



PROJECT: STDF/PG/328

**BEYOND COMPLIANCE:
INTEGRATED SYSTEMS APPROACH FOR PEST RISK
MANAGEMENT IN SOUTHEAST ASIA**

FINAL REPORT



Submitted to STDF 20 MAY 2015

TABLE OF CONTENTS

LIST OF ABBREVIATIONS	- 1 -
1 EXECUTIVE SUMMARY	- 4 -
2 BACKGROUND	- 6 -
3 PROJECT GOAL	- 7 -
4 PROJECT IMPLEMENTATION AND MANAGEMENT	- 8 -
5 PROJECT OBJECTIVE, OUTPUTS & ACTIVITIES	- 8 -
5.1. Project Objective: Decision tools for enhanced competence in market access	- 8 -
5.1.1. Output 1: Development of a series of tools to support evaluation and design of pest risk management systems.....	- 8 -
5.1.2. Output 2: Facilitation of the use of the tools	- 10 -
5.2. Project Objective: Relevant NPPO staff and stakeholders with capacity to put tools into use	- 11 -
5.2.1. Output 1: Case studies developed based on output of tools	- 11 -
5.2.2. Output 2: Tools filled in through consultation with stakeholders	- 12 -
5.2.3. Output 3: Increased confidence in representing Systems Approach in trade negotiations.....	- 12 -
5.2.4. Output 4: Overall enhanced communications and management skills.....	- 13 -
5.3. Project Objective: Facilitate global dissemination and uptake of the tools	- 14 -
5.3.1. Output 1: The global plant health community was shown the tools	- 14 -
5.3.2. Output 2: Those working in risk management were shown the tools	- 15 -
6 FINANCIAL OVERVIEW	- 15 -
7 OVERALL PROJECT RESULTS AND LESSONS LEARNED	- 16 -
7.1. Summary of results from the project	- 16 -
7.2. Lessons learned	- 16 -
8 RECOMMENDATIONS	- 17 -
8.1. Specific recommendations to the project	- 17 -
8.2. Broader recommendations	- 18 -
9 REFERENCES AND RESOURCES	- 19 -
9.1 Project reports to STDF	- 20 -
10 ANNEXES	- 21 -

LIST OF ABBREVIATIONS

AAQ	Agency for Agricultural Quarantine (AAQ), Ministry of Agriculture, Indonesia
APPPC	Asia and Pacific Plant Protection Commission
AusAID	Australian Agency for International Development
BN	Bayesian network
CABI SEA	CABI Southeast and East Asia
CP	control point, defined in earlier editions of the ISPM 14
CPM	Commission on Phytosanitary Measures
DSS	Decision Support System
EPPO	European and Mediterranean Plant Protection Organization
FAO	Food and Agriculture Organization
GeNIe	Graphical Network Interface, for SMILE
HACCP	Hazard Analysis Critical Control Point
IAEA	International Atomic Energy Agency
ICL	Imperial College London
IPPC	International Plant Protection Convention
IRSS	Implementation Review and Support System
ISPM	International Standards for Phytosanitary Measures
NPPO	National Plant Protection Organisation
NUS	National University of Singapore
PCE	Phytosanitary Capacity Evaluation tool
PG	Project Grant
PPG	Project Preparation Grant
PRA	Pest Risk Analysis
PRATIQUE	Enhancements of Pest Risk Analysis Techniques, EU project
PVS	Performance, Vision and Strategy tool
QUT	Queensland University of Technology (Australia)
RPPO	Regional Plant Protection Organisation
SE	Southeast
SMILE	Structural Modeling, Inference, and Learning Engine
SPS	Sanitary and Phytosanitary
STDF	Standards and Trade Development Facility
WTO	World Trade Organization

COVER DESIGN

Flags of the four countries which completed the project: Viet Nam, Thailand, Philippines, Malaysia

Photos from the Viet Nam case study on dragon fruit

PROJECT INFORMATION

Title Beyond Compliance: Integrated Systems Approach for Pest Risk Management in Southeast Asia
Implementing Agency CABI SEA, QUT and Imperial College London
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1 EXECUTIVE SUMMARY

Under the international framework for plant health, elaborated in the International Plant Protection Convention (IPPC), National Plant Protection Organisations (NPPOs) must balance the objectives of facilitation of agricultural trade with protection of natural plant and crop resources. To achieve these often conflicting objectives, phytosanitary measures may be used to reduce the risk of new pests entering the importing country territory. Most decisions about import requirements to reduce pest risk are made by the importing country NPPO for a specific commodity coming from a specific country, or area within a country, or even place of production. The decision process, therefore, includes an estimate of the risk of a new pest introduction and of the impact of these measures in reducing that risk. Many countries still apply precaution and require more management than might be justified if the evaluation of impact of measures was more easily done and transparent. Negotiations over market access can be very resource demanding.

The concept of the ***Beyond Compliance*** project was to adapt and introduce a series of decision support tools for NPPOs to use in designing and evaluating risk management plans for trade in agricultural products that may be associated with pests, and thus are considered a source of pest risk. In the current context of reduced chemical use and integrated pest management, a combination of pest risk management measures is often necessary to reach the appropriate level of protection. In plant health, this combination of measures is called Systems Approach, which is described in International Standard for Phytosanitary Measures (ISPM) 14.

The objective of the project was to enhance competency and confidence within the Southeast Asian sub-region for applying Systems Approach to plant health. Systems Approach is the most complicated of risk management plans and it was assumed that any enhancement for this would also work for simpler cases as well. It was also assumed that the best way to learn about and try out these tools is to use them in real cases of potential trade. Each participating NPPO was asked to select appropriate cases which would be supported by political will and producer interest. Two regional cases for import were selected in conjunction with the Asia and Pacific Plant Protection Commission (APPPC), the Regional Plant Protection Organisation. The participating NPPOs were from Malaysia, Viet Nam, Thailand and Philippines. The Indonesian NPPO was unable to continue participation, after initial inputs to one of the regional case study.

The tools ranged from very simple, such as using a poster presentation (to select trade cases and clarify objectives) or a check list (what to do to prepare for meeting stakeholders), to ones requiring a facilitator, such as mathematical modelling showing causal relationships between each phytosanitary measure and the overall pest risk for a particular consignment (Bayesian networks [BNs]). An Excel™-based decision tool draws on the ISPM 11 and organises information from a Pest Risk Analysis (PRA) or dossier for a PRA, along with expert judgement. That decision support system (DSS) spreadsheet can be used with experts to display management options and represents their evaluation of management choices. The most popular tool turned out to be mapping each step for a Production Chain (using free software or simply drawing on a board) so that each activity was clearly understood in terms of its purpose (reducing pest risk; verifying the performance of the measure; market quality or other non-regulatory purposes) and its potential mechanism for achieving impact. While a simple process, the systematic thinking and stakeholder engagement it required led to a much greater clarity on which pest risk measures would be needed to achieve safe trade. Some of the tools were refinements of prototypes from another plant health project regarding Enhancements of Pest Risk Analysis Techniques in the European Union, "PRATIQUE". However, new tools were developed in the project as well.

The trade cases were progressed through to at least a proposal for trade. The Malaysian case led to a national discussion of Systems Approach components and a proposal to China for trade. The Thai case led to a clearer stakeholder discussion on what would be required to leap from heavy reliance on methyl bromide to a combination of other measures. The Vietnamese case was presented to the Republic of Korea in 2014 but no conclusion has yet been reported. The Philippines case led to proposed changes to the operational plan for exports which had already been agreed when the case was selected. Even before the project ended, the process has been applied to new cases of trade negotiation, particularly by the Philippines participants. The regional case studies were complicated and politically sensitive. They were taken through to completed DSS and Production Chain but are not likely to alter decisions regarding import to the region any time soon.

One surprising outcome was the extent to which the tools supported communication with the production sector, as well as with trade negotiation teams. The Production Chain for one case, for example, highlighted that earlier negotiations were based on measures not feasible for small-scale producers. In other cases, it was perhaps the first time stakeholders understood that the use of control points along the production chain (where official verification by the NPPO would be required) could strengthen risk management claims to the point of reducing import requirements. The production sector has not always understood the unique role of the NPPO in both negotiating and overseeing implementation of trade agreements. Show casing the role of the NPPO in this way also increases the credibility of the NPPOs. The project contributed to an increase in number and possibly the quality of stakeholder meetings. Other materials (e.g. the IPPC manual on market access and on stakeholder relations) and future projects should help to support this start.

