



DFID Natural Resources Systems Programme

**DFID Natural Resources Systems Programme, Land
Water Interface Project R7668: Impact and
amelioration of sediment and agrochemical pollution
on Caribbean coastal waters**

**Report of a project visit to Jamaica, Dominica and St
Lucia by Nicole Kenward and Chris Mees,
6 – 30 June 2001**

MRAG

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EXECUTIVE SUMMARY

- This report documents the second field related activity for agro-chemical elements of the NRSP LWI project R7668 *Impact and amelioration of sediment and agro-chemical pollution on Caribbean coastal waters*. It will be distributed to all contacts made during the first and second project trips.
- The MRAG Project Team visited Jamaica, Dominica and St Lucia during the month of June 2001. The Project Team met with collaborating partners in both Jamaica (UWI, CARDI, C-CAM) and St Lucia (MAFF Extension Services, MAFF DoF, CEHI) and project activities were organised in association with collaborating partners.
- The objectives of the visit included one-day project workshops for agricultural extension officers (Jamaica/St Lucia), field visits to locate environmental monitoring stations (St Lucia), collection of additional information on imports and farming practices (Jamaica/St Lucia), further investigation of linkages with other projects (Jamaica/St Lucia) and participation and presentation at the 6th annual meeting of the Co-ordinating Group of Pesticide Control Boards of the Caribbean (Dominica).
- Highlights of the trip are described in the first section of this report, and include the completion of two project workshops, two project presentations at the 6th annual meeting of the CGPC and invitation to subsequent meetings, finalisation of a Memorandum of Understanding with CEHI, collection of import data for 1997-2000 for St Lucia and Jamaica, a productive round-table meeting with all collaborators in Jamaica, linkage established with the Water and Sewerage Company in St Lucia and initial consultations about critical control points for amelioration of agro-chemical pollution.
- The majority of the trip has been documented through the use of reports for meetings held with collaborating partners and other institutions. Other activities have been recorded in tabulated format, and all reports/records are included in the body of this report. The project workshops held with agricultural extension officers in Jamaica and St Lucia have been summarised in this report, and Workshop Proceedings will be prepared separately.
- A farmer survey by agricultural extension officers is currently underway in Jamaica (Wag Water and Rio Cobre watersheds) and St Lucia (Roseau, Praslin/Mamiku and Soufriere watersheds). The next project trip will take place in November 2002.
- All outputs for this project (including the first Trip Report, the current Trip Report and Workshop Proceedings) are accessible on MRAG's web site ([www.mragltd.com/LandWater Interface/R7668](http://www.mragltd.com/LandWater%20Interface/R7668)). Linkage is currently being established between the project site and the Caribbean pesticides network.

ACRONYMS

CARDI	Caribbean Agricultural Research and Development Institute
CBO	Community-based organisation
C-CAM	Caribbean Coastal Area Management Foundation (Jamaica)
CCST	Caribbean Council for Science and Technology
CEHI	Caribbean Environmental Health Institute
CGPC	Co-ordinating Group for Pesticide Control Boards of the Caribbean
CMS	Centre for Marine Science (UWI Mona Campus, Kingston)
CWIP	Coastal Water Improvement Project (Jamaica)
DFID	Department for International Development
DoC	Department of Chemistry (UWI Mona Campus, Kingston)
DoEH	Department of Environmental Health (St Lucia)
DoLS	Department of Life Sciences (UWI Mona Campus, Kingston)
ECLAC	Economic Commission for Latin America and the Caribbean
EJASP	East Jamaica Agricultural Support Project
ENACT	Environmental Action Programme (Jamaica)
ENCORE	Environmental and Coastal Resource Project (St Lucia)
EU	European Union
FAO	Food and Agricultural Organisation (of UN)
H&S	Health and Safety
IICA	Inter-American Institute for Cooperation on Agriculture
IMDG	International Maritime Dangerous Goods
LBA	Land-Based Activities
LWI	Land Water Interface
MAFFE	Ministry of Agriculture, Forestry and Fisheries (St Lucia)
MRAG	Marine Resources Assessment Group
MS	Member State
NEPA	National Environment and Planning Agency (Jamaica)
NGO	Non-governmental organisation
NPA	National Programme of Action
NPI	Natural Products Institute (UWI Mona Campus, Kingston)
NRCA	Natural Resources Conservation Authority
NRMU	Natural Resources Management Unit
NRSP	Natural Resources Systems Programme
OECS	Organisation of Eastern Caribbean States
PCA	Pesticides Control Authority (Jamaica)
PCB	Pesticides Control Board
PI	Principal Investigator
RADA	Rural Agricultural Development Authority (Jamaica)
SLASPA	St Lucia Air and Sea Ports Authority
SLBC	St Lucia Banana Corporation
SLBGA	St Lucia Banana Growers Association
SLSWMA	St Lucian Solid Waste Management Authority
SMMA	Soufrière Marine Management Association (St Lucia)
TQFC	Tropical Quality Fruit Company
UNEP	United Nations Environmental Programme
UoY	University of York
UWI	University of the West Indies
WASCO	Water and Sewage Commission, St Lucia
WIBDECO	Successor to WINBAN: Windward Islands Banana Development and
WINCROP	Windward Islands Crop Insurance (1988) Ltd

1 INTRODUCTION

This three-year research project *Impact and amelioration of sedimentation and agro-chemicals in Caribbean coastal waters* is funded by DFID's NRSP LWI programme (R7668). It follows on from an earlier LWI project *Review of the impacts of pollution by sediments and agro-chemicals of tropical coastal waters with reference to the Caribbean region* (R7111). The present project is managed and conducted by two organisations: the University of York, responsible for the sedimentation aspects of the project (activities commenced in June 2000 and are concentrated in the SMMA in St Lucia); and MRAG Ltd, responsible for agro-chemical components of the project (activities are undertaken in St Lucia and Jamaica). This trip report is the second output for the agro-chemical component of the project.

1.1 Purpose of visit

This visit to Jamaica, Dominica and St Lucia and Jamaica took place in June 2001. In accordance with the project log frame, the purpose of the visit was:

- To initiate structured interviews with farmers through a standardisation and training workshop for agricultural extension officers in St Lucia and Jamaica;
- To carry out key informant interviews through the above workshop;
- To locate monitoring stations in the three watersheds in St Lucia (Roseau, Soufrière, Praslin/Mamiku);
- To collect additional information on imports and further determine analytical requirements; and
- To further explore linkages with other projects.

The Secretariat of the CGPC also invited the Project Team to attend and present the project background and preliminary outcomes at the 6th annual meeting of the CGPC on 19-21 June 2001 in Dominica. The project was also asked to review the regional databases designed for PCB's (the FAO database designed for OECS countries and Geref database adapted from Central America for Jamaica), and invited to present this review to the meeting. These dates fell within the timing for this project trip and the project team was therefore able to attend this meeting.

1.2 Itinerary and meetings

The itinerary was set up around project workshops in Jamaica and St Lucia, and the CGPC meeting in Dominica. The final version of the itinerary is attached (Annexe 1: Itinerary). Meeting reports (including actions and follow-up) have been prepared for meetings with each institution and are presented in Section 2. The contact details of all relevant people and their institutions are given in Annexe 2 – Contact details.

1.3 Highlights of the Trip

- Completion of two project workshops with agricultural extension officers from study watersheds in St Lucia and Jamaica: information was collected about study watersheds, questionnaires were revised and finalised, standardisation of questionnaire techniques was conducted and the questionnaire survey programme implemented. It is anticipated that questionnaires be completed by end August for analysis by CARDI.

- A radio interview was conducted following the St Lucia workshop for a subsequent 'Agri-focus' broadcast on Radio St Lucia. This covered details of the project's purposes and the reason for conducting the farmer survey. It is an example of useful local dissemination of the project, and a useful pre-cursor to implementation of the survey.
- Two project presentations were made at the 6th Meeting of CGPC in Dominica: the first focussed on project activities and preliminary findings; the second responds to a regional request for a review of existing regional databases. Subsequent to the presentations, there were three important outcomes:
 1. The Project Team has been invited to attend the 7th Meeting of CGPC to update members on project research outputs.
 2. It was also suggested that the final project workshop coincide with the 8th Meeting of CGPC in order to disseminate findings.
 3. The Project Team has been requested to finalise the database review, and the CGPC have recommended 'that a user requirement analysis for a pesticide database, as well as a fuller assessment of the GERIFI database of Jamaica (copy obtained during this visit), be performed, taking into consideration issues of sustainability, local ownership and workability. Out of the study, if necessary, a project should be developed and submitted to FAO for updating of the respective databases and equipment in the countries' (CGPC 2001).
- Linkage with the Caribbean pesticides network has been discussed and will shortly be established. All project outputs will be available over the web, and a link to all reports will be set up on the regional website that is coordinated by the PCA in Jamaica (www.caribpesticides.net).
- The MoU with CEHI has now been finalised and environmental monitoring is planned for November 2001. Two replicates of sub samples will be analysed by CEHI, one replicate will be analysed by a UK laboratory, results of which will support CEHI in certification procedures.
- Sampling sites for environmental monitoring were located in collaboration with extension services in St Lucia and the sites visited.
- A particularly useful and productive round-table meeting was held at UWI in Jamaica with representatives from all Jamaican collaborating partners (CMS, DoLS, DoC, CARDI, C-CAM). The meeting was briefed about project outputs by respective partners and commitments were made for second drafts and the review process. The meeting discussed future project activities at length (BMP, critical control points, relevant studies).
- Initial consultations were made with a number of people with respect to future project activities related to critical control points for management and best management practices. In addition to discussions with collaborators these included: UNEP CEP and details of BMP guidelines developed by them; target agricultural extension organisations in Jamaica and St Lucia who promote farming practices; manufacturers of pesticides who have their own extension programmes for agro-chemical use; and contact details for the UK supermarkets co-ordinator in relation to their policies which have a significant impact on farming practices.

- A meeting was held with the Southern Branch Manager of the Water and Sewerage Company of St Lucia (WASCO). WASCO has laboratory equipment available for use during environmental monitoring of the three watersheds and is also keen to support the project's activities in terms of transport.
- Additional import data was obtained for both Jamaica and St Lucia to extend the time series available for analysis.

