodities by implementing a new, versatile and effective method to map out and model pest risk management in trade. Such a transparent, mutually agreed framework for understanding how much each phytosanitary measure – or measures in combination – reduces the estimated risk could open new trade and present alternatives to prohibition for existing trade that has encountered problems. Agreeing on a harmonised framework requires less investment of resources and time by each individual country, avoids prolonged delays in decision making and clarifies criteria for decisions.

The project will directly support implementation of ISPM no. 14, *'The use of integrated measures in a systems approach for pest risk management'*, which gives guidance on the use of a combination of measures that, when integrated, provide effective mitigation of pest risk in a way that is the least trade restrictive. (It also will apply to single measures, but these have been less problematic in the past.) Systems Approaches are of increasing interest to NPPOs in the region for addressing emerging phytosanitary trade issues outlined elsewhere in this proposal.

Under the current PRATIQUE project of the European Commission (website: [secure.fera.defra.gov.uk/pratique](http://secure.fera.defra.gov.uk/pratique)), a framework for Systems Approaches has been designed using a Bayesian Belief Network (BBN), a type of probabilistic model. A BBN template can be applied to specific case studies of phytosanitary trade. The BBN models a commodity pathway with which a regulated pest may be associated, such that estimates of the probability of the effect of a phytosanitary measure can be integrated to calculate the overall conditional probability of infestation/freedom from the target pest. This provides an estimated total efficacy of combined measures based on data along with expert opinion where data is lacking.

Furthermore, the BBN enables node (control point) estimates to be varied, so that the impact of uncertainty can be evaluated. In other words, this tool can inform which missing data is most important, so that resources can be focused on research or data collection to address the “weakest link” of a System. This saves investment of resources on obtaining more data where the information will not alter the action taken – and bypasses the tendency to delay decisions due to uncertainty on particular issues.

Using a BBN offers a range of benefits to developing, negotiating and managing Systems Approaches agreements, compared to conventional systems:

- using modelling based on a control point approach to risk management, as opposed to *ad hoc* consideration of the effects of phytosanitary measures, allows a more structured and objective decision making process;
- a Bayesian approach accommodates uncertainty in the model, which in most situations will be important due to a lack of quantitative data. Bayesian statistics can use expert estimates, which are often well-founded even where there is no published information. The sensitivity of the system to uncertainty in these estimates can then be tested, so that further data can be sought, or it can be demonstrated that additional data is not essential;
- developing a BBN and populating it with node estimates can be a highly cooperative activity among stakeholders, which will potentially simplify agreement on jointly developed solutions;
- a BBN is a learning system, so as data becomes available during trade or during a test period, the model can be updated. This also could provide a mechanism for monitoring and review of the trade and its phytosanitary security. It may also create opportunities for trade that is seasonal or otherwise restricted and thus requires monitoring of changes in key factors.

BBN modelling for control point-based risk management plans is already emerging as a tool to handle data on impact of measures for Pest Risk Management. (See, for example, letter of support from the Australian NPPO.) It is important to involve export-focused countries in the next phase of the testing of this approach, particularly lesser developed ones. Otherwise, the tool could be adopted without considerations in regard to feasibility for NPPOs with fewer resources. Engaging a wider group of NPPOs now will work to avoid technical disparities that affect trade in the future.

### **Relationship with national objectives**

#### *Objectives of countries that have prioritised exporting*

The PPG supports design of a project that will be an extension of and build on training and technical cooperation activities in the plant health area in the region. SE Asian NPPOs have acknowledged the

importance of capacity in PRA and the Pest Risk Assessment phase through ongoing training, projects and programmes. This project in the Pest Risk Management component will potentially enable faster negotiation and a greater openness to new phytosanitary trade agreements based on Systems Approaches.

The Asian Development Bank (ADB) draft Action Plan for improved SPS in cross border trade cites improvements in other components of a sound plant health system such as enhanced diagnostic capacity, improved laboratories, low cost disinfestation systems and improved quarantine treatments. This has been especially significant in Cambodia, Lao PDR, Myanmar and Vietnam.

A base level of capacity is needed for this type of project (see selection of participants, below) for the early testing phase. Countries already engaged in systematic strengthening of phytosanitary capacity have stated interest in moving on to improved Pest Risk Management, both as exporters and importers. Vietnam participated in a preparatory survey to strengthen phytosanitary measures, with financial support from Japan International Cooperation Agency (JICA). This sets the stage for the NPPO's cooperation with external resources to achieve national objectives in plant health.