In conclusion, the tools were shown to support more systematic thinking in both designing and defending risk management proposals. The additional time required to organise thoughts and data proved to be worth the investment for most cases. The more advanced modelling was important for cases with more varying or contrasting viewpoints or to introduce something new, but not essential for simple cases. Competence among project participants in designing and evaluating risk management plans and presenting the estimated impact of measures improved by using these tools; then confidence rose as well.

One recommendation is to further support global understanding of ISPM 14 and Systems Approach trade examples, because of a lingering suspicion of their success. The entire national team for research, trade negotiation and plant health needs to be convinced that a great volume of trade takes place using combined measures. Letting go of the security provided by methyl bromide, for example, is a paradigm shift in many cases. This lack of confidence in the approach is exacerbated by the fact that few trading partners share their operational or management plans, even though PRAs they are based on are becoming more available. A global database detailing successful trade cases using Systems Approach would begin to address this.

It also would be useful to have long-term tracking of efforts towards market access, possibly through the IPPC's Implementation Review and Support System (IRSS), because trade proposals will often take years from first submission to agreement. Even with regular clarification of what could be expected, not achieving trade in some cases during the project time frame was disappointing to some.

For now, the tools were appropriate to cases of new trade, maintaining trade that has been challenged owing to interceptions, a proposal for equivalence and evaluating import as well as export questions. The tools were designed for commodities, focusing on two or three pests or pest guilds at a time and would need further revision for plants that are pests (weeds), seeds, or pathways such as conveyances. An eBook is being published in 2015 that may allow use of the most basic tools without support. The BN tools for more contentious cases will require facilitation and all of the tools will benefit greatly from facilitation, just as application of the IPPC Phytosanitary Capacity Evaluation (PCE) tool is more robust when facilitated. It would be useful to have the materials translated into other languages and for regional facilitators to be trained.

The project followed on from a Project Preparation Grant (PPG) which was managed by Imperial College London (ICL) with the NPPO of Malaysia. The full project was led by partners at the Queensland University of Technology (QUT), to take advantage of additional Australian funding, and experts on the technical tools and on plant health governance at ICL. The regional logistics, internet site and reports were managed by CABI Southeast and East Asia (CABI SEA). The regional import studies were also coordinated by that group. Observers from the NPPOs of New Zealand and the Republic of Korea, National University of Singapore (NUS) and collaborators in a sister project in Australia made useful contributions and expanded the geographic coverage. Progression of the cases was facilitated by varying degrees of success with: frequent meetings on calls, shared internet folders, a project blog, field visits, annual whole project meetings, extra discussions at routine meetings attended by project members and visits in conjunction with other travel. Dissemination beyond the project was achieved by side sessions at Commission on Phytosanitary Measures sessions in two different years and at a WTO SPS (World Trade Organization – Sanitary and Phytosanitary) Committee meeting session. There were also presentations at industry meetings and published articles. The concepts of the project are being further developed as part of an integrated pest management project funded by the European Union (DROPSA) focusing on two emerging pests of high significance in the fruit industry, which started in 2014. Further global roll out of the **Beyond Compliance** tools will be proposed to STDF in 2015.

2 BACKGROUND

The international framework for plant health is elaborated in the International Plant Protection Convention (IPPC) and implemented on a national level by the public sector entity designated as a National Plant Protection Organisation (NPPO). With this national mandate, the NPPO must balance the objectives of facilitation of agricultural trade with protection of natural plant and crop resources. To achieve these often conflicting objectives, phytosanitary measures may be used to reduce the risk of new pests entering the importing country's territory.

International agricultural trade in products which might carry pests depends on either compliance with ISPMs, or agreement between trading partner NPPOs on a plan to manage any risk from plant pests that is presented by the trade in question. Most decisions about import requirements to reduce pest risk are made by the importing country NPPO for a specific commodity coming from a specific country, or area within a country, or even place of production. The decision process, therefore, includes an estimate of the risk of a new pest introduction and of the impact of these measures in reducing that risk. Many countries still apply precaution and require more management than might be justified if the evaluation of impact of measures was more easily done and transparent. Finding and agreeing on appropriate plans for risk management of agricultural trade is at the heart of this project.

Some of the first ISPMs to be endorsed by the contracting parties of the IPPC were about using risk assessment to determine an appropriate level of management for imported items associated with plant pests. During the years following the World Trade Organization (WTO) Agreement on the Application of Sanitary and Phytosanitary Measures, or the SPS Agreement (WTO, no date), there has been much focus on methodologies for Pest Risk Assessment and Analysis. Globally, however, there is less confidence around designing and evaluating risk management plans once the risk has been assessed. The principle under the SPS of imposing only as much management as is scientifically justified and required is fairly recent and demands more of the decision process.



Figure 1. Launch of the Beyond Compliance project in 2011 at a meeting hosted by Malaysian NPPO.

The project was conceived within the context of the process of designing a pest risk management plan and evaluating the impact of measures being still very weak in many countries. When a request for determination of equivalence arises, NPPOs do not have a framework for evaluating the proposed measures in relation to existing ones, despite the International Standards for Phytosanitary Measures (ISPM) 24 (FAO, 2005) on how to interact with trade partners on this

issue. If a combination of measures which are integrated in Systems Approach is used, as described in ISPM 14 (FAO, 2002), calculation of the reduction of risk is even more challenging. The best practice is to break down components of risk and consider each aspect before estimating overall efficacy (Jamieson et al, 2011; Mumford et al, 2013). The lack of a decision framework for determining the impact of management measures results in both avoidance of risk and long years of negotiation for trade. Negotiations over market access can be very resource demanding.

Following discussions initiated at the Commission on Phytosanitary Measures (CPM) session in Rome and expanded at a meeting in Malaysia, which was supported by the Project Preparation Grant (PPG 328) from the Standards and Trade Development Facility (STDF), a group from the SE Asian sub-region proposed a project to address these issues.

As reported by Whittle, Quinlan and bin Tahir (2011), the Southeast (SE) Asian sub-region exported over US\$6 billion per year in fresh produce at that time, but faced multiple restrictions to trade and requirements which are generally imposed by the importing contracting parties without much negotiation. This had been due in part to a lack of confidence and possibly some skills for market negotiation.

There had also been a heavy reliance on field use of pesticides and end point application of methyl bromide. Such treatments would often lower market quality, reduce the shelf life of the commodity and increase costs. Exports often would occur after treatments only to be found to be infested, so that the high cost led to no return. For example, the countries with the highest interception rates in the European market were located in SE Asia. While aiming to increase exports, new pests have been arriving to the countries in the region, particularly those with contiguous borders and unfortunately little control over smuggling.

A project of this size could not address all of these challenges. Focusing on market negotiation based on well informed understanding of risk management measures was a popular choice. In fact, the idea that one could go beyond simply complying with restrictions imposed by others, to the point of being a confident represent of the pest risk management measures preferred by one's own country, was an appealing image which led to the naming of the project during the PPG discussions: Beyond Compliance.

Combined measures in a Systems Approach is one way to provide greater options when considering pest risk management, having a number of advantages such as the possibility of continuing trade when interceptions arise by added an additional measure (IAEA, 2011). Although it was not a commonly applied approach amongst the partners at the time the project began, with some countries claiming they had no export under the approach, there was a growing need for alternatives, with drivers for increased use of the method only increasing in intensity (Quinlan and Ikin, 2009). The Systems Approach trade proposals were taking considerable time to negotiate. Only one import case using Systems Approach was noted, amongst the five SE Asian NPPOs represented (Whittle et al, 2011).

From the beginning of the project there was interest and support from the NPPOs of Australia, New Zealand and later from the Republic of Korea. The National University of Singapore (NUS) had biostatisticians participating at most meetings. The use of models showing relationships between measures and risk reduction outcomes was already under consideration in these countries and in Europe, through the European and Mediterranean Plant Protection Organization (EPPO). By setting the project in SE Asia, it also was an opportunity for an emerging methodology in plant health to be fit for purpose for these exporting countries, rather than having them fall behind in yet another market negotiation skill built up in a more developed region.

3 PROJECT GOAL

The goal of the project was to increase capacity of the participating country NPPO staff, and to the degree possible other NPPO colleagues, in market access through a deeper understanding of the Pest Risk Management step in Pest Risk Analysis (PRA) and an increased confidence in negotiating alternative measures.