1.4 Future trips

The third project trip is scheduled for November 2001. At present, planned activities within the log frame include:

- Coordination of sampling activities at the three watersheds in St Lucia and distribution for analysis;
- Follow up to information from structured interview analyses, and discussions with extension officers;
- Gather further material relating to critical control points for management and best management practices;
- Coordination of activities with collaborating partners.

1.5 Collaborative Arrangements

Meetings were held with collaborating partners in St Lucia (MAFF: Departments of Agriculture and Fisheries; CEHI) and in Jamaica (UWI: CMS, DoC, DoLS; CARDI; C-CAM). The purpose of meetings was to discuss collaboration and plan joint project activities. Collaborative arrangements have been set out in separate MoU's for each collaborating partner; during this trip the MoU with CEHI was finalised and the MoU with MAFF was elaborated during meetings. Detailed requirements indicated in the MOU's of Jamaican partners were discussed at a round table meeting (see Table 2.1 and Table 2.5). Within each MOU although certain outputs are the responsibility of one collaborator, it is intended that all partners will be able to contribute and/or review all project outputs. In this way, the project will draw on the local, national and regional experience of all collaborating partners.

2 OUTCOMES

It was decided that the majority of this project trip would be most easily presented through the use of meeting reports. In this way, it is possible to document key discussions and conclusions of each meeting, and maintain a record of information useful for project outputs. This section includes the following:

- Reports from meetings held with collaborators and key informants in Jamaica;
- Reports from meetings held with collaborators and key informants in St Lucia;
- Report from 6th Meeting of the Coordinating Group of Pesticide Control Boards of the Caribbean (19th - 21st June 2001);
- Locations of sampling sites in Roseau, Soufriere and Mamiku watersheds; and
- Updated flow charts of administrative management of agro-chemicals in St Lucia and Jamaica.

2.1 Reports from meetings held with collaborators and key informants in Jamaica

Meeting reports included in this section are set out as follows:

1. CCAM meeting
2. PCA meetings
3. UWI/CARDI workshop preparation meeting
4. Project round-table meeting
5. DoC meeting
6. UNEP meeting

Table 2.1 CCAM meeting

Meeting between	CCAM : Peter Espeut; Brandon Hay. MRAG : Nicole Kenward; Chris Mees
Venue	Four Seasons Hotel, Kingston
Dates of Meeting	8 June 2001 1000 – 1320hrs
Points of discussion	To review and discuss CCAM's first project document: <i>Pesticides regulation in Jamaica</i> relating to the following activity defined in the MoU: 'Assist project collaborators in developing appropriate contacts within Jamaica (Government and Industry) and in the collection and collation of material and data for developing an understanding of the systems locally established for monitoring the fate of agro-chemicals from import through to the final point of sale. (delivery: end April 2001).' To discuss the questionnaire designed by CARDI for farmer interviews.
Commitments made	
CCAM	To address the points raised in the written review of the document - in particular to describe systems for the import/manufacture and distribution to the point of final sale of other agro-chemicals (fertilisers) including review of Customs and Excise procedures relating to imports/ exports and the recording system.

CCAM (continued)	To address the system beyond import, in order to describe the marketing chain, including quantification in terms of numbers of importers, manufacturers, distributors and their sub outlets, and retail outlets (where feasible). It was recognised that quantification of the amount of individual pesticides distributed at each point in the chain is difficult, though may be possible in some cases, e.g. through the coffee board. The quantification of the numbers of 'distributors' in the chain will assist in identifying the scale of the problem and may guide future recommendations for improved systems monitoring.
	To describe any regulations relating to the marketing chain beyond the point of import or manufacture.
	To obtain details of the IDB project that reviews the legislation relating to pesticides (referred to by H. Chin-sue of the PCA), and to incorporate details into the report.
	To describe and comment on the future programmes that PCA intend to implement relating to further monitoring activities on the use and fate of chemicals (PCA have indicated these programmes will come on line 'soon'), including appraisal of the institutional capacity to implement them.
	To verify the details in the draft report relating to the Manufacturing system: what is the requirement for registration - the end product or the active ingredient for import?
	To obtain details (and quantities) relating to the export of pesticides/fertilisers manufactured in Jamaica (through JAMPRO and others)
	After the point of sale, what happens regarding disposal of any 'waste' chemicals (expired, obsolete, no longer registered etc) - distinguish between what are legal requirements (and under which acts?) and what is commonly applied best practice in Jamaica.
	Outline details of the publicity and media material produced by PCA relating to use/ safety/ storage/ disposal etc of pesticides and their containers. Draw inferences where possible on whether such media campaigns are effective, e.g. are data available on the history of medical cases of poisoning, or chronic effects leading to liver diseases?
	To cross check the updated report text (CCAM) with the updated systems flow diagram and ensure they agree.
MRAG	To update the systems flow diagrams for import and manufacture (of pesticides) based on discussions with PCA and CCAMs updated report.
	To prepare a flow diagram for the distribution /marketing chain from the point of import/manufacture through to sale and use (including details of disposal where possible), based on CCAMs updated report.

MRAG (continued)	To prepare equivalent flow diagrams for other agrochemicals.
	To distribute copies of the flow diagrams to CCAM and other partners (including PCA) in order to verify the systems.
	To circulate updated copies of the project reports of CCAM, CARDI, UWI CMS and UWI-Chemistry to all other project partners when they are available for review.
	To follow up with CARDI suggestions for improvements to the farmer questionnaire.

Table 2.2 PCA meeting 1

Meeting between	PCA : Hyacinth Chin Sue, Marcia Thompson MRAG : Chris Mees, Nicole Kenward
Venue	PCA, Kingston
Dates of Meeting	Thursday, 7 th June 2001 1300-1445hrs
Points of discussion	<ol style="list-style-type: none"> 1. Gerefi database and CGPC meeting 2. Agro-chemical loadings 3. Administrative procedures 4. Fate of agro-chemical loadings 5. Use of agro-chemicals and management
Discussion and commitments made	
Gerefi database and CGPC meeting	The PCA have prepared a copy of the Gerefi database for inclusion in the project's review of regional administrative databases. Cost for IT time is J\$6000. The presentation of the regional databases at the CGPC meeting was discussed as MRAG wish to include details of Gerefi. PCA described the advantages and disadvantages of the database.
Agro-chemical loadings	Quantification of imports – present queries do not automatically generate a list of imports by Active Ingredient. Information is stored by brand names but it is policy not to distribute this information. Active ingredient must be calculated from brand name data. The PCA will arrange for the IT specialist to extract the list of imports by Active Ingredient for 1998-2000.
Administrative procedures	<p>Using information from C-CAM's report and earlier meetings with the PCA, MRAG had prepared flow charts illustrating administrative procedures for imports and manufacture. The flow charts were amended in line with comments from HC-S and MT. <i>It was concluded that MRAG would send a copy of C-CAM's report to the PCA for comment and feedback.</i></p> <p>A visit is required to Customs & Excise to verify their administrative procedures for imported goods.</p> <p>Another administrative routing for pesticides is export of manufactured goods. PCA does not keep a record of manufactured quantities or of exports, however export licenses are required which are administered by JAMPRO. PCA has data for raw material imported so could calculate quantity of manufactured end product (since they possess process documentation required for registration of manufacture).</p>

Fate of agro-chemical loadings	This project output was discussed and the PCA is interested to receive a copy of the final report. The PCA does not commission any studies on the fate of agro-chemical loadings.
Use of agro-chemicals and management	<p>The PCA is developing several programmes with respect to the use of agro-chemicals and their management (including licensing of pesticide control operators and the use, sales and distribution of pesticides). PCA is interested in monitoring the use and fate of pesticides. Pesticide control operators will be licensed and obliged to use a monitoring record of applications. A separate database has been constructed to keep a record of licensing, training and applications.</p> <p>An island-wide inventory that occurred in 1998-9 was described. 8 tonnes of obsolete, no longer registered or out of date pesticides were collected and exported since the island does not possess facilities to incinerate waste.</p> <p>There is an IDB project underway to review existing legislation as there is considerable overlap between the Pharmaceutical, Food Storage and PCA Acts. The PCA reported the need for more legislation to enforce new programmes.</p>
Future actions from the meeting	MRAG will re-visit PCA during coming week to collect import data.

Table 2.3 PCA meeting 2

Meeting between	PCA : Hyacinth Chin-Sue; Marcia Thompson MRAG : Nicole Kenward; Chris Mees UWI : Garvin Gordon, UWI
Venue	PCA, Kingston, and UWI Mona Information Centre
Date of Meeting	12 June 2001
Points of discussion	Gerefi database; Data on active ingredients.
Discussion and commitments made	
Gerefi database	<p>MT described the database functions - details were summarised, together with comments arising from the meeting at PCA on 7 June in the database presentation given at the 6th Annual General meeting of the CGPCB in Dominica (see Section 2.4.2).</p> <p>The zipped copy of the database supplied to MRAG on 7 June 2001 was corrupted and could not be downloaded. GG at UWI Mona provides technical support to PCA for this software, and at a meeting (GG/CM) at the UWI Campus a working version of the software (without data) was supplied.</p>
Historical dataset for imports of active ingredients (AI)	<p>Details of imports of AI (1998-present) requested on 7 June were not yet available.</p> <p><i>GG to e-mail the data to MRAG</i></p>

Historical dataset for imports of AI's (continued)	<p>Note at the time of writing (21/06/01) this data had been received by e-mail and incorporated into the project presentation given at the CGPC meeting (Section 2.4.1). At that meeting, additional details were requested from HC-S:</p> <p><i>PCA- to arrange with GG to send details of imports of AI from 1992 (ie start of data storage on Gerefi) to 1997 to enable trends in the data to be observed;</i></p> <p><i>- to send details of two questionnaire surveys conducted to evaluate baseline and then the impact of a pesticide public awareness campaign;</i></p> <p><i>- to send details of an ad-hoc study to investigate evidence for acute or chronic pesticide poisoning contained within medical records.</i></p>
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Table 2.4 UWI/CARDI workshop preparation meeting