Ongoing regional efforts have complemented national ones. For example, over the last five years workshops in ISPM awareness, pest surveillance, PRA, diagnosis and taxonomic identification of specific plant pests and diseases and management of pest and disease collections were supported by CABI-SEA in benefit of the SE Asian region. All of these components could constitute phytosanitary measures and/or control points (model nodes). The CABI-SEA regional project funded by Canada's IDRC on "Knowledge Networks and Systems of Innovation to support Implementation of Sanitary and Phytosanitary Standards in the Developing Countries of Southeast Asia" identified the major constraints faced by developing countries in the region in their implementation of ISPMs. IDRC has since given support to the establishment of the ASEAN Regional Diagnostic Network (ARDN) for sharing plant pest diagnostic knowledge and resources.

Despite these significant efforts, improvement in PRA remains a key objective as noted in the ADB SPS Action Plan for GMS countries. The strengthening of national capacity for PRA will benefit from including improved decision making in the Pest Risk Management phase.

This PPG additionally supports national and regional objectives to reduce pesticide use and employ Integrated Pest Management (IPM) practices.

#### *Objectives of target market countries*

It is premature to state the final outcome of the PRATIQUE project work in Europe, however it is reasonable to expect this control point and modelling approach will be adopted by the European and Mediterranean Plant Protection Organisation (EPPO), the European RPPO, in some form. There is interest from within the EU phytosanitary policy framework (European Commission and EFSA) as well. Historically, Europe has not taken full advantage of Systems Approach, although risk management options are often offered. The European Union is an important export market for much of the developing world. Furthermore, if the modelling tool is effective, it may also be adopted by other EPPO members (e.g. in the Middle East, Northern Africa and Russia/NIS countries/regions) in short order.

A similar initiative has been taking place in Australia in light of the likely loss of an important post harvest pesticide. While this has been focused on domestic interstate trade, it is following international standards (ISPMs). Both Australia and New Zealand are in initial phases of developing BBNs for supporting import and other strategic decisions in plant health and biosecurity. Australia has developed a new policy on using Systems Approach under consultation with private and public stakeholders.

The target market countries have an obligation under the SPS Agreement to support development of phytosanitary capacity in LDCs and the Australian Centre for International Agricultural Research (ACIAR) has undertaken a number of projects in this field. The development objectives of several SE Asian countries have been identified in conjunction with ACIAR and in several cases include enhancing their phytosanitary capacity in order to increase trade opportunities. Hence this project aligns with national interests of both the proponent countries and the intended delivery countries.



### **Cost benefits of a BBN approach**

A notable advantage of Systems Approach is that additional measures may be applied initially (when technical certainty or the statistical confidence level is low), then (after sufficient trade has taken place and data is available to increase the confidence level) may be removed. By the same token, if a system is designed that has unacceptable failure rates, additional measures may be added in an evidence-based manner. Both cases occur while trade is ongoing, often without requiring further regulatory or normative changes.

The original drafting group of ISPM no. 14 and many similar expert panels before and after have avoided a requirement for the use of statistics, models, and the more quantitative methods (e.g. Hazard Analysis and Critical Control Point, HACCP). The plant health community has matured in this time period, however. Such tools are becoming more acceptable and improved software has also allowed them to be more user-friendly.

The system is simply a choice of how to manage and express the already ongoing use of data and lack of data. Decisions are being made without such a harmonised framework or tool. There are instances, such as the draft ISPM on citrus canker, in which years of expert consultation have led to agreement on all but one point. The expensive conclusion has been that without sufficient data on this single point of debate, no decision can be made and thus no trade is taking place under a harmonised agreement.

The exciting opportunity of global adoption of a common tool is that, with the confidence gained in its use, new components can be developed to basically “plug in” to the framework over future years. For example, all of the data that does exist from use of commodity treatments, trapping for targeted surveillance, or diagnostic tests (e.g. for clean planting material) can be compiled into a data base that will further harmonise the use of measures. Experiences with other measures can be compared more directly, to inform estimates where data is lacking.