The intention was to enhance capacity by using new tools to support the design and evaluation of pest risk management measures, or systems of measures specifically when trade requires a combination of risk management measures rather than only end point fumigation. Most important

to this process was the use of priority trade cases as the means for becoming familiar with the tools, rather than straight training workshops.

The project had a secondary goal of supporting implementation of international standards, in particular ISPMs 11, 14 and 24. The systematic thinking required for application of the tools also supports a better understanding of the principles of the IPPC and the SPS Agreement, including the imposition of restrictions proportional to the risk and the concept of equivalence.

The goal was pursued in the spirit of joint learning and each NPPO partner took responsibility for their case study, with support in using the tools as needed, and for completion of related reports.

4 PROJECT IMPLEMENTATION AND MANAGEMENT

The participating NPPOs committed significant time and some resources for advancing their priority case studies and thereby participating in the project. Malaysia, Viet Nam and Thailand NPPOs hosted full project meetings, and they and the NPPO of Philippines organised technical visits from the project partners and their own stakeholder meetings.

The CABI SEA office was asked to manage the logistical and financial aspects of the NPPO participation, to increase efficiency. Dr Sivapragasam was the manager for the term of the project. CABI SEA staff provided support on communications, report preparation and planning meetings as was represented as Work Packages for Communications and Administration. Ms Mei was largely responsible for these achievements, as well as producing one of the regional case studies.

Imperial College London (ICL) experts had helped organise the PPG and administer those funds and continued to take on much of the administrative role of coordinating reports. The main project contract, however, was held by the Queensland University of Technology (QUT) under the leadership of Prof Mengersen, an expert in the use of Bayesian networks (BNs). Having the contract in Australia encouraged additional funding from the Government of Australia and in fact the Australian Agency for International Development, AusAID, funded a complementary add on to the project (described below). QUT was responsible for overall financial reporting and the first round of country visits to assist in the use of the tools.

Each of these partner entities joined in with the NPPOs to form Work Packages regarding the Technical Framework (primarily the tools themselves); the Country Export and Regional Import Case Studies; and a smaller function of Governance which related to alignment of all outputs with the IPPC process, terminology and conceptual basis and reporting to that forum. This final aspect was further supported by the participation of the IPPC Secretariat and the Asia and Pacific Plant Protection Commission (APPPC) as part of an informal Steering Committee which also participated in most meetings.

5 PROJECT OBJECTIVE, OUTPUTS & ACTIVITIES

The objective of the project was to enhance competency and confidence within the SE Asian sub-region for applying Systems Approach to plant health. Systems Approach is the most complicated of risk management plans and it was assumed that any enhancement for this would also work for simpler cases as well. It was also assumed that the best way to learn about and try out these tools is to use them in real cases of potential trade.

5.1. Project Objective: Decision tools for enhanced competence in market access

5.1.1. Output 1: Development of a series of tools to support evaluation and design of pest risk management systems

The concept of the **Beyond Compliance** project was to adapt and introduce a series of decision support tools for NPPOs to use in designing and evaluating risk management plans for trade in agricultural products that may be associated with pests, and thus are considered a source of pest risk. Some of the tools were refinements of prototypes from another plant health project regarding Enhancements of Pest Risk Analysis Techniques in the European Union, "PRATIQUE". However, new tools were developed in the project as well.

Each of these tools is described in detail in an eBook which was prepared as the final output of the project. It is scheduled to be released with free access in mid-2015 by the publisher Chartridge Books Oxford. Examples of completed tools and their application are included in this user-oriented publication. Project funds paid for the internet book publication costs, which will be highlighted on plant health websites once released.

The tools ranged from very simple, such as using a poster presentation (to select trade cases and clarify objectives) or a check list (what to do to prepare for meeting stakeholders), to ones requiring a facilitator, such as mathematical modelling showing causal relationships between each phytosanitary measure and the overall pest risk for a particular consignment (BNs).

The initial focus of the project was the use of influence diagrams or mathematical models with causal relationships shown, such as BNs, to support explanation of pest risk management systems and thereby facilitate market negotiations. This was perhaps based experiences of the more extreme cases (including in development of ISPMs) which require resolution after years of debate over possibly one single scientific principle. In such cases, having quantitative estimates and sensitivity analysis could lead to much faster resolution or scenario plans that reveal whether the point of contention is even significant for the overall efficacy of the system. An explanation of the advantages of using such a framework is provided in the Mengersen et al (2012) article prepared as part of the project and describing the project soon after its launch.

Before the project even began, as outlined in that article, the technical team considered what information would be available at the time of seeking market access. It would be either the dossier of information submitted by the NPPO of the country wishing to export, or the PRA provided by the NPPO of the target market country, if this had been completed. Important information about the pests of concern and routine practices in production of the associated commodity would be available in either document. This led to a conceptual progression of a case through the process shown in Figure 2.

Planned progression of tools

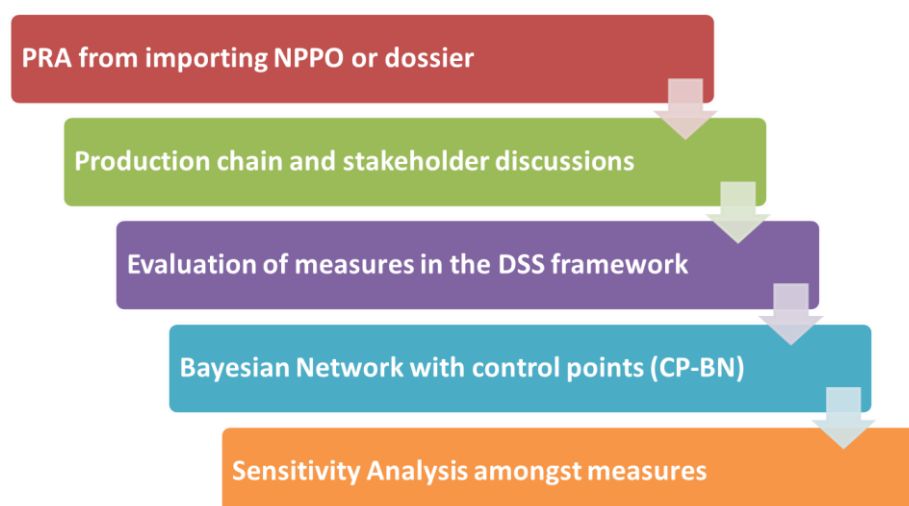


Figure 2. Planned relationship of primary Beyond Compliance tools to each other.

The ICL team had previously identified some of the main characteristics of a pest which would directly affect the selection of risk management measures and these appear in the Decision Support System (DSS) on the first sheet (Quinlan et al, 2011). The Excel™-based decision tool draws on the ISPM 11 and organises information from a PRA or dossier for a PRA, along with expert judgement. From there, points raised in ISPM 11 (FAO, 2013) were in the DSS prototype which was introduced in the European PRATIQUE project. The DSS was a way of collating expert opinion and graphically representing the range and certainty of opinion on pest risk management options. Expert opinion would frequently be contributed by colleagues in plant health either in

research or with experience in implementing the measures. Producers and other private industry might contribute but it is pitched more in the context of risk-based decision making for official agreements.

The most popular tool turned out to be mapping each step for a Production Chain (using free software or simply drawing on a board) so that each activity was clearly understood in terms of its purpose (reducing pest risk; verifying the performance of the measure; market quality or other non-regulatory purposes) and its potential mechanism for achieving impact. While a simple process, the systematic thinking and stakeholder engagement it required led to a much greater clarity on which pest risk measures would be needed to achieve safe trade.

The addition of mapping a Production Chain proved an effective way to capture input from other stakeholders. The tool was envisioned as a way to identify all the official measures applied, or requested by the importer to be applied, so as to facilitate identification of points where the actual impact could be measured. This idea of a control point was not required in plant health, but was explained in the annex of ISPM 14 by relating Systems Approach to Hazard Analysis Critical Control Point (HACCP) methodology. The Production Chain was also a means to clarify the purpose of each measure – reduction of likelihood of infestation, reduction of survival after infestation, etc., or simply verification that a measure was applied or carried out properly. This systematic thinking about what purpose each measure that is applied serves is key to increased understanding of the measures imposed so that one can begin to discover alternatives. One might also identify duplicate or redundant measures and question their purpose.

Finally, once completed, the Production Chain and DSS were designed to show the information needed to build a BN of the entire system of measures and the pest threat along the same Production Chain. Real time data would only be generated at a control point, in contrast to projected data based on the design of the measure and expected outcome. A relationship to the performance of the measure – carrying it out properly – was added in acknowledgement of the difference in probable outcomes. One could add other factors such as climatic conditions, effect of other hosts nearby, etc., if these were important.