Meeting between	CMS - Peter Edwards CARDI - Leslie Simpson, Raymond Martin MRAG - Chris Mees, Nicole Kenward
Venue	Botany Seminar Room, Block B, Life Sciences, UWI Mona Campus
Dates of Meeting	Wednesday 7 June 2001 1000-1200hrs; 1500-1700hrs
Points of discussion	<ol style="list-style-type: none"> 1. Update on project deliverables and adjusted time lines 2. Payment/billing considerations 3. Questionnaire development 4. Workshop preparation 5. Update on upcoming St Lucia workshop
Discussion and commitments made	
Project deliverables	<p>Draft literature review: CMS has received MRAG's comments and feedback. <i>CMS will revise literature review in line with comments ASAP.</i></p> <p>Draft report on characterisation of farming units: <i>CARDI</i> has received MRAG's comments <i>and will revise report in accordance with feedback.</i> Differences in the watersheds of north and south Jamaica were described. Under a section about site selection, there is a need to describe the difference in physical characteristics of the two study watersheds due to expected difference in persistence of agro-chemicals. It is also important to record data available about these 2 watersheds and that this is a factor in their selection. Delay reported with finalisation since awaiting STATIN data on farms within the selected case study watersheds (Wag Water and Rio Cobre). Data also required for questionnaire stratification and <i>CARDI</i> expects to receive data within next 2 weeks.</p>
Payment/billing	<p>UWI has not yet received payment of April invoice from UoY. MRAG informed that cheque has been resent. In accordance with <i>CARDI/UWI MoU</i>, <i>CARDI</i> has received payment from UWI funds for work that has been carried out. An advance is required for payment of questionnaires. MRAG informed that invoice should be prepared for Q1 to include questionnaire budget line. <i>Invoice should be submitted to UoY by end June.</i></p>

Questionnaire	Questionnaire has been revised in accordance with feedback from MRAG and from biometrician. Number of questionnaires should be revised from 100 to 150 (100 Rio Cobre, 50 WagWater watershed) at a cost of \$10 each and budget allocation (£1115) will be discussed during next meeting. Questionnaire was revisited with a number of revisions before it is printed for Monday's workshop. The criteria for stratification of the questionnaire were discussed. The project is interested in impacts of different crops and impacts on livelihoods, therefore stratification will be (a) large or small farm size, and (b) large farms will be subdivided to crop types.
Workshop preparation	The revised workshop agenda was presented and further amendments made due to availability of speakers. Logistics for the workshop were discussed. <i>CARDI to prepare agenda and questionnaire.</i> Peter Edwards to be rapporteur.
Update on St Lucia workshop	Leslie Simpson will represent CARDI at the St Lucian workshop on Tuesday 26 June. His role will be to present the questionnaire, discuss and action amendment in line with St Lucian farming practices and to facilitate discussions on crop types and soil conversation measures. Flight arrangements will be arrival 25/6 and departure 27/6. The team will stay at the Still Plantation House in Soufriere where the workshop will take place.
Future actions from the meeting	The team discussed the need for a further 'round-table' meeting to discuss the next stages of the project, including use of agro-chemicals and management and options for future monitoring. It was decided that this meeting should take place on Tuesday 12 th June at 0930hrs. Attendance at this meeting will include representatives from all project partners in Jamaica: CMS, Department of Life Sciences, CARDI, Department of Chemistry and CCAM.

Table 2.5 Project round-table meeting report

Meeting between	CMS : Dale Webber, George Warner, Peter Edwards; DoC : Malvern Spencer; CARDI : Leslie Simpson, Raymond Martin; C-CAM : Brandon Hay; MRAG : Nicole Kenward, Chris Mees
Venue	Department of Botany Seminar Room, UWI
Dates of Meeting	12 June 2001 0930-1230hrs
Points of discussion	<ul style="list-style-type: none"> • Round-table introduction and review of agenda items • DFID quarterly report (Quarter 1 – April-June 2001) • Review of Minutes of Last Meeting (7 June 2001) • Agrochemical loadings (List and quantify imports, List and quantify manufacture, Review of administrative procedures(CCAM)) • Fate of agrochemical loadings (Literature review overview, Toxicity review overview)

Points of discussion (continued)	<ul style="list-style-type: none"> • Use of agrochemicals and management (Review use and application methods of agrochemicals, Different levels of management of agrochemicals, Soil management, Review existing legislation / policy, Identify critical control points for management – what are the needs (to improve use of agrochemicals and reduce soil erosion rates)?) • Options for future monitoring (Monitoring of imports, Environmental monitoring (based on costs)) • Any other business
Discussion and commitments made	
1 Introduction	<p>CM noted that this was the first time that all project partners had gathered together at the same meeting. The team agreed to meet more regularly. It was noted that the inclusion of PE on the team should help facilitate the project.</p> <p><i>The next meeting will be held on 6 August 2001. CMS to send minutes of the meeting to MRAG</i></p>
2. Quarterly report	<p>MRAG to prepare the NRSP quarterly report. Once finalised a copy will be sent to project partners.</p>
3. MOLM - 7 June	<p>Matters arising are discussed in the following agenda items.</p>
4. Agro-chemical loadings	<p>NK outlined details of import and manufacture for Jamaica</p> <p>MRAG to circulate details of imports of Active Ingredients to all project partners once received from PCA</p> <p>BH presented the draft C-CAM report on administrative procedures, and described future actions defined at a meeting between MRAG and C-CAM on 8 June 2001.</p>
5. Fate of Agro-chemical loadings	<p>PE outlined details of the draft CMS report.</p> <p>CMS: <i>Additional details on studies conducted in Jamaica are available with CARDI and need to be included.</i></p> <p>MRAG to re-send review and 'track-changes' file to PE.</p> <p>MS described the toxicity review activity undertaken with MRAG on 11 June.</p> <p>MRAG to type up details of that review and circulate to all partners.</p>
6. Use of agro-chemicals and management	<p>LS described the CARDI 1st draft report on quantification and characterisation of farming units. Discussion of the content of the final CARDI report ensued. The items in the terms of reference effectively describe sections (chapters) of a final report, rather than separate reports. Literature reviewed should include grey material, such as RADA manuals.</p> <p>CARDI literature review to include relevant gaps relating to legislation after sight of the C-CAM review - i.e. NRCA act, Wildlife act etc.</p>

6. Use of agro-chemicals and management (continued)	<p>The questionnaire surveys were discussed.</p> <p>CARDI to send a copy of the finalised questionnaire to Rufus Leandre in St Lucia in advance of the workshop there.</p> <p>CARDI to finalise details of stratification for sampling farming units. Surveys to be initiated as soon as possible in Jamaica and St Lucia following the workshops.</p> <p>MRAG to compile (with CMS) the proceedings of the workshop held on 11 June and circulate to partners for distribution to RADA prior to undertaking the surveys.</p> <p>All project partners to look at final questionnaire and define the sort of answers that we require from it (by end July) - MRAG to circulate a list of priorities to all partners for comment by mid July.</p> <p>CARDI to complete analysis of surveys by end September 2001</p>
6. Control points for management	<p>Discussion related to where we might best look for information on critical control points for management.</p> <p>CARDI review to include RADA strategic plan and appraisal of the success of its implementation in their literature review - what do they promote? What works? What are the alternatives?</p> <p>Institutions with experience of BMPs include EJASP, CARDI Min Ag R&D section, Commodity boards, Jam. agricultural society; CWIP, Ridge to reef.</p> <p>All partners to consider if there are any additional institutions that should be contacted, and to collect materials where possible.</p> <p>MRAG to consider how best to follow this up.</p>
7. Options for future monitoring	<p>CCAM review partly covers this - For environmental monitoring it was noted that CMS have proposed a programme.</p> <p>CMS to distribute details of the environmental monitoring programme.</p>
8. AOB	<p>Financial matters were discussed - it was agreed to fund 150 interviews in Jamaica.</p> <p>The next trip to Jamaica by MRAG will be in October/November 2001.</p>
Future actions from the meeting	<p>All italicised items above, and:</p> <p>MRAG to send the report template to all partners</p> <p>A time line for submission of project outputs was developed. CCAM and CMS had provided 1st drafts on time for review by MRAG. CARDI had provided a 1st draft of relevant parts of their output. The preliminary review by DoC was late, though the final review is not due till February 2002. The following deadlines were agreed:</p>

<p>Future actions from the meeting (continued)</p>	<p>All italicised items above, and:</p> <p>MRAG to send the report template to all partners</p> <p>A time line for submission of project outputs was developed. CCAM and CMS had provided 1st drafts on time for review by MRAG. CARDI had provided a 1st draft of relevant parts of their output. The preliminary review by DoC was late, though the final review is not due till February 2002. The following deadlines were agreed:</p> <p><i>CCAM/CMS/CARDI: 20 August 2001: 2nd draft reports of C-CAM, CMS and CARDI (for quantification, characterisation and target crops) to be circulated to ALL project partners for review. Reviews by all partners to be completed and sent to MRAG for compilation and feedback to authors by 1 September. Authors to update drafts and return to MRAG by 15 September for submission with quarterly report on 20 September.</i></p> <p><i>DoC 20 August 2001. 1st draft report to MRAG for review. Following feedback 2nd draft report to all project partners by 20 November 2001. Comments by 20 December 2001. Final report completed by 31 January 2002. Note that this review should contain details of toxicity of pesticides to a range of animals to include fish, invertebrates, mammals and birds where available. Report also to indicate if data relate to tropical or temperate climate?</i></p> <p><i>CARDI: 30 September 2001: 1st draft report covering literature review circulated to all project partners for review. 1st draft survey analyses completed and circulated.</i></p> <p><i>MRAG to circulate 2nd (this) trip report to all institutions visited on either the 1st of 2nd trip for information.</i></p>
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Table 2.6 DoC meeting

Meeting between	DoC : Tara Dasgupta, Malvern Spencer MRAG : Chris Mees, Nicole Kenward
Venue	Department of Chemistry, Professor Dasgupta's office, UWI
Date of Meeting	Friday 8 th June 2001 1500 – 1730hrs
Points of discussion	Toxicity Review Analytical methods Analytical capacity of Department of Chemistry
Discussion and commitments made	
Toxicity review	The draft toxicity review was due for completion by end of February 2001. The review is urgently needed for determination of environmental monitoring in St Lucia and the draft is not yet complete. In order to accelerate the process, the meeting was convened to review toxicity of imports to St Lucia. Using the list of pesticides imported to St Lucia in 1998-9, the group prioritised pesticides according to volume and toxicity. Pesticides were then described in terms of stability, toxicity (LD50 for rats and categorisation), type of pesticide, prioritisation for monitoring and type(s) of analytical method required.