Finally, the project outcome will speed up consideration of proposals for equivalence (ISPM no. 24). Presently, this process remains slow and opaque in many instances. All of these outcomes are related to the IPPC Strategy for Developing National Phytosanitary Capacity (Strategic Area 1, 2b and 6) in terms of enhanced implementation of ISPMs and the ability to monitor and evaluate performance, and the use of tools for phytosanitary systems that are fit for purpose and adapted to national and regional conditions. The process of stakeholder involvement in design of Systems Approach and the use of an agreed framework for negotiating with trade partners indirectly supports Strategic Areas 5 regarding advocacy/communication by NPPOs. A project to support this approach to Pest Risk Management will be highly cost effective.

### **Linkage with other programmes**

This project is aimed at NPPOs and their supporting national partner organisations because decision making for Pest Risk Management lies with this governmental authority. In this way, we seek to link with national programmes and objectives as discussed above. Key decisions on the project proposal will be made by these participants with the hosting NPPO of Malaysia leading that discussion.

Coordination will also be sought with all ongoing externally funded projects and programmes on PRA and general capacity building in the SE Asian region. Indeed, by starting with a PPG, even closer coordination with those groups already in contact can be achieved. This includes the Asia Pacific Plant Protection Organisation (APPPC); the CABI-SEA centre in Kuala Lumpur; and the World Bank. Bilateral development agencies including JICA, NZAID and AusAID also are being contacted during this pre-funding period. New ties with environmentally focused projects can be forged, once the project is underway. This includes Integrated Pest Management programmes and even private Good Agricultural Practice registration schemes, as well as groups supporting reduction in pesticide use and protection from invasive species.

Representatives of the most relevant of these groups will be invited to participate (without financial support) in the PPG-supported Workshop where details of the larger project proposal can be agreed. Meetings have already been held with World Bank to discuss this PPG and the suggestion was made to submit the project proposal to the Trade Facilitation Facility (TFF).

External to the SE Asian region, the European PRATIQUE project will be in its final stage during the PPG activities and outcomes will be monitored. ICL is a partner in PRATIQUE. (ICL will lead the PPG process, but will not be the project's lead institution.) Great effort is being made to coordinate with the Australian NPPO in particular, but also other important importers in the region. QUT has attended meetings on Systems Approach and use of BBNs convened by the Australian NPPO over the past two years. Australia's internal work on this tool should be closely tracked by the future project team.

Australia's Cooperative Research Centres programme for National Plant Biosecurity (CRC NPB) committed extensively to observing and participating in PRATIQUE in the past three years. As the CRC engages in its bid for a further 7-year term, it wishes to participate in implementation of PRATIQUE outputs. This project is of great interest in two regards: 1. Systems Approaches are a key strategy for developing biosecurity market access and the project takes advantage of relevant CRC expertise; 2. Collaboration with ICL is strategic and the CRC wishes to extend its current extensive engagement in SE Asian projects. External funding for this project, if based in the CRC NPB, will draw substantial in-kind and cash funding in the CRC to meet STDF requirements for Australia's participation.

Direct ties with delegates to the Commission for Phytosanitary Measures (CPM), IAGPRA and the IPPC Secretariat will continue so that everyone is informed of the progress made and in agreement with the objectives and planned activities. We will articulate and share the potential contribution of this project to the ADB SPS Action Plan for GMS countries and the recently adopted IPPC Capacity Building Strategy.

### **Selection of project partners**

Some SE Asian exporters have suffered a high number of interceptions in trade into Europe and the US in recent years. Others may be trying to expand or initiate new trade. Ideally, all future project partners will be participating in the Workshop to be held under the auspices of the PPG. Funding is budgeted for up to 6 SE Asian countries to participate with full reimbursement of travel expenses. (Salary and other ongoing costs for the staff will be paid by the NPPOs as an in kind contribution.)

Criteria for countries to participate include:

- clear interest of risk management experts and NPPO executives to engage in the project;
- existing exports that required the NPPO to negotiate a plan and to oversee or monitor application of phytosanitary measures;
- experience with using combined measures or Systems Approach for an export market, or the recognized need to enhance this capacity;
- membership in the APPPC and contracting party to the IPPC;
- and eligibility for funding from promising funding agencies. It is likely that two or three countries will be selected for adaptation of the model, while other countries can participate subsequently.