Therefore, the original progression through a series of tools, as shown in Figure 2, is considered now to be less important than familiarity with the range of tools so that one may pick and choose which aspect of the decision making and preparation for market access negotiation requires support. A discussion of scenarios when each tool might be used is included in the soon to be released eBook.

The hardest tool to prepare as a “generic template” was the Control Point-Bayesian Network (CP-BN). It required substance of the trade cases before all of the details could be worked out. It will still require a facilitator to achieve the most value from it. If one is building a BN, it is useful to start with the Production Chain in the same software. GeNIe (the Graphical Network Interface for SMILE, a Structural Modelling, Inference, and Learning Engine) was selected as a good fit for the purpose while also being no cost and readily available.

5.1.2. Output 2: Facilitation of the use of the tools

Various approaches were used to facilitate the understanding and use of the tools amongst the project partners. Posters were prepared by each NPPO to share at the very first meeting to show existing knowledge and information on the selected trade case. This also encouraged participants to settle on one case ahead of time and also to avoid time being diverted to details which were not vital to the project discussions.

In some cases, the tools were embraced and expanded or reinterpreted to fit the circumstances. The Production Chain, for example, was used to map all activities, including quality assurance, voluntary private standards, quality control, etc. For that case, it made more sense to the producers to see the full picture of what was being done and then discuss the role of each.

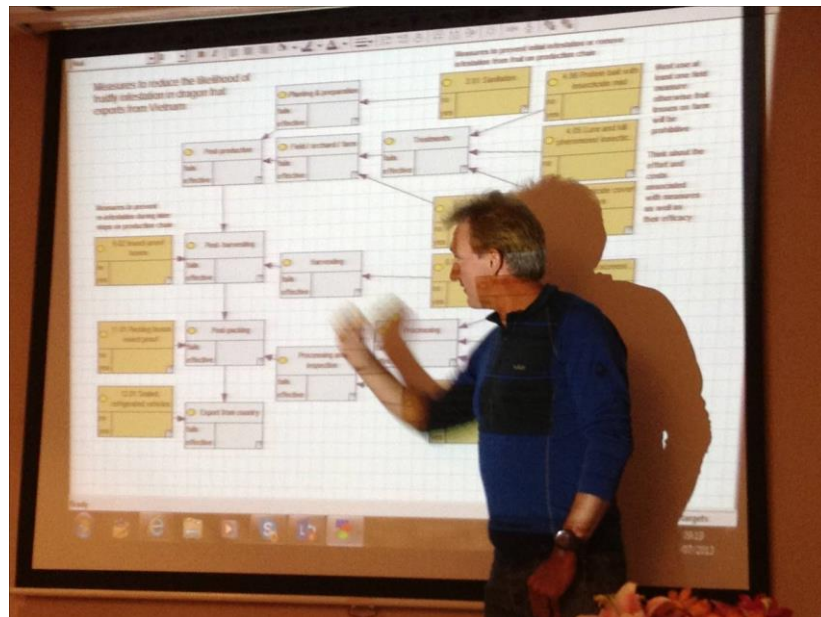


Figure 3. Dr Leach and other facilitators support proper structuring of Control Point-Bayesian Network (CP-BN).

The development of a CP-BN was found to be intimidating for most participants who were managing large portfolios of work and would not have the time required to learn methods and software for mathematical modelling.

The exception was the Thai case, due to support from a recent PhD graduate familiar with such tools. Dr Taekul was able to demonstrate the possibility of abandoning methyl bromide, using sensitivity analysis of the CP-BN he completed. This was presented to the Thai orchid grower associate conference (Taekul et al, 2013) but more needs to be done to convince the industry of such a drastic change. That team was considering demonstration plots with the more progressive growers to try to spark a paradigm shift.

A facilitator for use of these final tools is recommended. As with the Phytosanitary Capacity Evaluation tool (PCE) or Performance, Vision and Strategy (PVS) process, the entire process would be enhanced by including expert facilitation.

5.2. Project Objective: Relevant NPPO staff and stakeholders with capacity to put tools into use

5.2.1. Output 1: Case studies developed based on output of tools

Each NPPO was asked to select an appropriate case which was already part of the work plan for the NPPO and would be supported by political will and producer interest. Two regional cases for import were selected in conjunction with the APPPC, the Regional Plant Protection Organisation (RPPO). The participating NPPOs were from Malaysia, Viet Nam, Thailand and Philippines. The Indonesian NPPO was unable to continue participation, after initial inputs to one of the regional case study.

The trade cases were progressed through to at least a proposal for trade. The Malaysian case led to a national discussion of Systems Approach components and a proposal to China for trade. The Thai case led to a clearer stakeholder discussion on what would be required to leap from heavy reliance on methyl bromide to a combination of other measures. The Vietnamese case was presented to the Republic of Korea in 2014 but no conclusion has yet been reported. The Philippines case led to proposed changes to the operational plan for exports which had already been agreed when the case was selected. Even before the project ended, the process has been applied to new cases of trade negotiation particularly by the Philippines participants. The regional case studies were complicated and politically sensitive. They were taken through to completed DSS and Production Chain but are not likely to alter decisions regarding import to the region any time soon.

Further details of these priority trade cases were presented in six monthly project reports and several will appear, with permission of the country NPPOs, in the forthcoming eBook.

5.2.2. Output 2: Tools filled in through consultation with stakeholders

Although it is possible to complete the tools alone, their value lies in collating input from various stakeholders. In most cases, there is little hard data related to efficacy of measures in the field, even if research was conducted to develop the measures with resulting lab data. Expert judgement or measurement of impact by proxy (e.g. measuring that temperature remains cold, which was shown in a lab to cause mortality) are the main sources of data for completing the DSS and BN.



Figure 4. Viet Nam NPPO and other government partners complete the Excel™-based Decision Support System with Dr Whittle and Dr Johnson.

One surprising outcome was the extent to which the tools supported communication with the production sector, as well as with trade negotiation teams. This was particularly true for the Production Chain mapping process. The project contributed to a marked increase in number, and presumably the quality, of stakeholder meetings. The Production Chain for one case, for example, highlighted that earlier negotiations were based on measures not even feasible for small-scale producers. International companies have far more capacity to engage in market access negotiation, albeit not officially, and can skew the outcome.

The manual on market access in draft was reviewed at one meeting. A generic Work Plan outline for Systems Approach from an IAEA (International Atomic Energy Agency) report (2011) was considered very helpful, along with a few examples of actual bilateral Work Plans for Systems Approach based trade, which were obtained through friendly connections with NPPOs. Other materials (e.g. the IPPC manual on stakeholder relations) and future projects should help to support this start.

5.2.3. Output 3: Increased confidence in representing Systems Approach in trade negotiations

The tools were shown to support more systematic thinking in both designing and defending risk management proposals. The additional time required to organise thoughts and data proved to be worth the investment for most cases. The more advanced modelling was important for cases with more varying or contrasting viewpoints or to introduce something new, but not essential for simple cases. Competence among project participants in designing and evaluating risk management plans and presenting the estimated impact of measures rose by using these tools; then confidence rose as well.

A new trade issue arose during the project in which the Philippines NPPO employed the Production Chain to consult with industry because pest interceptions into the Republic of Korea had become unacceptable. This entire consultation took under a month, owing to the clarity of the message from the NPPO to industry and their rapid response. The Republic of Korea accepted the counter

proposal and trade continued with additional measures preferred by the industry rather than the additional measure originally proposed by the Korean NPPO.

One way these experiences were captured was the use of posters prepared by NPPOs in advance of later meetings as a mechanism to report on and also a catalyst to consider questions about increased confidence or experiences with stakeholders. The reports also covered these points. Each NPPO presented their results to the other NPPOs in person at the final meeting.

It was noted that meeting each other over time also facilitated the occasion to pick up the phone and speak about trade concerns between project partners. This is a small show of confidence that could resolve a trade issue before it even starts.



Figure 5. Country NPPOs presenting their case study during the final meeting, Thailand.

In other cases, it was acknowledged that holding stakeholder consultations on these cases was the first time stakeholders understood that the use of control points along the production chain (where official verification by the NPPO would be required) could strengthen risk management claims to the point of reducing import requirements. The production sector has not always understood the unique role of the NPPO in both negotiating and overseeing implementation of trade agreements. Show casing the role of the NPPO in this way also increases the credibility of the NPPOs.