Toxicity review (continued)	<p><i>MRAG to prepare table with details for pesticides reviewed during meeting (by 15 June) (see Table 2.7).</i></p> <p><i>DoC to review table and fill in missing gaps (by 22 June).</i></p> <p><i>DoC to refer to Round-Table meeting (Table 2.5) for the details of additional requirements needed in their toxicity review.</i></p>																								
Analytical methods	<p>Various analytical methods are required for analysis of pesticides reviewed above. Methods are detailed in the attached table (GCMS, GCECP, LCMS, HPLC, GLC, GCNPD, GCPCD, LC-fluorescence, TID)</p> <p>The fate of pesticides in organisms is determined by properties so that different parts of the organism need to be analysed for different pesticides, eg. Organo-chlorines are fat soluble so fatty tissues should be analysed for their presence.</p> <p><i>DoC to give a brief outline of the different methods mentioned above for MRAG reference (by 22 June), and to be further described in the toxicity review.</i></p>																								
Analytical capacity of DoC	<p>TD mentioned that the Department has the capacity to analyse samples collected by the project. Prices (US\$) were quoted:</p> <table data-bbox="532 814 1029 1062"> <tr> <td>Organo-chlorines:</td> <td>Water</td> <td>100</td> </tr> <tr> <td></td> <td>Sediment</td> <td>120</td> </tr> <tr> <td></td> <td>Fish</td> <td>150</td> </tr> <tr> <td></td> <td>Plants</td> <td>120</td> </tr> <tr> <td>Organo-phosphorus:</td> <td>Water</td> <td>100</td> </tr> <tr> <td></td> <td>Sediment</td> <td>120</td> </tr> <tr> <td></td> <td>Fish</td> <td>150</td> </tr> <tr> <td></td> <td>Plants</td> <td>120</td> </tr> </table>	Organo-chlorines:	Water	100		Sediment	120		Fish	150		Plants	120	Organo-phosphorus:	Water	100		Sediment	120		Fish	150		Plants	120
Organo-chlorines:	Water	100																							
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Organo-phosphorus:	Water	100																							
	Sediment	120																							
	Fish	150																							
	Plants	120																							

Table 2.7 Results of a preliminary toxicity review of pesticides imported into St Lucia

Brand Name	WHO Toxic level	AI chemical	Group	AI unit	Total import StL 1998/9	LD50 (rats) mg/kg	Toxic rank	Stability	Type: F,H,I,N	Priority	Analytical method
Touchdown	3	glyphosate-trimesium		litres	18430.1	5600	L	Stable. Glyphosate is main component.	H	M/H	Difficult analytical techniques (LC fluorescence)
Tilt 250 EC	3	propiconazole		litres	682.5	1570	L	Very stable. Stable at high temperature. Low	F	M/H	TID/GCMS
Miral 10G	2	isazofos		kg	9550.0	40-60	H	Hydrolyses more rapidly in alkali than acid. Stable in neutral.	N	M	GCMS/GLC
Reglone	3	diquat	bipyridinium	litres	1228.8	231	M	Stable in neutral/acid. Decomposes in alkali	H	M	LCMS (difficult)
Tambo 440 EC	3	profenofos		litres	969.0	350	L	Stable under neutral/acid.	I	M	GCMS
Dursban	2	chlorpyrifos	organo-chlorine	litres	33.6	135-163	M		I	M	
Dursban PT 270	2	chlorpyrifos	organo-chlorine	litres	1.2	135-163	M		I	M	
Fungafior 75 SP	3	imazalil	organo-chlorine	kg	13552.0	320	M	Stable in water but photolyses rapidly (half life about 3d in sunlight). Expect persistence in ground water and soft soil but not in surface water (also problem in	F	L/M	GCMS/GCECP
Talent	2	Asulam		litres	1291.1	>4000	L	Stable for more than 4yr under normal conditions	H	L/M	GPCPD/HPLC
Rugby	1	cadusafos		kg	1080.0	37.1	H	Has 115d half life in	N	L/M	GCNPD/GCMS
Tambo 440 EC	3	cypermethrin		litres	96.9	250-4150	L	Stable in neutral - weak acid. Hydrolyses in alkaline. Stable to light.	I	L/M	HPLC
Furadan 10G	2	carbofuran	carbamate	kg	18280.3	8.2-14	H	Degrades quickly	N	L	Difficult analytical techniques (LCMS)
Gramocil	2	diuron		litres	6144.4	3400	L	Stable in neutral solution but decomposes quickly in	H	L	LCMS/HPLC
Ridomil MZ 72 WP	3	mancozeb		kg	1600.0	500	L	Stable under dry storage. Decomposed by heat and water.	F	L	UV visible or by GLC
Sevin 85 WP	2	Carbaryl	carbamate	kg	241.9	850	L		I	L	
Ridomil MZ 72 WP	3	metalaxyl		kg	200.0	?			F	L	
Malathion	3	malathion	organo-phosphorus	litres	90.5	1395-2800	L		I	L	
Sevin 80 Dust	2	Carbaryl	carbamate	kg	90.4	850	L		I	L	
Mancozeb 80% WP	3	mancozeb		kg	87.5	1395-2800	L		F	L	
Diazinon	2	diazinon	organo-phosphorus	litres	86.6	300-400	L		I	L	
Malathion	3	diazinon	organo-phosphorus	litres	76.9	1395-2800	L		I	L	
2-4 D Amine	3	dichlorophenoxyacetic acid		litres	56.9	375	M		H	L	
Basudin	3	diazinon	organo-phosphorus	litres	55.2	300-400	L		I	L	
Diazinon 48 EC	2	diazinon	organo-phosphorus	litres	49.5	300-400	L		I	L	
Actellic 50 EC	3	pirimiphos-methyl	organo-phosphorus	litres	42.0	?			I	L	
Actellic	3	pirimiphos-methyl	organo-phosphorus	litres	28.0	?			I	L	
Sevin 5%	2	Carbaryl	carbamate	kg	27.0	850	L		I	L	
Sevin 5% WP	2	Carbaryl	carbamate	kg	24.3	850	L		I	L	
Sevin 85 S	2	Carbaryl	carbamate	litres	18.5	850	L		I	L	
Malathion ULV 91	3	diazinon	organo-phosphorus	litres	17.2	1395-2800	L		I	L	
Trigard	3	cyromazine		kg	15.0	3387	L		I	L	
Phyton 28	2	copper sulphate pentahydrate		litres	13.9	neg	L		F	L	
Karate	2	lambda-cyhalothrin		litres	10.9	79	H		I	L	
Phyton 27	2	ammonium formate		litres	9.1	neg	L		F	L	
Karate 2.5 EC	2	lambda-cyhalothrin		litres	6.8	79	H		I	L	
Phyton 29	2	sodium sulphate alquiletoxi		litres	3.3	neg	L		F	L	
Trimiltox-Forte	3	copper oxychloride		kg	2.3	neg	L		F	L	
Cuprosan 311 SD	3	copper oxychloride		kg	2.2	neg	L		F	L	
Trimiltox-Forte	3	mancozeb		kg	2.0	neg	L		F	L	
Diazinon 14G	2	diazinon	organo-phosphorus	kg	1.7	300-400	L		I	L	
Trimiltox-Forte	3	copper calcium sulphate		kg	1.5	neg	L		F	L	
Admire 2 Flowable	2	imidacloprid		litres	1.3	?			I	L	
Cuprosan 311 SD	3	zineb		kg	1.1	neg	L		F	L	
Trimiltox-Forte	3	copper carbonate		kg	0.8	neg	L		F	L	
Cuprosan 311 SD	3	maneb		kg	0.7	neg	L		F	L	

Table 2.8 UNEP meeting

Meeting between	UNEP : Tim Kasten, CEP Co-ordinator Caribbean, MRAG : Nicole Kenward, Chris Mees
Venue	UNEP, Kingston
Dates of Meeting	13 June 2001 0930-1030hrs
Points of discussion	Synergies between UNEP Central American pesticides project and that of NRSP LWI
Discussion and commitments made	
Projects	<p>MRAG outlined the current status of activities of the LWI project.</p> <p>TK provided copies of a Power-point presentation describing the UNEP project, and details are not re-iterated here. Certain preliminary activities have now been completed. The full project proposal for GEF funding will be ready during the next month for submission in October 2000.</p> <p>TK agreed to provide a copy of the project brief once it was prepared.</p> <p>Included in the discussion were:</p> <ul style="list-style-type: none"> • UNEP will develop a standardised database for storage of environmental monitoring information. This differs from the databases reviewed under the LWI project which relate to registration of imports and manufacture of pesticides. • Best management practices (for use of pesticides / agricultural practices) and alternative technologies. Both projects will aim to promote existing technologies rather than develop new ones. LWI will specifically highlight BMPs that support the livelihoods of small scale (poor) farmers. The UNEP project will look into issues of technology transfer and up-scaling from pilot implementation within participating countries (Costa Rica, Nicaragua, Panama and Colombia). UNEP CEP have already documented IPM/BMPs (FAO/UNDP CEP Tech Rep 41) and MRAG were provided with a copy of the document. • Details of the Cartagena convention and protocol on land based sources of non-point pollution. <p>TK agreed to e-mail a summary copy (in English) of the four national reports for participating countries.</p>
Future actions from the meeting	<p>There are a number of synergies between the two projects, though the budget of the UNEP project is an order of magnitude greater than that of NRSP LWI and will cover more.</p> <p><i>It was agreed to maintain contacts and to continue to share relevant information on project activities and outputs.</i></p> <p>MRAG to e-mail copy of this trip report and other project outputs as they become available.</p>

2.2 Reports from meetings held with collaborators and key informants in St Lucia

Meeting reports included in this section are set out as follows:

1. MAFF extension services meetings
2. SLASPA meeting
3. CEHI meetings
4. Customs & Excise meeting
5. PCB meetings
6. WASCO meeting
7. DoF meeting

Table 2.9 MAFF extension service meetings

Meeting between	MAFF : Rufus Leandre, Chief Extension Officer MRAG: Chris Mees, Nicole Kenward
Venue	Extension Department, MAFF, Castries
Dates of Meeting	1. Friday 22 nd June 2001 (1000 – 1230hrs) 2. Monday 25 th June 2001 (0830 – 1030hrs) 3. Wednesday 27 th June 2001 (1200 – 1300hrs) 4. Thursday 28 th June 2001 (1000 – 1200hrs)
Points of discussion	MAFF activities listed under MoU; Project workshop for Extension Officers (Tuesday 26 th June); Questionnaire stratification; Radio interview about project
Discussion and commitments made	
MAFF activities	In addition to the workshop and structured questionnaires that are listed on the MoU, other activities also included on the MoU (review of agricultural practices in St Lucia, legislation impacting farming, etc) were highlighted during the first meeting. RL wanted further clarification about these activities and NK/CM prepared ToR to elaborate on activities listed in the MoU. These ToR were presented during the second meeting (Table 2.10). RL agreed that he and Mr Anthony Philigence (Coordinator of the soil and water programme) would conduct the review. <i>A copy of the draft review will be submitted to MRAG by end August 2001.</i>
Project workshop for Extension Officers	This workshop was held at the Still Plantation Restaurant in Soufriere on Tuesday 26 th June (0830hrs – 1630hrs). Planning for the workshop had taken place by fax/email prior to the visit to St Lucia and also in Jamaica with the CARDI facilitator, Dr Leslie Simpson. Arrangements for the workshop were made by the Extension Office of Region 6 (based at Soufriere). Details were finalised in the first and second meetings and payment was made using MAFF budget.