Imperial College London (ICL) is leading the PPG application, but does not intend to be the lead for the project proposal. Queensland University of Technology (QUT, another partner in the PPG), a SE Asian regional organisation or an NPPO of one of the selected countries could be the lead for the proposed project. The APPPC is unusual as an NPPO because of its link to FAO. Any involvement of the APPPC will require compliance with FAO procedures. Although this has discouraged the inclusion of APPPC in this initial PPG, due simply to the time required to process proposals (or even official letters of support) through that system, advance planning could make FAO/APPPC an attractive implementing agency or project partner.

Criteria for leading on the project proposal must include administrative capacity as well as the points noted above for project participation. Key importing NPPOs may wish to participate in a project as funders, program managers, partners or observers. NPPOs may also wish to designate private entities (research institutes, universities, trade associations) already active in risk management negotiations to act on their behalf in such a project. Again, eligibility for promising funding sources will be taken into account.

**Wider application**

The project will begin in SE Asia with a selected few countries which meet the criteria laid out above. SE Asia seems the perfect site for testing a new risk management approach and tool. From the perspective of importing countries, the advanced work in the region, principally by Australia, and the recent enhancement of plant health systems in some of the least developed countries indicates a high level of interest. (See also the letter of support from the Australian NPPO.)

One avenue for regional dissemination of the results of the country demonstrations is through existing regional meetings including the biennial APPPC meeting (August 2011), regionally based workshops and meetings to review draft ISPMs. (Indeed, we considered joining these events for an initial proposal planning meeting, but felt that a more targeted participation would be more effective.) A larger project should include some South-South training, with the demonstration countries becoming the training sites and those NPPOs becoming the regional experts. If the project is successful, it is anticipated that other regions will be interested in gaining experience in this risk management approach.

For the global level, this can be done through a series of regionally based projects, a global project addressing only this topic, individual training courses or other means. The best method for global dissemination may become clearer after the IPPC plan for implementation of a capacity strategy is prepared, hopefully by 2011.

One unexplored possibility is to provide the data and BBN software (free or share ware), examples etc through the CABI Crop Compendium or some other respected source that could maintain updates through charging for services. Although there is a cost to the user, many NPPOs are already using this resource. Dissemination through the IPPC will rely on Information Technology Support staff working with the project team, and will therefore depend on the funding of the IPPC. The IAEA/FAO may be producing a booklet on Systems Approach in 2010, so initial information on the concept could be disseminated in this fashion.

A very preliminary draft plan for global dissemination will be presented at the RPPO Technical Consultation in August, 2010, to solicit feedback and additional ideas for global dissemination. This year's Technical Consultation addresses Systems Approach as a priority topic. The project can provide draft summaries on progress to the STDF and/or the IPPC for presentation to the CPM on an annual basis.

## Appendix 4: Work Plan

<b>1. Pre-Workshop Activities</b>	
<p><b>1.1 Confirm Workshop participants</b></p> <p><b>July 2010</b></p>	<p>The countries participating in the Workshop with full funding for expenses (from STDF) will be confirmed and agreed among the three project partners, in consultation with the Executive Secretary of the APPPC and the countries themselves. Funding is budgeted to support an estimated 6 SE Asian country representatives, including one from Malaysia, the host country (i.e. travel funds for up to 5 countries.) Each selected country's NPPO will designate the individual to attend, based on a set of criteria included with the invitation. Preliminary conversations on this activity will precede the awarding of the contract from STDF, with the understanding that the Workshop is pending grant approval.</p> <p>Invited countries participating without funding for expenses (e.g. Australia and New Zealand) will be agreed, limiting the number to ensure a good working environment.</p>
<p><b>1.2 Define background material</b></p> <p><b>July - August 2010</b></p>	<p>Background papers and other material required for the Workshop and participatory meetings will be collaboratively defined. Advance material and background reading to support a common understanding of basic principles prior to meeting will be agreed by ICL and QUT. Regional participants will be asked to provide a brief description of his or her country's current process for evaluating and selecting pest risk management measures, in relation to the Pest Risk Analysis, and of national priorities in terms of trade and environment.</p>
<p><b>1.3 Prepare and circulate documents</b></p> <p><b>August 2010</b></p>	<p>The background material will be compiled and circulated a minimum of two weeks prior to the Workshop. Available materials from the European regional project (PRATIQUE), the Australian or other NPPOs showing progress on the application of this concept will be provided, with permission. QUT will be the lead partner to develop some case studies (for advance circulation or to share at the Workshop) to clearly demonstrate the application of the concept to existing regulated trade.</p>
<p><b>1.4 Plan Workshop</b></p> <p><b>July - August 2010</b></p>	<p>ICL will lead in planning of the content of the regional Workshop and related meetings in terms of (i) achieving participation and representation of various parties/views, (ii) developing an agenda and work plan for Workshop and meeting activities, (iii) developing the structure of the full proposal prior to meetings to ensure all aspects are discussed, (iv) liaison with the hosting NPPO prior to Workshop. ICL also will provide project application formats for likely funding sources to facilitate data collection in person as possible.</p>
<p><b>1.6 Complete Workshop arrangements</b></p> <p><b>July - August 2010</b></p>	<p>The Malaysian NPPO will be the lead partner for arrangements for the regional Workshop (Activity 2), including confirmation of attendees, accommodation, local organization (Workshop room, catering, facilities etc), copying of final documents, and communication systems for an efficient work environment. The Malaysian NPPO will organise travel of all funded regional participants and will pay for this from the STDF</p>