5.2.4. Output 4: Overall enhanced communications and management skills

Additional results relate to enhanced project management skills and communications methods. While often simple, these were unknown to most participants until used in this project:

- The use of Meetomatic™ to plan project meeting dates.
- The use of World Meeting Planner™ to find times for group calls, across several time zones.
- The introduction to Skype™ for group calls, and in particular individual case consultations to follow up from field visits.
- Establishing a convener and minute taker for the monthly project communication to make the time as effective and efficient as possible.

- The use of Dropbox™ for shared internet folders to facilitate last version accessibility and avoid emails with very large data files.
- Early agreement on file naming to support version management.
- The set up by CABI of a blog using WordPress™, rather than investing in a short term more expensive project website.
- Call for volunteers within the project to prepare project logo and brochure design, rather than outsourcing – individuals talented in this area self-identified.
- Provision of templates for posters, presentations, etc., in advance of all meetings with suggested topics and questions to harmonise information exchange and ensure important points are not left out.

5.3. Project Objective: Facilitate global dissemination and uptake of the tools

5.3.1. Output 1: The global plant health community was shown the tools

There have been numerous discussions with NPPOs around the world about the opportunity provided by these tools. Not least of these are down to the Observers who went back to New Zealand and Australia and began similar work.

The article explaining the project, Mengersen et al (2012), was published in the *EPPO Bulletin* which is read by many people working in plant health.

Ms Palacpac, Dr Taekul and Ms Quinlan gave a side session on Risk Management to meet import requirements and facilitate market access, on 17 October 2013, at the SPS Committee Meeting in Geneva, Switzerland.

Two CPM sessions included Beyond Compliance in side sessions. In 2012 Ms Quinlan presented at the STDF-WTO Side Meeting, at the VIIth Session of the CPM. In 2014, she and Ms Kongchuesin presented results and experience about the tools developed in the project at the IXth Session of the CPM, Food and Agriculture Organization (FAO), Rome, Italy.



Figure 6. Beyond Compliance presenters at the WTO, Geneva.

Dr Holt and Ms Quinlan reported on the tools to members of the Secretariat of the IPPC as well as from the Codex Alimentarius, in Rome mid-2012. The IPPC webpage showed news of the Beyond Compliance project, including announcing it was holding its Final Meeting in Bangkok. This raised the profile of the project with many plant health counterparts.

The head of the European PRATIQUE project, Dr Richard Baker, reported on the project in 2012 in New Zealand: Tools for risk analysis with systems approach for risk management: PRATIQUE + follow on project for further development.

Prof Mumford presented results of the cases involving fruit fly pests at the 9th International Symposium on Fruit Flies of Economic Importance, Bangkok, Thailand, in May 2014, after a final visit to Philippines to support transfer of the methodology to other sections of the NPPO and a wrap up visit with the Thai team.

A global roll out of the **Beyond Compliance** tools will be proposed to STDF in 2015 comprising training of regional facilitators, translation of materials and additional cases from other regions.

5.3.2. Output 2: Those working in risk management were shown the tools

There was broad participation at the SPS Committee side session, including from outside the committee. People immediately see the relevance and possible applications of the approach. It is accessible conceptually to most people with experience in plant or animal health or food safety. Indeed, the use of BNs in these field has been expanding, although not usually for market negotiation.

Dr Whittle shared the use of BNs for this purpose at the 4th Annual Conference of the Australasian Bayesian Network Modelling Society (ABNMS2012), Wollongong, Australia, November 2012 with the presentation:

Whittle P, Johnson S, Leach A, Holt J, Quinlan M, Mengersen K and Mumford J. (2012) Beyond Compliance – developing systems approaches for phytosanitary pest risk management using Control Point–Bayesian Networks.

A technical article which has been submitted for consideration is:

Holt J, Leach AW, Johnson S, Tu DM, Nhu DT, Anh NT, Quang LN, Quinlan, MM, Whittle, PJL, Mengersen K and Mumford JD. Bayesian networks to compare pest control interventions on commodities along agricultural production chains.

The eBook will reach many people. It is hoped that it supports uptake of the tools for similar cases reported. It has taken considerable time outside the project funded activities to prepare, and will provide details on all the project activities:

Quinlan M, Mengerson K, Holt J, Leach A, Mumford J and Murphy R (eds). (in prep) *Beyond Compliance: a production chain framework for plant health risk management in trade*. eBook Chartridge Books, Oxford, UK.

6 FINANCIAL OVERVIEW

The STDF contribution to this project was US\$600,000 for the Project Grant (PG). In kind contribution was reported as an additional US\$904,686, with in kind coming from all NPPOs, QUT and ICL in particular. The final financial summary appears as section 10.2. Details on the use of funds appeared in each six monthly report.

As reported previously, savings through careful management by CABI SEA allowed a final whole group meeting, which was critical to solidify the confidence gained and for exchange of experiences. Whole project meetings were hosted in Malaysia, Viet Nam and Thailand and additional contributions of staff time and other resources were provided in each instance.

In actual fact, the project cost considerably more than represented here, due to the third year under a no cost extension and the significant additional in kind contributions following the official end of the project. The contribution of the AusAID support was important but was used for additional activities of adding financial costing for the Viet Nam case and preparing an Australian domestic case study, therefore it did not support the planned project work directly.

ICL has been successful in using experiences and outputs from Beyond Compliance as the basis for further development of the tools, which will be reported to STDF as those activities are completed.

There also was substantial value from piggy back meetings facilitated by meetings, conferences or visits throughout the project which linked with other projects or responsibilities of the participants and continue to today.

The wisdom of the change in policy by STDF to allow projects to apply for up to US\$1 million from their project funding stream and for up to three years is borne out by this project's experience of the length of time and resources needed to address long standing challenges in market access.

7 OVERALL PROJECT RESULTS AND LESSONS LEARNED

7.1. Summary of results from the project

Early in the project it was clear that a method for measuring confidence in this topic did not exist. The PCE and PVS do not cover risk management as clearly as some other areas. However, from observation and even show of hands, the general outcome is an increased confidence to provide the materials for or participate in trade negotiations involving complicated, multiple measures for pest risk management.



Figure 7. Field visit to one of the largest orchid growers during Thailand final meeting.

The components of the log frame, in section 10.1, summarise the outcomes. The only one that fell short of completion was to have a more harmonised approach across the region by the end of the project. This would require a stronger champion within the hierarchy of the RPPO. The project has been presented in some sub-regional and regional settings, however. Although the SE Asian sub-region has not taken this up as a whole, other regions have shown considerable interest. The tools will return to Europe for further use and refinement in EU funded projects such as DROPSA, started in 2014 on two exotic pests and the affected fruit production. The FAO/IAEA Division of Nuclear Techniques in Food and Agriculture coordinated to add further field support to dragon fruit production in Viet Nam. Various sectors of the national and local government were working together on these activities, which further highlighted Beyond Compliance as a resource.

The name of the project was chosen during the PPG meeting. It elicits a positive feeling of achieving more than "only" compliance with what another country presents to the "less sophisticated" trade partner. The most impressive result has been for those who continue applying the tools and the concepts behind the tools for each new trade opportunity and the more effective communication with stakeholders and trading partners.

7.2. Lessons learned

The range of trade cases was very valuable due to their different commodities, pests, and objectives. The effort and cost of covering all of these topics did not perhaps leave sufficient to document the outcomes within the project period. The project began with a call for students from

the sub-region. These students could have enrolled in a certificate or MSc program at QUT and might have been useful in documenting further the existing situations in the partner countries, for example in terms of risk management experiences. However not a single space was applied for or taken, so these funds allowed additional stakeholder meetings and reporting to the CPM.

A common understanding of some phytosanitary concepts which are fundamental to the project was assumed. In the first meeting, the ISPM 5 glossary was highlighted as the source for terminology. However, as with so many things, the message bears repeating. Furthermore, the exact use of concepts by the project could only be clarified and agreed after some development of case studies and shared experiences. It is important to have at least one person who is an expert in the IPPC and its standards, terminology and principles to avoid heading too far down a path which conflicts with that framework. (Interestingly, some definitions important to the project were altered or eliminated by the IPPC and CPM during the course of the project. This was discouraging to the participants even if it did not conflict with anything developed.) When observers attended the project meeting where preliminary reports being given might not have been appropriate yet to share, a separate session with them on IPPC concepts related to the project was a valuable side session.