<p>Project workshop for Extension Officers (continued)</p>	<p>The questionnaire was then updated with contributions from Extension Officers. Amendments to apply the questionnaire to St Lucia were necessary due to language differences (e.g. cutlass instead of machete) and climatic variation (e.g. St Lucia has problems of flooding not experienced in Jamaica).</p> <p><i>NK/LS to amend questionnaire and hand final version to RL before leaving St Lucia.</i> <i>NK/CM to prepare workshop proceedings so that these can be handed out to Extension Officers when they collect copies of questionnaires.</i></p>
<p>Questionnaire stratification</p>	<p>Numbers of farms in each study watershed were reported during the Working Group session of the workshop. A list of farmers in each extension region had been passed to NK during a previous visit and was intended to be the basis for stratification. However, it was discovered during the third meeting that the extension services list focuses on poor farmers and so is incomplete. During the last meeting, RL introduced NK/CM to Ricardo George, Network Administrator for MAFF. He has the framework for the 1996 agricultural census and is able to extract data for the 3 study watersheds.</p> <p>Questionnaire implementation will commence as soon as RL receives stratification details from NK. The survey should take a maximum of 1 month (30 questionnaires in Praslin and Soufriere, 90 questionnaires in Roseau). Survey sheets will then be sent to CARDI Jamaica for analysis.</p> <p><i>RL to give RG a map indicating area covered by the 3 study watersheds.</i> <i>RG to extract data for 3 watersheds and send by email to NK by 6 July 2001.</i> <i>NK to arrange stratification (by large; small farms) and send details to RL as soon as data is received so that survey can commence.</i> <i>RG to further extract island-wide data for Extension Services. RL to forward this data to NK when available.</i></p>
<p>Radio broadcast</p>	<p>MAFF has several media communication channels:</p> <ul style="list-style-type: none"> • a radio broadcast <i>Agrifocus</i> on Radio St Lucia (97.3fm, 60am) at 1740hrs each Thursday; • a TV news bulletin at 1900hrs (channel 34/35); and • a video programme <i>Agrifocus</i> shown on TV at the end of each month. <p>NK/CM were invited to record a radio interview about the project at the end of the workshop. The interview was conducted by Phillip Sidney (MAFF extension information officer) and related to the background to the project, workshop activities, the questionnaire survey, partnership with Department of Fisheries and why the project was important to farmers. The interview will be broadcast at 1740hrs on 5th July 2001. NK/CM were invited to record a TV bulletin and sections for a video programme during the next trip (November 2001). <i>PS to keep a recording of the radio interview for NK/CM</i></p>

Table 2.10 Explanation of activities detailed in Memorandum of Understanding between MAFF and MRAG relevant to the Extension Services.

Activities	Delivery date: (end of ...)
<p><i>Produce a review of soil management and farming practices, including the use of agro-chemicals¹ in St Lucia. In this context:</i></p> <p>Agro-chemical (both fertilizer and pesticide) application:</p> <ul style="list-style-type: none"> • What are the current/past practices promoted by MAFF? • What public awareness/farmer training mechanisms have been employed? • Supply copy of any Manuals produced or recommended by MAFF. • Which of the promoted methods are successful, and why? • If methods have changed during the past decade, explain changes and why? • Describe alternative options to agro-chemicals (organic, biological control, rotation...) • Describe literature available from studies carried out in St Lucia relating to the above. <p>Soil management</p> <ul style="list-style-type: none"> • What are the current/past practices promoted by MAFF? • Supply copy of any Manuals produced or recommended by MAFF. • What public awareness/farmer training mechanisms have been employed? • Which of the promoted methods are successful, and why? • If methods have changed during the past decade, explain changes and why? • Describe alternative options to traditional systems of soil conservation (organic, biological control, rotation...) • Describe literature available from studies carried out in St Lucia relating to the above. <p>Other sources of material for the above</p> <p>List other organizations (eg. CARDI, NRMU, WIBDECO) involved in agro-chemical or soil management and briefly describe their activities including details about specific projects (e.g., organic farming, community projects).</p>	August 2001
<p><i>Provide a copy of current legislation relating to, or impacting upon, use and application of agro-chemicals as well as soil management. Summarise relevant details.</i></p>	August 2001

Table 2.11 SLASPA meeting

Meeting between	St Lucian Air and Sea Port Authority (SLASPA) : Dermot Saltibus (Director Designate Maritime Affairs) and Paul Richards (Acting Operations Manager) MRAG : Chris Mees and Nicole Kenward
Venue	SLASPA, Castries, St Lucia
Dates of Meeting	25 June 2001 1430 – 1530hrs

¹ For the purpose of this research, agro-chemicals are defined as both pesticides and fertilisers

Points of discussion	<p>Verification of the flow chart for administrative control of pesticides in St Lucia;</p> <p>Tariffs on imports of agro-chemicals;</p> <p>Legislative matters;</p> <p>Banned or unregistered substances</p> <p>Dangerous goods shed</p>
Discussion and commitments made	
Flow Chart	<p>The flow chart was amended following comments made at this meeting, and those with Guy Mathurin of the Pesticides Control Board and Brian Wardrope at Customs & Excise. DS expressed interest to receive copy of the revised chart.</p> <p><i>NK to send updated flow chart to DS</i></p>
Tariffs on imports of agro-chemicals	<p>If the importer does not hold a license to import pesticides, goods are seized by Customs & Excise and then held by SLASPA until release on issue of a license. Any tariffs/fines are charged by Customs & Excise. SLASPA charges rent on storage of these goods for each period after the initial 5 days period has passed, as follows:</p> <p>Held for 5-7 days (EC\$3.50/tonne)</p> <p>Held for 8-9 days (EC\$4.50/tonne)</p> <p>Held for 10-12 days (EC\$6.00/tonne)</p> <p>Held for each subsequent 3 day period (EC\$8.00/tonne)</p> <p>Goods that are not released are subsequently sold by auction arranged by SLASPA. SLASPA sends the PCB (Guy Mathurin) lists of items for auction in order to control sale of unregistered/unlicensed pesticides.</p>
Legislation	<p>MRAG received copies of legislation empowering SLASPA (SLASPA Regulations) and concerning import of dangerous goods (Shipping Act No.11 of 1994). SLASPA also abides by the IMDG code.</p>
Banned or unregistered substances	<p>SLASPA files all information (manifesto, discharge notices) by ship file, not by cargo category. SLASPA automatically receives a copy of the manifesto upon arrival of each ship, and the consignment is then declared to Customs & Excise directly by the ship. SLASPA is responsible for the secure storage of cargo until released by Customs & Excise (who carry out <i>ad hoc</i> stock checks). SLASPA does not check the manifesto for banned or unregistered substances and is not responsible for repatriation of banned or unregistered substances; this is the role of Customs & Excise, which gives instructions to SLASPA.</p> <p>The importer processes the discharge of goods through Customs & Excise (import license, tariff payments, etc). Once the requirements of Customs & Excise are met, the goods can be released. SLASPA releases goods from storage upon receipt of a discharge notice (approved by Customs & Excise and given to importer) and payment of any storage fees.</p>
Dangerous cargo shed	<p>NK visited the dangerous goods shed during November and had previously communicated with SLASPA about the lack of suitable storage. In the intervening period, the Director of Maritime Affairs has given approval for a new cargo shed to be constructed.</p>

Dangerous cargo shed (continued)	<p>The shed is almost completed and will have an eye wash station inside the shed and drench shower (pull activation switch) outside the shed. The shed has a containment area with 2 overlain pallets (one as false floor for leaks, one for storage). The shed has a double door (a lockable ventilating grille (daytime) and outside secure door (nighttime)).</p> <p>A committee has also been established to ensure safe handling of dangerous cargo (comprised of Operations Manager and staff, Chief Ports and staff, Fire Service, Chief Security and staff) and to oversee construction of the shed. A training programme in safe handling is now being organised for all SLASPA staff and dockworkers.</p>
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Table 2.12 CEHI meeting

Meeting between	CEHI : Joth Singh, Andrew Lewis MRAG : Chris Mees and Nicole Kenward
Venue	CEHI, St Lucia
Dates of Meeting	25 June 2001 and 28 June 2001
Points of discussion	Finalisation of the MoU between CEHI and MRAG Ltd
Discussion and commitments made	
MoU	<p>An MoU between CEHI, MRAG Ltd and University of York was drawn up and agreed for signature. It indicates the number and type of samples to be analysed, and the chemicals to be analysed from each sample.</p> <p>CEHI will analyse two samples from each of the sampling stations and a UK lab will analyse one as a precision check, except for Paraquat : CEHI will analyse two water samples, the UK lab will analyses one water sample and three tissue and algae samples. Neither lab is able to analyse sediment for Paraquat.</p>
Sampling techniques	<p>Since the aim of having one sample analysed in UK and two at CEHI was to enable a precision check, the three sub-samples will be obtained from a single master sample collected at each station, rather than obtaining three samples per station. This means that variability will not be determined. However, sample sizes are small and the chief objective of the snapshot is to indicate presence or absence of agro-chemicals in the environment. Sub samples will thus be taken from the master sample at CEHI.</p> <p><i>CEHI will provide MRAG with the protocols used for sub-sampling, extraction, analysis etc. Similar protocols will be obtained from the UK lab and a common protocol developed. MRAG will contact the UK lab in early July to finalise the arrangements with that lab. Contact details will be provided so that the two laboratories may communicate directly.</i></p>
Equipment	MRAG will source and obtain bottles for the UK sub-samples, and will establish the correct procedures for storage and transportation of them to UK.