	funds, transferred from the lead contractor (ICL) immediately upon award of the grant (early July). While this does not allow much time for final preparations, it fits with the time line of other activities in the region.
<b>2. Workshop Activity</b>	
<b>2.1 Hold regional Workshop</b>  <b>Mid August 2010</b>	The regional Workshop will be held in Kuala Lumpur, Malaysia. Participants will be encouraged to present substantive comment at the Workshop. The Workshop is the first phase in project proposal development, as described further under Activity 3.
<b>2.2 Plan for regional demonstration project</b>  <b>August</b>	A plan for conducting a regional project to demonstrate the use of Bayesian Belief Networks (BNN) in use of Systems Approach risk management plans will be developed at the Workshop, taking into account the background material and the collective view of participants. During the Workshop, countries for the in depth demonstration work will be selected, or a clear process for selection will be agreed. The lead applicant(s) for a project will be identified from the SE Asian regional participation, the Australian partner (QUT) or regional or international parties. (ICL will not be the lead partner in the full project proposal.) At the Workshop, we will draft the objectives, a time line and activities plan for the future project, including appropriate regional and ultimately global dissemination of the tool if successful. This will provide important input for those who draft the actual project proposal.
<b>2.3 Write report</b>  <b>August - September 2010</b>	A report on the Workshop will be written within four weeks of the conclusion of the activity, including any progress on the above points (2.2) and all background materials. Assistance in preparation of these components will be sought from amongst the participants. Draft materials for the proposal may be kept as confidential until further developed.
<b>2.4 Conclude Workshop activities</b>  <b>September-December 2010</b>	Post-Workshop activities will be completed, including communication with participants, finalisation of local organization, dissemination of Workshop material as appropriate, and other follow up as agreed among project partners.
<b>3. Proposal Development</b>	
<b>3.1 Hold Brisbane meeting</b>  <b>August 2010</b>	The ICL and QUT partners will meet in Brisbane to finalise materials for the Workshop and plan strategy for development of the full proposal. Meeting in Brisbane will facilitate participation of BBN experts from QUT not attending the Workshop and thus the completion of specifications of BBNs to be refined under the project in demonstration countries, in line with prevailing conditions.
<b>3.3 Prepare meeting report</b>  <b>September 2010</b>	A report of the Australian meetings will be developed within four weeks of the meetings to share with the Workshop Participants or selected partners for the project.