There was a point part way into the case studies when participants focused on the tools, rather than the intended outcome. Without a project meeting, this trend may not have been noticed and reversed. It is probably not unusual when rolling out new methods or tools for this to occur. Perhaps having a reminder of the higher level goal, using the log frame, is one way to avoid this.

In the final project meeting, Prof Mengersen and Dr Leach led a practical exercise on use of GeNIe software for everyone who wanted to check his or her work. Although the topic was covered in the first meeting, this follow up after the case studies proved to be important. In retrospect, this practical exercise should have been incorporated into early field visits and all project meetings. While in general the staff participating was fairly stable, there were new participants at each meeting who could have benefited from this practical.

It also may be noted that the tendency may be for higher level professionals to rely on younger professionals to take up new approaches and software, rather than learning it themselves. Hands on experience is a key component of understanding and confidence, therefore all participants should be encouraged to try out the methods, even if inevitably some people will do better than others in their application.

Some challenges can be anticipated but not easily remediated. For example, staff turnover, medical leaves, several family bereavements and natural disasters all delayed progress on timely reporting.

While these comments are largely about the negative lessons, in fact the positive lessons learned far outweighed the negative. The project results, reported above, were much more far reaching than the individual cases or tools.

8 RECOMMENDATIONS

8.1. Specific recommendations to the project

The tools were designed for commodities, focusing on two or three pests or pest guilds at a time and would need further revision for plants that are pests (weeds), seeds, or pathways such as conveyances. This additional development should be carried out when there is a priority case of this nature.

It would be useful to have the materials translated into other languages and for regional facilitators to be trained. The materials to date are all in English, so those tools ready to use are less accessible to non-English speakers, although the strong emphasis on graphical presentation makes the outcomes understandable in multilingual contexts but also across levels of expertise. Translations of the most relevant materials would complement the training of regional experts and use of facilitators from each region and dissemination to those who learn best from written explanations.

At the time of this report, none of the tools, the eBook and other materials are posted on the STDF web site for broader access. This will be rectified soon, in cooperation with the STDF Secretariat.

Once the tools are more widely available, feedback will be very important. A method to collect information on usage could be through a licensing system (used by FAO in earlier software development) or the requirement for registering to use the tools when downloading. While a simple access counter can provide the number of downloads, it is better to have a two way communication mechanism for future users of the tools. This way, the details of their impact can be collected through short surveys, for example, but also suggestions for improvements and support requests can be gathered.

Links to the phytosanitary resources page are imperative for effective awareness-raising. However, this cannot be a passive activity. *Beyond Compliance* materials should be actively promoted and shared with other projects and training courses addressing risk management. Any other initiatives in risk management should be consulted to ensure a harmonised approach to basic concepts so that all useful tools are grouped together for future access and use. Cases developed under the auspices of other projects or funding mechanisms should be somehow linked to show their evolution from the *Beyond Compliance* tools. At this time, there is no person to play this role. This role might fall to the implementation staff of the IPPC Secretariat, if supported by the CPM.

The experiences with stakeholders completing tools together built capacity and trust amongst stakeholders in each of the participating countries. With permission, the reports of stakeholders' meetings could be posted on the phytosanitary resources page and linked to the IPPC manual on Managing Stakeholder Relations, as case studies. This would allow the users of the manual to see how maintaining relations with stakeholders can be used in practice for pest risk management and market access purposes.

8.2. Broader recommendations

One broader recommendation is to further support global understanding of ISPM 14 and Systems Approach trade examples, because of a lingering suspicion of their success. The entire national team for research, trade negotiation and plant health need to be convinced that a great deal of trade takes place using combined measures. Letting go of the security provided by methyl bromide, for example, is a paradigm shift in many cases. This lack of confidence in the approach is exacerbated by the fact that few trading partners share their operational or management plans, even though PRAs they are based on are becoming more available. A global data base detailing successful trade cases using Systems Approach would begin to address this.

The lack of awareness, acceptance and confidence in ISPM 14 and Systems Approach is exacerbated by the fact that few trading partners share their operational or management plans, even though PRAs they are based on are becoming more publicly available. Moreover, there is no current mechanism for sharing success stories about the implementation of ISPM 14 and Systems Approach. A global database detailing successful trade cases using Systems Approach would begin to address this. Combinations of measures have been the basis of substantial trade for decades. The implementation of this ISPM is significantly slowed because NPPOs do not have wide access to the details of this trade.

A collection of Systems Approach operational plans or implementation agreements would provide valuable insights for those who are less experienced with the methodology. If the IRSS could specifically invite NPPOs to share these, perhaps more would be forthcoming than is currently available publicly. It could be useful to design a form requesting permission to share details of information, such as the operational plans noted above, so that this obstacle to wider sharing of resource materials may be overcome.

In the future, if funding is available, it would be useful to train SPS experts, who are comfortable working with quantitative tools on the use of the BN tool. This would allow the availability of facilitators in each region who combine both SPS expertise and skills in the use of the BN tool. The advantage is that a single point person could support use of the concept for other topics in the country or region, such as food safety, animal health or similar applications. A word of warning on this idea: even with experience, a network with regular contact with the developers of the tool is advisable. In recent years, BNs are being taken up for a range of applications in plant health. The

Beyond Compliance tool is already tailored over years of testing. Without serious consideration of the ideas, assumptions and experiences underpinning the Beyond Compliance tool, uptake of other applications of BN methodology could confuse matters rather than help.

It also would also be useful to have long-term tracking of efforts towards market access, possibly through the IPPC's Implementation Review and Support System (IRSS), because trade proposals will often take years from first submission to agreement. Even with regular clarification of what could be expected, not achieving trade in some cases during the project time frame was disappointing to some. The tracking mechanism can be designed to provide valuable, anonymous data for indicators of the impact of the IPPC, as well as of the project. This recommendation was noted also in discussions on indicators for the IPPC overall (Quinlan et al, 2013).

The entire process of preparing for market access negotiations requires on going and long term support. This "final mile" towards trade should be supported the way that the PCE tool and process has become embedded regionally, but supported centrally. The IPPC Market Access manual is an excellent start.

9 REFERENCES AND RESOURCES

FAO. (2001; rev 2013) *ISPM 11 Pest risk analysis for quarantine pests, including analysis of environmental risks and living modified organisms*. IPPC, FAO, Rome.

FAO. (2002) *ISPM 14 The use of integrated measures in a systems approach for pest risk management*. IPPC, FAO, Rome.

FAO. (2005) *ISPM 24 Guidelines for the determination and recognition of equivalence of phytosanitary measures*. IPPC, FAO, Rome

IAEA. (2011) *FAO/IAEA Guidelines for Implementing Systems Approaches for Pest Risk Management of Fruit Flies*. IAEA, Vienna, Austria.

Jamieson LE, DeSilva N, Worner S, Kelly S, Bewsell D and Rogers D. (2011) A review of systems approaches to assessing and managing risk. A report prepared for The Foundation for Research Science and Technology - Better Border Biosecurity (CO2X0501) 35 pp.

Mengersen K, Quinlan MM, Whittle PJL, Knight JD, Mumford JD, Wan Ismail WN, Tahir H, Holt J, Leach AW, Johnson S, Sivapragasam A, Lum KY, Sue MJ, Othman Y, Jumaiyah L, Tu DM, Anh NT, Pradyabumrung Y, Salyapongse C, Marasigan LQ, Palacpac MB, Dulce L, Panganiban GGF, Soriano TL, Carandang E and Hermawan. (2012) Beyond Compliance: project on integrated systems approach for pest risk management in South East Asia. *EPPO Bull.* 42:109-116. DOI:10.1111/epp.2551

Mumford JD, Quinlan MM, Holt J and Leach AW. (2013) Analysing risk on pathways where a Systems Approach to managing risks is proposed. In: *Risk Analysis for Imports and Exports* (New Zealand Plant Prot. Soc. Symp. published abstract).

Quinlan MM and Ikin R. (2009) A review of the application of Systems Approach to risk management in plant health. Deliverable report D4.2., PRATIQUE. 70 pp.

Quinlan MM, Knight JD, Leach AW, Mumford JD and MacLeod A. (2011) Demonstration PRA framework including systems approach. Deliverable report D4.7., PRATIQUE. 17 pp.

Quinlan MM, Sosa O, Mumford J, Hammons S, Belton D, Christodoulou M, González MM, Fulponi L, Holt J, Lamb J and Murphy R. (2013) Report on the Round Table Discussion on Indicators of Implementation of the International Plant Protection Convention, Windsor, UK, October 2013. IPPC, Rome.