Table 2.13 Customs & Excise meeting

Meeting between	C&E : Brian Wardrope, Supervisor MRAG : Chris Mees
Venue	Customs and Excise, St Lucia
Dates of Meeting	28 June 2001
Points of discussion	Verification of the flow chart for administrative control of pesticides in St Lucia; Tariffs on imports of agro-chemicals; Legislative matters; Banned or unregistered substances
Discussion and commitments made	
Flow Chart	The flow chart was amended following comments made at this meeting, and those with Guy Mathurin of the Pesticides Control Board and Dermot Saltibus of SLASPA.
Tariffs on imports of Agrochemicals	Charges applied to imported goods are an import duty and a consumption tax. Photo-copies of the relevant documentation were provided. Import duties are generally free for pesticides and fertilisers for agro-chemical use. Consumption tax varies and is usually around 5%.
Legislative matters	<p>The Customs and Excise legislation does not refer directly to agro-chemicals. A blanket clause relates to “any other enactment”, and this gives C&E the authority to act as an agency on behalf of other relevant Ministries, and in this case to execute the regulations defined in the Pesticides Control Act # 7 (1975) and the Pesticides Control (Registration and Licensing) Regulations, Statutory Instrument # 71 (1987) (Shortly to be updated in the Pesticides and Toxic Chemicals Control Act (2000) and the Pesticides and Toxic Chemicals Control (Registration, Licensing and Permit) Regulations (2001). Customs may seize any illegally imported chemicals, but they are only detained by C&E. The right for forfeiture and any legal action including imposition of fines lies with the Pesticides Control Board</p> <p>The example of high fines imposed in Jamaica for the illegal import of unregistered goods was discussed. It was considered that this would need careful consideration in the situation of St Lucia where there was not a tradition of such fines. Goods may be abandoned and hence become a problem for the authorities, or smuggling may be encouraged. The aim should be to encourage compliance.</p>
Banned substances	Any lists of banned substances will be provided by the relevant Ministries. C&E would seize and detain them for action by the relevant authority
Contact with Chris Lubin	Contact was arranged with Chris Lubin, previously of Aventis (an agro-chemical organisation). Issues for future discussion related to contacts for the UK Supermarket co-ordinator for the banana industry (see also St Lucia Workshop proceedings; <i>note that these contacts will be followed up after consultation with MAFF</i>), and the extension services offered by chemical companies to the farming industry.

Table 2.14 PCB meeting

Meeting between	PCB : Guy Mathurin, Secretary MRAG : Nicole Kenward and Chris Mees
Venue	MAFF, Union.
Dates of Meeting	25 June 2001 28 June 2001
Points of discussion	Verification of the flow chart for administrative control of pesticides in St Lucia; Revised legislation for control of pesticides; Historical import data.
Discussion and commitments made	
Flow Chart	<p>The current situation is reflected in the appended flow chart. It should be noted that the new legislation currently in preparation may change the situation slightly and the flow chart will need to be updated.</p> <p>The draft flow chart indicated that registration occurred after import. Whilst this does indeed occur in St Lucia, strictly it should not. Registration should occur prior to import. For the time being, however, the flow chart needs to reflect that registration may occur before and after import. Note that currently no pesticides are manufactured in St Lucia.</p> <p>Copies of the registration documentation referred to in the updated flow chart were provided. These may change slightly once new legislation is introduced. There will also be a requirement for completion in triplicate for financial accounting.</p> <p>Details of the measures taken in Jamaica for the import of unregistered goods were discussed (see also report of meeting with Brian Wardrope, Customs and Excise).</p> <p>The procedures relating to detention of goods are discussed in the meeting report of Customs and Excise, and reflected in the flow chart. C&E detains the goods, but they are held by SLASPA. Any goods that are subsequently unclaimed are auctioned. SLASPA provides a list of items to be auctioned to PCB. PCB checks that list and will prevent the auction of any illegal chemicals.</p> <p>It should be noted that there are no formal links between Customs & Excise and the PCB.</p>
Extension of flow chart	Beyond the point of onward distribution and sale of pesticides in the flow chart, it should be noted that currently there is no legal requirement on the part of the importer/sales outlet to keep records of the fate of chemicals sold or imported. This is expected to change with the introduction of the new legislation when monthly records will be required. The main importers are SCIC, Renwick and Co., Stanthur, St Lucia Agriculturalists Association, Home and Garden. Agricultural pest control companies (Terminix and Care Services) and household pest control companies (Peter and Co., JQ Charles Ltd, Renwick and Co) are also relevant here.

<p>Flow Chart Registration Process</p>	<p>Importer applies to PCB for registration (new cost will be EC\$350)</p> <ul style="list-style-type: none"> • Application Form A1 • MSDS sheet • Specimen label for use in St Lucia • Any supporting documentation <p>PCB considers application</p> <ul style="list-style-type: none"> • has 90 days to reach decision • International literature and standards for chemical in question are consulted • Accept or reject <p>Registration approved</p> <ul style="list-style-type: none"> • PCB issues a registration certificate • Certificate indicates condition: e.g. for sale or supply, for use with which crops, environmental protection details etc. <p>Importer applies for a license to import pesticide (new cost will be EC\$300 if hold registration certificate; EC\$650 if not hold registration and wish to seell product)</p> <ul style="list-style-type: none"> • Application Form A2 • PCB considers application and license issued (or refused) within 24-48 hours) <p>License issued/rejected Back to original flow chart</p>
<p>Pesticides legislation</p>	<p>The relevant legislation is the Pesticides Control Act # 7 (1975) and the Pesticides Control (Registration and Licensing) Regulations, Statutory Instrument # 71 (1987).</p> <p>During the past year the legislation has been reviewed and updated with the assistance of Barbara Pierre formerly of the OECS Legal Unit in St Lucia (the Pesticides and Toxic Chemicals Control Act (2000) and the Pesticides and Toxic Chemicals Control (Registration, Licensing and Permit) Regulations (2001)). These have not yet been been gazetted, and are expected towrds the last quarter of 2001.</p> <p>The new legislation repeals and replaces the Pesticides Control Act, and amends other related acts. It includes provision for the convention on chemical weapons, provides an integrated approach to the regulation of toxic chemicals in harmony with legislation in other OECS islands, establishes a new board, defines the regulation of chemicals, establishes a fee structure for licenses and permits, defines requirements for monitoring compliance and for enforcement, and other issues.</p> <p>A one year period will be allowed to enable re-registration. It may be the case that some existing registered chemicals will not be re-registered, and licenses for import will not be issued for those chemicals.</p>

Table 2.15 WASCO meeting

Meeting between	WASCO : Raphael Eudovique (Manager, Southern Branch) MRAG : Nicole Kenward, Chris Mees
Venue	Vieux Fort (airport)
Dates of Meeting	29 June 2001 1200-1300hrs
Points of discussion	Environmental monitoring – water abstraction points Previous water quality studies
Discussion and commitments made	
Environmental monitoring	<p>NK explained the regime (timing, locations) for the project's environmental monitoring. RE expressed interest in the sampling of polluted water abstraction points, in particular:</p> <ul style="list-style-type: none"> • Vieux Fort River (suspect high pollution of Grace Woodlands, Beau Sejour points); • Micoud River abstraction points (main river in St Lucia). <p>Water abstraction points in the 3 study watersheds are unlikely to be impacted by agro-chemical pollution, as follows:</p> <ul style="list-style-type: none"> • Soufriere – all intakes are sourced from underground springs, not the main river; • Roseau – the only abstraction point is at the high dam and there are no agricultural activities in the watershed above this dam; • Mamiku – intake at Patience. <p>RE indicated that he would make laboratory facilities (all analysis except heavy metal and pesticides) and transport available to the project during the sampling period in November. WASCO has a Hach kit (DR4500) which can be used for field sampling.</p> <p><i>NK to follow up plans for sampling with WASCO.</i></p>
Previous water quality studies	<ul style="list-style-type: none"> • RE studied integration of treatments for rural communities as his MPhil thesis in 1989 (University of Surrey) and had prepared a copy of relevant sections. RE analysed paraquat as a principal AI. • Barry Lloyd and Brian Clarke (Senior Lecturer, Engineering Dept) of the University of Surrey carried out an island-wide study of water quality in catchments 3 years ago. They used the biotic index as an indicator of the impact of agricultural activities. • The CWWA has data for sediment loss (RE had heard estimates that 4" top soil is lost p.a.). <p><i>RE to provide paraquat data</i> <i>MRAG to contact Lloyd and Clarke</i> <i>MRAG to communicate CWWA contact to York</i></p>

Table 2.16 DoF meeting

Meeting between	DoF, MAFF : Leroy Ambrose Aquaculture specialist (Briefly also Sarah George) MRAG : Chris Mees
Venue	Fisheries Department, Castries