<b>4. Wider consultation on global applicability</b>	
<b>4.1 Attend technical consultations</b>  <b>August 2010</b>	A representative from ICL will attend the <b>Technical Consultation among Regional Plant Protection Organisations (RPPOs)</b> , to present the proposed project concept during the symposium portion on Systems Approach. The presentation will include a draft plan for the regional project and subsequent global dissemination of the concept/tool, if successful regionally. Feedback and commitment will be sought from relevant attendees. (Note, a representative from ICL will be participating in an IAEA/FAO expert consultation on Systems Approach in June, where she also can receive feedback on the concept from experts representing decades of experience in application of Systems Approach.)
<b>4.2 Prepare meeting report</b>  <b>September 2010</b>	A report of the feedback and response on the proposed project will be developed within two weeks of the Technical Consultation. (An official report of the TC will be prepared by the hosting RPPO by the end of the year.) This will be shared with those drafting the project proposal.
<b>5. Proposal preparation</b>	
<b>5.1 Confirm draft proposal</b>  <b>September-October</b>	The various components of the proposal will be brought together as a full document. Both ICL and QUT will support this activity, with selected lead applicants fully involved.  The structure and content of the full proposal will be confirmed among project partners (including other conferring experts and the nominated demonstration country representatives) through remote communication (e.g. Skype, for routinely scheduled virtual meetings).
<b>5.2 Consultations</b>  <b>October-November</b>	The draft proposal will be circulated to relevant project participants, the STDF, the APPPC Executive Secretary, the IPPC Secretariat and other interested parties either by the PPG partners, or by the newly confirmed SE Asian applicant(s). Feedback and commitment will be sought.
<b>5.3 Proposal budget preparation</b>  <b>November 2010</b>	In conjunction with selected countries for project work, a budget will be prepared for the activities identified in the regional Workshop and as defined in the proposal.
<b>5.4 Finalisation of proposal</b>  <b>December 2010 – January 2011</b>	Based on feedback, the proposal will be finalised with continuing support from ICL and QUT.
<b>5.5 Submission of proposal</b>  <b>January – February 2011</b>	The full proposal will be submitted to STDF, but also promoted with other funding bodies possibly interested in co-financing specific components.

## Appendix 5 Time Table of Activities and events related to this PPG

### *Developing Trade Opportunities: An integrated Systems Approach for Pest Risk Management*

Earlier 2010	June	July	August
<p>Agreement and discussion amongst potential partners ***</p> <p>Agreement on method for developing proposal (PPG) ***</p> <p>Submission of PPG application</p>	<p>IAEA/FAO Expert Consultation on Areawide Control as a part of Systems Approach ***</p> <p>Preliminary selection of participant countries ***</p> <p>Preliminary subcontracting agreements in place</p>	<p><b>STDF Working Group meeting</b> ***</p> <p><b><i>PPG start date 15 July</i></b></p> <p>Contracting STDF/Imperial College London ***</p> <p><b>Pre-workshop activities</b></p> <ul style="list-style-type: none"> <li>• Selection of participating experts</li> <li>• Preparation of workshop materials</li> <li>• Plan and arrangements for workshop</li> </ul>	<p><b>Pre-workshop activities</b></p> <ul style="list-style-type: none"> <li>• Dissemination of materials</li> <li>• Final arrangements</li> </ul> <p style="text-align: center;">***</p> <p style="text-align: center;"><b>August 17th -18th</b></p> <p style="text-align: center;"><b>Workshop for project discussions</b></p> <p style="text-align: center;">***</p> <p style="text-align: center;"><b>Workshop activities</b></p> <ul style="list-style-type: none"> <li>• Discuss ideas</li> <li>• Select lead partners</li> <li>• Draft project plan</li> <li>• Write report on workshop</li> <li>• Plan for next steps</li> </ul> <p style="text-align: center;">***</p> <p style="text-align: center;"><b>August 23<sup>rd</sup> – 27<sup>th</sup></b></p> <p style="text-align: center;"><b>RPPO Technical Consultation</b></p> <ul style="list-style-type: none"> <li>• Present concept and draft plans for SE Asia region</li> <li>• Receive comments on <b>global applicability</b> of concept</li> </ul>

September	October	November	December
<p><b>Post workshop activities</b></p> <p>***</p> <p><b>Proposal development activities</b></p> <ul style="list-style-type: none"> <li>• Draft components of proposal</li> <li>• Lead partners in place</li> </ul>	<p><b>Proposal development activities</b></p> <ul style="list-style-type: none"> <li>• Consultations on Draft Proposal</li> </ul>	<p><b>Proposal development activities</b></p> <ul style="list-style-type: none"> <li>• Integrate comments from Consultations</li> <li>• Budget for Draft Proposal</li> </ul>	<p><b>Proposal development activities</b></p> <ul style="list-style-type: none"> <li>• Finalise proposal</li> </ul>
January 2011	February	Rest of 2011	
<p><b>Proposal development activities</b></p> <ul style="list-style-type: none"> <li>• Submission of proposal to one or more potential funding bodies</li> </ul>	<p><b>Proposal development activities</b></p> <ul style="list-style-type: none"> <li>• Submission of proposal</li> <li>• Report to STDF on PPG progress and results</li> </ul> <p>***</p> <p><b><i>PPG end date</i></b></p> <p><b><i>15 February</i></b></p>	<p><b>Report to CPM, March 2011</b></p> <p><b>Continue to follow Proposal</b></p> <p><b>Form project management team for proposed project</b></p>	<p><b>Initial dissemination of outcomes: APPPC biennial meeting, August 2011</b></p>