Taekul C, Kongchuensin M, Pradyabumrung T, Salyapongse C, Rourchaiapicul S, Quinlan MM, Mumford JD, Leach AW, Holt J, Johnson S, Mengersen K and Whittle PJL. (2013) The integrated system approach of risk management for *Thrips palmi* Karny on exported orchids from Thailand to

the European Union. Presented at: 11th National Plant Protection Conference, Khon Kaen, Thailand, 26–28 November 2013.

Whittle P, Quinlan MM and Bin Tahir H. (2011) Beyond Compliance - Report on workshop for STDF Project Preparation Grant 328: Developing trade opportunities: an integrated systems approach for pest risk management.

www.standardsfacility.org/sites/default/files/STDF_PPG_328_WorkshopReport_Aug-10.pdf

WTO. (no date) *Agreement on the Application of Sanitary and Phytosanitary Measures*. 1867 U.N.T.S. 493.

9.1 Project reports to STDF

Beyond Compliance (2011) Beyond Compliance: Integrated Systems Approach for Pest Risk Management in Southeast Asia (STDF/PG/328), Kuala Lumpur, Malaysia, 25–28 July 2011. Inception meeting report.

Beyond Compliance (2011) Beyond Compliance: Integrated Systems Approach for Pest Risk Management in Southeast Asia (STDF/PG/328). STDF project report (1st), 1 July 2011 – 31 December 2011.

Beyond Compliance (2012) Beyond Compliance: Integrated Systems Approach for Pest Risk Management in Southeast Asia (STDF/PG/328). STDF project progress report (2nd), 1 January 2012 – 30 June 2012.

Beyond Compliance (2012) Beyond Compliance: Integrated Systems Approach for Pest Risk Management in Southeast Asia (STDF/PG/328), Ha Noi, Viet Nam, 16–19 July 2012. Mid-term project review report.

Beyond Compliance (2013) Beyond Compliance: Integrated Systems Approach for Pest Risk Management in Southeast Asia (STDF/PG/328). STDF project progress report (3rd), 15 February 2013

Beyond Compliance (2013) Beyond Compliance: Integrated Systems Approach for Pest Risk Management in Southeast Asia (STDF/PG/328). STDF project progress report (4th), 15 August 2013.

Beyond Compliance (2013) Beyond Compliance: Integrated Systems Approach for Pest Risk Management in Southeast Asia (STDF/PG/328), Bangkok, Thailand, 29 July – 2 August 2013. Report of the final meeting.

Beyond Compliance (2014) Beyond Compliance: Integrated Systems Approach for Pest Risk Management in Southeast Asia (STDF/PG/328). STDF project progress report (5th), 25 June 2014.

This report completes the reporting requirements.

10 ANNEXES

Logical Framework
Financial Report
Contact List

10.1. Logical Framework

Outputs and Activities were reviewed and revised in the Project LogFrame at the Project Meeting at Ha Noi in July 2012. Progress on the completion was considered at each project meeting. This is a final summary, as of the close of the project. Subsequent progress is not represented here.

Output / Activity	Indicator / Target:	Actual performance: (% complete)	Comments (results and challenges faced)
Output 1: Decision tools for implementing Beyond Compliance (BC) framework in the region			
Activity 1: Develop Beyond Compliance (BC) tools for Systems Approach	<p>Indicator: Tools produced and demonstrated within the region.</p> <p>Targets: Guidance notes, documents or publications on concepts and project tools: production chains, decision support system, Control Point-Bayesian Networks</p>	100%	<p>The three tools are instructions or templates for development of the Production Chain, completion of the Decision Support System (DSS) for selecting measures, and the Control Point-Bayesian Network (CP-BN) for determining the impact of measures, their relationships and points where monitoring and correction can take place.</p> <p>The Production Chain tool is completed. The DSS was refined, in a more user-friendly format, and is being used as a template within an EU project on responses to introduced pests. Extensive work was put into refining the CP-BN and this enhanced version is now ready for application. The format of the Production Chain and DSS leads directly into a CP-BN, making additional networks much easier to generate.</p> <p>The regional import Case Studies may raise other issues to address in revision of tools, or these issues may simply be documented for future consideration.</p> <p>In the coming period summary documents explaining the use of the tools will be updated and finalised; technical publications describing each of the tools are in preparation.</p>
Activity 2: Conduct Case Studies in project country for potential exports, and for two Cases for import to the region as a whole	<p>Indicator: National and regional Case Studies of Systems Approaches are identified and described.</p> <p>Targets: Demonstrations and reports of national and regional Case Studies of Systems Approach</p>	90%	<p>The four country case studies and one regional study have production chains and DSSs completed. Model CP-BNs have been developed as part of the tool development. The enhanced CP-BN tool (template) was finalised in December 2012. Case Study CP-BNs have been developed with NPPOs for each national case study.</p> <p>One regional case study (South American Leaf Blight, which could enter on a variety of pathways) has developed a Production Chain, but no DSS or CP-BN. The oil palm import case study has developed Production Chain, DSS and CP-BN</p> <p>A common format for reporting on Case Studies has been drafted.</p>

<p>Activity 3: Determine institutional needs, acceptability and the potential for Systems Approaches</p>	<p>Indicator: Stakeholder meetings and evaluations by NPPOs on use and potential are held</p> <p>Targets: Results of stakeholder meetings and evaluations by NPPOs on use and potential are reported</p>	<p>100%</p>	<p>Institutional arrangements for trade negotiations were discussed at the final project meeting in Ha Noi. Partners are aware of challenges of inter/intra-agency coordination. The potential for Systems Approach lies directly with the value perceived by the growers/exporters. Further work on clarifying acceptance by this sector is needed, because ultimately growers are the group that must implement and in most cases pay for Systems Approaches.</p> <p>Each of the four national partners held stakeholder meetings. Additional project funds were reallocated to NPPOs to allow for more stakeholder meetings in each country during the project after initial meetings proved useful. Guidance on the organisation of stakeholder meetings related to the use of the Beyond Compliance tools was drafted by WP3 following discussions at the Ha Noi meeting in July 2012. There was strong feedback from NPPOs that the Production Chain and DSS tools had been useful in structuring discussion on Systems Approaches with stakeholders.</p> <p>WP3 (ICL) linked with an IAEA-funded initiative that was also directed at dragon fruit exports and met private stakeholders in Viet Nam to review the details of the CP in particular. Further IAEA-funded stakeholder meetings were held in conjunction with Viet Nam NPPO in 2013.</p>
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<p>Activity 4: Raise awareness about the BC method for Systems Approaches amongst targeted plant health stakeholders</p>	<p>Indicator: Tools are discussed and used in national and regional plant health meetings, in stakeholder discussions and in trade negotiations</p> <p>Targets: Presentations at international, regional and national meetings of plant health and trade specialists; web publicity; technical papers on development and use of tools; mention of tools and Systems Approach in trade negotiations and agreements</p>	<p>100%</p>	<p>All the NPPO partners have discussed the concepts within their Departments at national level. Awareness has been raised through stakeholder contacts at national level in the partner countries.</p> <p>WP3 (ICL) reported at Ha Noi the response to the STDF side event presentation at CPM in 2012 and the internal meeting there for SE Asia country delegations. Target market country NPPOs are aware of the project and its support from the IPPC. Reference to the project has appeared on the IPPC website. The project blog featured updates.</p> <p>New Zealand NPPO heard of initial results in a workshop to explore BN tools for Systems Approach. One project resource person (staff of NZ NPPO) reported to Ha Noi project meeting the development of a BN based Systems Approach for a trade entering NZ, developed expressly as a result of the BC project discussions at the first project meeting.</p> <p>AusAID provided funds to develop an Australian Case Study linked to Beyond Compliance, and to extend the Viet Nam Case Study to include costing of measures, from Beyond Compliance during 2013.</p> <p>The project was described in the <i>EPPO Bulletin</i> which featured results of the PRATIQUE project, an edition that will be widely accessed by all NPPOs. The Production Chain, DSS and CP-BN templates are being used and developed further in the EU project DROPSA on imported Asian horticultural pests in Europe.</p> <p>The Beyond Compliance tools have been presented at the International Congress of Plant Pathology in Beijing in 2014 and at the New Zealand Plant Protection Society Conference in 2013.</p> <p>Reference to the tools in trade negotiations may arise more after the time of this project. (The emphasis also has been on the tools for building confidence of the negotiating team, rather than as something simply handed over for review by the target market NPPO.)</p>
<p>Output 2: Relevant NPPO staff and stakeholders with capacity to put tools into use</p>			
<p>Activity 5: Technical resources for developing capacity of NPPO staff and other stakeholders in the use of BC Systems Approach tools</p>	<p>Indicator: NPPO staff and other stakeholder make effective use of tools</p> <p>Targets: Explanatory materials and guidance on stakeholder interactions are available</p>	<p>80%</p>	<p>A summary description of the tools and their use has been prepared as an e-book, as well as in several international conference presentations. NPPOs have discovered their own preferred use of tools in some stakeholder meetings (e.g. to compare different risk management measures along the same production chain, or to show all measures regardless of the targeted pest). One NPPO has applied the Beyond Compliance experience to other cases and has used Production Chains as part of the case for measures to restore two cases of trade interrupted due to interceptions. Another of the partner NPPOs has</p>