Dates of Meeting	28 June 2001
Points of discussion	Sampling for aquaculture species in the three watersheds studied in the project Suitable wild species for sampling. Sampling permission.
Discussion and commitments made	
Aquaculture species	Of the three watersheds selected, only Soufrierre has farmed fish species (<i>Tilapia nilotica</i> and <i>Macrobranchium rosenbergii</i>). Sea-moss cultivation (<i>Eucheuma</i> spp.) occurs in the bay at Praslin. It is possible that the water feeding the ponds at Soufrierre comes from springs rather than the river draining the watershed, and <i>it will be necessary to check this detail with Mr Du Boulay, the owner of the Still Plantation.</i> For the purposes of sampling, it may be necessary to select alternative stations with similar characteristics to the 3 study watersheds where tilapia and/or prawns are cultivated. <i>Correspond with Leroy Ambrose on this.</i>
Wild stocks	The potential for sampling wild fish or shellfish species in the rivers of study watersheds was discussed. <i>Tilapia mossambica</i> (known locally as <i>Atkinson</i>) occur, particularly in Roseau, and there are a number of crayfish species in the rivers that would be suitable for sampling. The best means of achieving this would be to engage a local trap fisher to catch specimens. <i>LR indicated that he would investigate the potential for doing this and also obtain more information on species available before the next visit by MRAG in November 2001.</i>
Sampling Permission	Permission to sample fish and other aquatic species in St Lucia may be obtained by writing to MAFF, Dept Fisheries indicating the species to be sampled, the location, the type of sample (Live, tissue only, whole, water, sediment), and the purpose of the sampling programme. This can be done by Fax in advance of the sampling programme to be conducted in November 2001. <i>MRAG to formally request sampling permission.</i>

2.3 Report from the 6th Annual Meeting of the Coordinating Group of Pesticide Control Boards of the Caribbean

Table 2.17 Report of 6th meeting of the CGPC

Meeting between	Nicole Kenward and Chris Mees, attendance at the 6 th Annual General Meeting of the Co-ordinating Group of the Pesticide Control Boards of the Caribbean
Venue	Fort Young Hotel, Roseau, Dominica
Dates of Meeting	19-21 June 2001

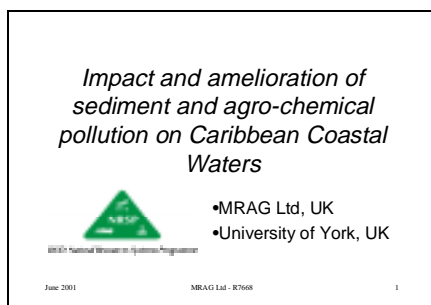
Points of discussion	Proceedings of the workshop will be published and distributed to all participants. Two presentations were made relating to project R7668: Project Description; Regional pesticides registration database review.
Discussion and commitments made	
Workshop	<p>MRAG were invited by the Secretary of the CGPCBs to present details of project R7668 at this meeting. Additionally a review the regional databases (FAO-OECS and Geref) was requested by members of the CGPCBs. At the time of the workshop only the FAO-OECS database had been comprehensively reviewed - details were presented and a discussion of user requirements followed.</p> <p>The workshop provided the MRAG team with a significantly better understanding of relevant activities in the region. It was also significant opportunity for the project: to meet with key persons from the PCBs throughout the Caribbean; to share information on the project's activities. The presentations given on project R7668 were well received and <i>we were invited to make subsequent presentations at the next two annual meetings (i.e. within the life of the project). Dissemination of final project findings to this group in 2003 will be particularly valuable.</i></p>
Future actions from the meeting	<p>The workshop proceedings will describe the presentations made, and discussions held at the meeting. A number of points relevant to R7668 arose and these will need following up once those minutes are available. e.g.</p> <ul style="list-style-type: none"> • <i>Critical control points for management - entry points - at import vs at the level of the user;</i> • <i>Institutional capacity for implementing pesticide regulations vs what can we usefully do with the available resources;</i> • <i>Licensing schemes regulating sale of pesticides e.g. Obtain details of the programme in Belize to licence spray operators (manuals also available);</i> • <i>IPM policies already developed as an example, e.g. Trinidad e.g. CABI/ EU projects, e.g. CEP-net / CARDI participatory IPM</i> • <i>Placing responsibility on manufacturers and importers of pesticides to ensure that chemicals are used properly (i.e. training/extension; pre measured soluble packaging for ease of use etc), and that those companies rather than PCBs have responsibility for maintaining paper trail from import to point of sale - need for partnerships between PCBs and importers/manufacturers.</i> • <i>Certification schemes, and local vs export requirements - inconsistencies. Need to train farmers in record keeping so that use of chemicals beyond point of sale can be monitored</i> • <i>Training of medical staff in diagnosis and better record keeping for pesticide related incidences of illness/poisoning.</i> • <i>Causes for historical trends in pesticide imports? Can these be related to WTO actions for e.g. or the arrival of a new pest problem?</i> • <i>(Sedimentation - for York Q. Is understanding of the effects of sedimentation at Soufriere not complicated by the volcanic activity there?)</i>

Future actions from the meeting (continued)	<ul style="list-style-type: none"> • <i>R7668 is a very ambitious project covering a wide range of issues - it must therefore focus its outputs appropriately e.g. by highlighting BMPs that focus on the poor; by focussing on impacts in the coastal environment (title); by carefully considering the target audience and ensuring the relevance of outputs (PCBs, Agriculture departments; end users etc - who will actually be interacting with the end-user and who is best placed to deliver the project outputs to them?).</i> • <i>status of PCBs throughout the region, and potential for uptake of project outputs</i> • <i>status and future development of CGPCBs</i>
Immediate action points	<p>Immediate action points arising from the meeting were:</p> <ul style="list-style-type: none"> • <i>Complete the reviews of databases to include Gerefi.</i> • <i>Initiate a user requirements analysis for Pesticide registration databases in the Caribbean (note training = component of any programme to implement a new database; must be simple and workable; must be able to generate ad-hoc reports; must network and share information in the region)</i> • <i>Develop a questionnaire for the user requirements analysis in consultation with Everton Ambrose, Gene Pollard, Claudia Bellot.</i> • <i>Investigate the potential for local ownership of any future database - sustainability and maintenance (Institution, via consultant e.g. at UWI, funding implications - PCBs to pay, donor assistance, large companies e.g. Sainsbury's?)</i> • <i>Liaise with Dr Gene Pollard, FAO-C on potential for taking a database project up? Send copies of draft database review documents to him when available (i.e. in advance of the user requirements analysis)</i> • <i>Create a link on the MRAG LWI projects website to Caribpesticides.net and vice-versa - Liaise with Hyacinth Chinsue and Garvin Gordon on this.</i> • <i>Obtain a list of contact details for participants at the workshop in advance of the proceedings.</i> • <i>Liaise with NRSP Management and Everton Ambrose on the potential to time a final project workshop to coincide with the 8th Annual meeting of the CGPCBs in 2003 - Implications for project end-date.</i>

2.4 Presentations relating to R7668 made at the CGPC meeting

The Project Team had been invited to attend the 6th annual meeting of the CGPC and to make two presentations. The first presentation focussed on the project objectives and preliminary findings and the second presentation responded to a previous regional request for the project to conduct a review of existing regional pesticide registration databases. This section comprises the Powerpoint slides and notes from the two presentations.

2.4.1 Project presentation and preliminary findings



This document is the annotated Power-point slide show of the DFID NRSP project R7668 (left) project presentation made to the Co-ordinating Group of Pesticide Control Board's 6th Annual General Meeting held in Dominica, 19-21 June 2001.

Our research on the *Impact and amelioration of sediment and agro-chemical pollution on Caribbean Coastal Waters* commenced in June of last year and the objective of this presentation is to describe the aims and objectives of the project, together with some of our preliminary findings.

Funded by DFID – NRSP – LWI for period of 3 years and research is therefore in early stages. As part of the NRSP programme, the research outputs must be generic to the Caribbean region, and we feel that exchange of information with you will aid us in this aim.

The research is contracted to the University of York (sedimentation) and to MRAG Ltd, UK (the company that we work for) (agro-chemicals)

Agro-chemical part of project has case studies: St Lucia (SIDS) & Jamaica (large island state). By agro-chemicals we are referring to fertilisers as well as pesticides. The sedimentation side of project is concentrating on St Lucia only

To give further details about the project, we are working with a number of collaborating institutions that have a role in different technical inputs for the agro-chemical elements of the project.

In Jamaica :

University of the West Indies (CMS, DoLS, DoC)

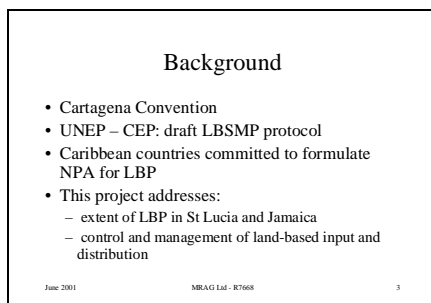
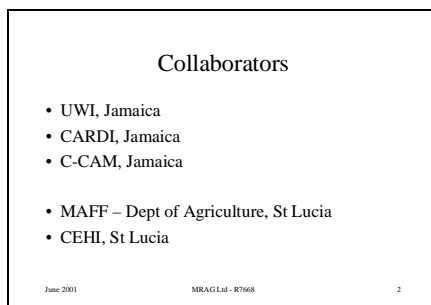
Caribbean Agricultural Research and Development Institute (CARDI)

Caribbean Coastal Area Management Foundation (C-CAM) based in Portland Bight, headed by Peter Espeut

In St Lucia

MAFF, Dept of Agriculture

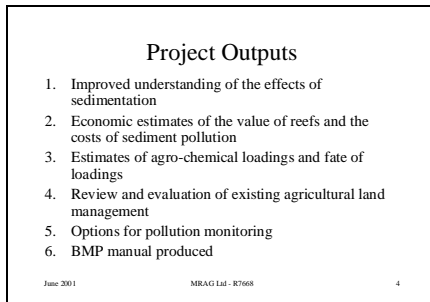
Caribbean Environmental Health Institute (CEHI) collaborating for environmental monitoring of agro-chemicals



There is an urgent need to address the amelioration of agricultural non-point sources of pollution in the Wider Caribbean. This was formalised by UNEP in the Draft Land-Based Sources of Marine Pollution Protocol (LBS Protocol to the Cartagena Convention) which was adopted by Caribbean States in October 1999.

The approach to the LBS Protocol is source-specific, and, as such it addresses pollutant sources, provides for concrete objectives and takes into account economic, environmental, cultural, and social considerations. Annex IV relates to agricultural non point sources and UNEP CAR-RCU is developing guidelines on BMP, undertaking assessment of non-point pollution, and carrying out pilot projects in several countries (Nicaragua, Costa Rica, Panama and Colombia). We are also working with UNEP to share research findings.