---



Summary budget for PPG application *Developing trade opportunities: an integrated systems approach for pest risk management*

<b>Item</b>	<b>Cost (US\$)</b>	<b>STDF Funding</b>	<b>Non-STDF funding*</b>
Personnel services	<b>\$35,200.00</b>	\$5,000.00	\$30,200.00
Travel	<b>\$19,856.00</b>	\$19,856.00	\$0.00
Workshop costs	(incl mtg room, hotel, per diems for funded participants) <b>\$4,026.00</b>	\$4,026.00	\$0.00
General operating expenses	<b>\$1,118.00</b>	\$1,118.00	\$0.00
<b>TOTAL</b>	<b>\$60,200.00</b>	<b>\$30,000.00</b>	\$30,200.00

NB. several trips have already been funded by ICL and QUT

\* an estimate of in kind contribution from organisers and participants

Detailed budget for PPG application *Developing trade opportunities: an integrated systems approach for pest risk management*

				<b>Expenditures on proposal preparation</b>		<b>Funding</b>			
				<b>Imperial College London</b>	<b>Malaysia NPPO</b>	<b>QUT/ CRCNPB</b>	<b>Other Participants</b>	<b>STDF</b>	<b>Non STDF</b>
<u>Travel</u>	<b>other travel and airfare only for Workshop</b>								
	Australia team to KL	2 air, Singapore airlines, \$1000				\$2,000		\$2,000	
	Asian NPPOs to KL	higher cost \$1200 x 2			\$2,400			\$2,400	
	6 countries (incl Malaysia)	lower cost \$600 x 3			\$1,800			\$1,800	
	UK team travel to Australia and KL	\$3025 x 2		\$6,050				\$6,050	
	UK team 5 nights Brisbane (in college)					\$1,900		\$1,900	
	UK rep to RPPO Technical Consultation (Azores)	hotel etc		\$800				\$800	
				\$1,500				\$1,500	
	local transport, incidentals (other than KL travel)	(other travel)		\$294				\$294	
	KL hotel and per diem			\$1,480		\$1,632		\$3,112	
								<b>\$19,856</b>	\$0
	<u>General Operating Expenses</u>								
	bank transfer and exchange rate losses				\$400			\$400	
	Telephone, copying, postage				\$120			\$120	
	Purchase of computer equipment				\$598			\$598	
	(headphones for Skype follow up calls and flash drives for participants)							<b>\$1,118</b>	<b>\$0</b>
	<u>Cost of Workshop</u>								

Meeting room, coffee, lunches	15 total incl support		\$1,170			\$1,170	
Hotel (incl breakfasts)	14		\$1,106			\$1,106	
Per diems for funded regional (dinners, airport transfer, incidentals)	14		\$1,750			\$1,750	
						<b>\$4,026</b>	<b>\$0</b>
<u>Personnel Services</u>							
8 days logistics support	\$200/day		\$1,600				\$1,600
14 days UK technical team	\$700/day	\$9,800					\$9,800
14 days Australian technical team	\$700/day			\$9,800			\$9,800
Workshop participation (2 day wkshop, 1 day travel)	\$300/day x 10 x 3		\$1,800		\$7,200		\$9,000
Proposal preparation	\$500/dayx10	\$2,500		\$2,500		\$5,000	
						<b>\$5,000</b>	<b>\$30,200</b>
	approx costs for each partner	\$22,424	\$12,744	\$17,832	\$7,200	<b>\$30,000</b>	<b>\$30,200</b>
	approx budget for each partner	\$12,624	\$9,344	\$9,432	\$0	<b>STDF</b>	in kind
						<b>funding</b>	contribution
	all expenses paid for selected Asian NPPO reps	<b>Imperial College London</b>	<b>Malaysia NPPO</b>	<b>QUT/ CRCNPB</b>	<b>Other Participants</b>		