			<p>applied some of the tools in ongoing trade discussions.</p> <p>NPPO partners have been supported in developing plans to use Beyond Compliance tools in stakeholder discussions. Additional materials such as power points, posters and spreadsheets have facilitated understanding and uptake.</p>
<p>Activity 6: Establish and develop a regional network for Systems Approach linked to existing wider plant health network</p>	<p>Indicator: Common regional Systems Approach concepts and tools appear</p> <p>Targets: Common regional Systems Approach concepts and tools are demonstrated in several NPPOs within the region; promotion of Systems Approach concepts and tools within RPPO</p>	<p>60%</p>	<p>NPPO partners have been actively engaged with each other and with UK, Australia, NZ, IPPC and FAO partners and participants in developing tools and talking with national stakeholders. The S Korean NPPO attended the final project meeting.</p> <p>Additional case studies have developed in Australia and NZ. NPPOs of other SE Asian countries have attended a closed door pre-CPM session to understand the upcoming tools.</p> <p>NPPOs are discussing the activities of Beyond Compliance beyond the project participants.</p> <p>Information has been provided for the 2013 Technical Consultation of the RPPOs and specifically to the APPPC for this RPPO meeting.</p>

10.2. Financial Report

PROGRESSIVE RECONCILIATION		RECONCILED AT: 28 November 2014								
322230-0060/53 WTO STDF PG 328 BEYOND COMPLIANCE: INTEGRATED SYSTEMS										
PROJECT CHIEF INVESTIGATOR: DR PETER WHITTLE										
DESCRIPTION	BUDGET	2011		2012		2013		2014		TOTAL
	USD	JULY-DEC	JAN-JUNE	JULY-DEC	JAN-JUNE	JULY-DEC	JAN-JUNE	JULY-DEC	JAN-JUNE	
REVENUE										
Progressive payment est. 31/7/2011	180,000.00	180,000.00								180,000.00
Progressive payment est. 2/2/2012	120,000.00		120,000.00							120,000.00
Progressive payment est. 31/7/2012	120,000.00			120,000.00						120,000.00
Progressive payment est. 2/2/2013	120,000.00				120,000.00					120,000.00
Progressive payment est. 31/7/2013	60,000.00									0.00
TOTAL REVENUE	600,000.00	180,000.00	120,000.00	120,000.00	120,000.00	0.00				540,000.00
EXPENDITURE										
<i>Queensland University of Technology</i>										
Retained payment est. 1/8/2011	70,000.00									
Retained payment est. 31/1/2012	20,940.00									
Retained payment est. 31/7/2012	24,590.00									
Retained payment est. 31/1/2013	5,900.00									
Retained payment est. 30/7/2013	27,600.00									
<i>SUB-TOTAL RETAINED AT QUT</i>	<i>149,030.00</i>									
Personnel services										
- QUT staff	102,249.00	30,681.20	31,888.10	39,679.70	8,950.00	0.00				111,199.00
Travel (MSc students only)	11,057.00	0.00	0.00	0.00	0.00	0.00				0.00
Training (launch mtg, final workshop, pp travel)	0.00	0.00	0.00	0.00	0.00	0.00				0.00
Travel to Case Studies	27,000.00	4,945.85	13,119.84	4,831.40	4,318.84	0.00				27,215.93
General operating expenses										
- In Aust Travel for QUT Staff	1,632.00	0.00	0.00	0.00	0.00	0.00				0.00
- contingency for foreign exchange etc	5,712.00	10,692.95	0.00	0.00	0.00	0.00				10,692.95
- External Review (Now funded by STDF)	18,000.00	0.00	0.00	0.00	0.00	0.00				0.00
Total	165,650.00	46,320.00	45,007.94	44,511.10	13,268.84	0.00				149,107.88
Closing retained funds										
<i>CABI - South East Asia</i>										
Progressive payment est. 1/8/2011	60,000.00	60,000.00								60,000.00
Progressive payment est. 31/1/2012	40,000.00		40,000.00							40,000.00
Progressive payment est. 31/7/2012	40,000.00			40,000.00						40,000.00
Progressive payment est. 31/1/2013	40,000.00				40,000.00					40,000.00
Progressive payment est. 30/7/2013	17,491.00					17,491.00				17,491.00
Variation payment	41,100.00				41,100.00					41,100.00
1st payment to NPPOs (variation)	26,060.00		26,060.00							26,060.00
2nd payment to NPPOs (variation)	22,410.00			22,410.00						22,410.00
<i>SUB-TOTAL PAYMENTS TO CABI-SEA</i>	<i>287,061.00</i>	<i>60,000.00</i>	<i>66,060.00</i>	<i>62,410.00</i>	<i>81,100.00</i>	<i>17,491.00</i>				<i>287,061.00</i>
Expenditure										
Personnel services	0.00	0.00	0.00	0.00	0.00	0.00				0.00
Travel (steering committee)	37,687.00	3,947.13	5,441.09	7,566.19	2,574.79	5,223.77	13,326.73			38,079.70
Training (launch mtg, final workshop, pp travel)	97,536.00	34,686.71	4,426.02	28,191.30	18,092.63	3,568.94	0.00			88,965.60
Other meetings & workshops (in region travel, meetings, consumables, venue hire)	24,480.00	5,120.00	6,144.00	3,072.00	3,584.00	6,656.00	0.00			24,576.00
IT & Software equipment (for NPPOs)	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00
Project Management	59,976.00	14,704.00	15,744.00	14,032.00	10,408.00	5,656.00	2,074.00			62,618.00
Consumables/General operating expenses	7,632.00	20.28	72.76	7.55	4,531.41	208.55	10,758.00			15,598.55
Other expenditure (promotional website or materials)	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00
Paid to NPPOs	59,750.00	0.00	24,388.40	17,107.09	15,727.66	0.00	0.00			57,223.15
Total	287,061.00	58,478.12	56,216.27	69,976.13	54,918.49	21,313.26	26,158.73			287,061.00
<i>Imperial College London</i>										
Progressive payment est. 1/8/2011	50,000.00	50,000.00								50,000.00
Progressive payment est. 31/1/2012	33,000.00		33,000.00							33,000.00
Progressive payment est. 31/7/2012	33,000.00			33,000.00						33,000.00
Progressive payment est. 31/1/2013	33,000.00				33,000.00					33,000.00
Progressive payment est. 30/7/2013	14,909.00					14,909.00				14,909.00
<i>SUB-TOTAL PAYMENTS TO ICL</i>	<i>163,909.00</i>	<i>50,000.00</i>	<i>33,000.00</i>	<i>0.00</i>	<i>80,909.00</i>	<i>0.00</i>				<i>163,909.00</i>
Personnel services	156,372.00	17,216.11	33,282.22	32,951.38	32,628.40	10,078.11	31,637.29			157,793.51
MSc costs	5,000.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00
General - in UK travel expenses	2,537.00	0.00	594.10	1,512.56	1,840.07	1,632.80	0.00			5,579.53
Total	163,909.00	17,216.11	33,876.32	34,463.94	34,468.47	11,710.91	31,637.29			163,373.04
TOTAL EXPENDITURE	600,000.00	122,014.23	135,100.53	148,951.17	102,655.80	33,024.17	57,796.02			599,541.92

10.3. Contact List

Numerous colleagues and stakeholders were involved in this project. This is a list of people who worked on the project directly, not including meeting support, trainees and observers from each NPPO when serving as the host; or those who attended CPM side sessions or the WTO SPS Committee side session.

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