In line with signatory country commitments to formulate national plans, policies and legal mechanisms for prevention and amelioration of land-based pollution, the project seeks to assess the type and extent of land-based pollution in St Lucia and Jamaica and addresses means of control and management of land-based input and distribution.



1. Improved understanding of the effects of sedimentation (on coral reefs, on efficacy of current management measures, on reef recovery from natural disturbances)

2. Economic estimates of (a) the value of reefs to the St Lucian economy, and (b) the costs of sediment pollution

3. Estimates of agro-chemical loadings and fate of loadings in St Lucia and Jamaica

- Achieved through quantification of imports over the past few years
- We are carrying out a review of agro-chemical toxicity and recommended management
- Environmental monitoring will trace the fate of agro-chemicals along a transect from plantation to reef. For reasons of high analytical costs, environmental monitoring is only being carried out in St Lucia. This decision is also based on the fact that a number of studies have already been conducted in Jamaica, and we are carrying out a literature review of these studies.

4. Review and evaluation of existing agricultural land management

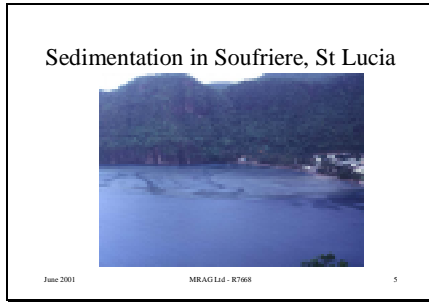
- We are studying the administrative procedures for agro-chemical imports and production in both St Lucia and Jamaica.
- CARDI is conducting a review of soil management and the use of agro-chemicals in agriculture (in Jamaica, this activity started with a characterisation of farming units, selection of 2 study watersheds in the Rio Cobre and Wag Water, and we held a workshop last week with RADA extension officers in Jamaica. In St Lucia, we have selected 3 watersheds and are holding a workshop next week with MAFF extension officers)
- We also aim to identify critical control points for management and dissemination of information

5. Options for pollution monitoring (combined activity with University of York)

- Looking at alternative options for environmental monitoring to detect changes in concentration of agro-chemicals and sediment loads in the coastal zone

6. BMP manual produced (combined activity with University of York)

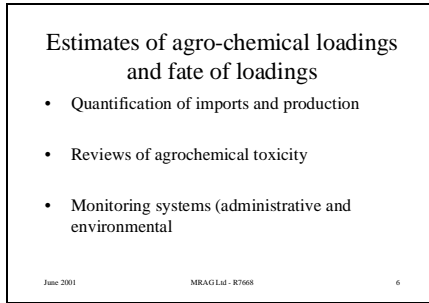
- One of the final activities will be to identify management options (including advice on education, training and awareness needs, and appropriate legislative and policy measures) to improve management of agricultural non-point sources of pollution and thereby we hope to reduce agro-chemicals / sediment in the marine environment. Management options will be discussed at a workshop during the final year of the project.
- The final project output will be production of a Best Management Practices Manual concerning usage of agro-chemicals and reduction of agro-chemicals and sediment in the marine environment. Findings and conclusions from the workshop I have just mentioned will be incorporated into the BMP Manual.



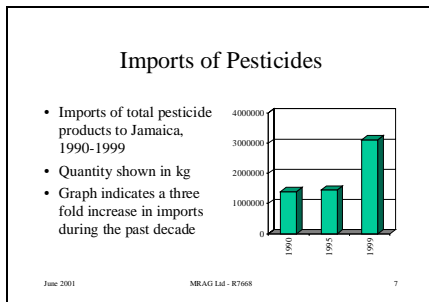
This photo has been included since it illustrates the impact of sediment that results from soil loss from farmed hillsides in the Soufriere watershed, St Lucia

The University of York has been conducting field work in Soufriere, and has investigated sedimentation rates over a 3 year period. Sedimentation has been estimated at 5m depth and at 15m depth. High sedimentation rates have occurred after heavy rainfall and high upwellings.

The first two outputs of the project concentrate on sedimentation. Our presentation will now focus on agro-chemical pollution which is the aspect managed by ourselves.

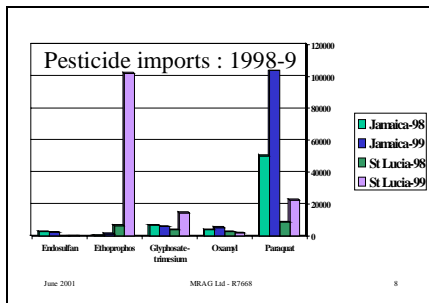


As I have already said, the majority of project activities take place in St Lucia and Jamaica, with the exception of environmental monitoring which will take place through a future snapshot survey in St Lucia only in 3 watersheds: Roseau, Soufriere, Praslin).



This data is taken from the 1999 Annual Report produced by the PCA.

- It shows the imports of total pesticide products to Jamaica, 1990-1999
- Quantity shown in kg
- The graph indicates a substantial increase in imports during the past decade and illustrates that the probability of a growing impact from pesticides in Jamaica.



Data are shown for 1998-9
It is interesting to compare the land area of St Lucia (238 sq miles) and Jamaica (4244 sq miles) at 20x greater. We expected to find that imports to Jamaica would be 20x greater, however this is really only shown in the case of Paraquat. Other pesticides shown in this example are within the same scale of magnitude.

We note that differences will of course relate to relative acreage of different crops and the different climatic influences on pests.

We selected the five pesticides shown on the graph (endosulfan, ethoprophos, glyphosate-trimesium, oxamyl and paraquat) since they have come out as priority pesticides for study in St Lucia, based on volume imported, stability in the environment and toxicity to mammals. The next slide shows toxicity data for these pesticides:

Toxicity review of selected AI

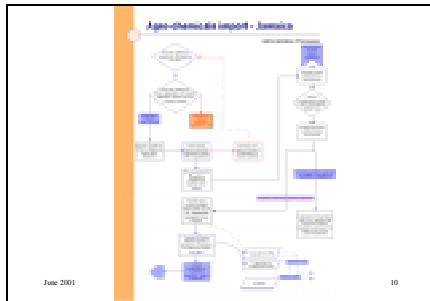
AI chemical	Group	LD50 (rats) mg/kg	Toxic rank	Stability	Type: F, H, L, N	Priorit y
endosulfan	organo-chlorine	70	H	Stable	I	H
ethoprophos	organo-phosphor	62	H	Very stable in acid but hydrolysed in alkaline. Stable at pH7. Decomposes with UV light.	N	H
glyphosate-trimesi-		5600	L	Stable. Glyphosate is main component.	H	MH
oxamyl	carbamate	5.4	H	Decomposes slowly but more in alkali and at high temperature.	I+N	H
paraquat	bipyridinium	157	H	Stable in neutral/acid. Decomposes in alkali.	H	H

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A toxicity review of pesticides used in St Lucia and Jamaica is currently being conducted by the Department of Chemistry at UWI Mona in Jamaica. This is an example of information that we are including in the review:



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We are illustrating the administrative management systems (for import and manufacture) in each country in order to verify information collected during the first project trip. Also being done for St Lucia

Information is presently being sought to expand the administrative management flow chart to encompass fertilisers.

Environmental Monitoring

- 3 watersheds: Roseau, Praslin, Soufriere
- 4 stations from plantation to reef
- Samples of sediment, water, fish and plant tissues (wild and cultured), drinking water sources
- Analysing priority pesticides highlighted by review
- Literature review for Jamaica

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Review and evaluation of existing agricultural land management

- Characterisation and quantification of farming units and crop types in study watersheds
- Application methods for agro-chemicals
- Soil management, including initiating key informant interviews and structured questionnaires to establish current practices of farmers and nationally recommended practices

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Characterisation and quantification of farming units and crop types in study watersheds

As a DFID research project, emphasis must be placed on impacts on livelihoods of the poor. This may occur in two ways:

1. Via any adverse effects of agro-chemicals in the environment, and

2. In relation to the impacts of deleterious farming practices

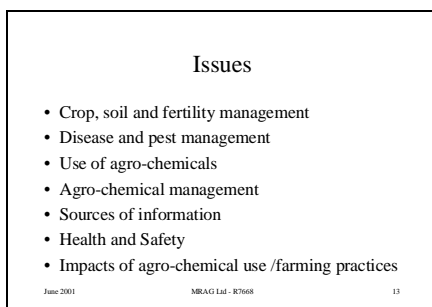
It is therefore necessary to stratify sampling to include an appropriate cross-section of farm sizes and types

Application methods for agro-chemicals

We are focussing on existing or promoted best management practices and validating their uptake by farming communities in order to guide decisions relating to appropriate practices that may be adopted by extension services as well as the farmer.

Soil management

Soil management will contribute to the extent of agro-chemical loading in the environment, both terrestrial and marine.

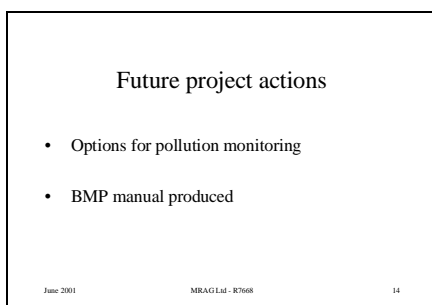


Issues for agricultural land management

In order to achieve the above outputs, key informant interviews and structured questionnaires will be undertaken to establish current practices of farmers and nationally recommended practices. We are working with the extension services in St Lucia and Jamaica and their officers are carrying out fieldwork.

Use of agro-chemicals examines benefits or dis-benefits of the use of agro-chemicals to livelihoods in terms of economic gain. Health and Safety looks at potential impacts of use and mis-use of agro-chemicals and the extent to which Guidelines are followed.

In particular, the impacts of agro-chemical use/farming practices concentrates on perceived environmental impacts, which is another output of this project.



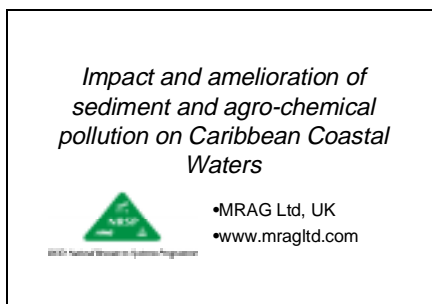
Options for pollution monitoring

These include options for administrative and environmental monitoring of agro-chemicals

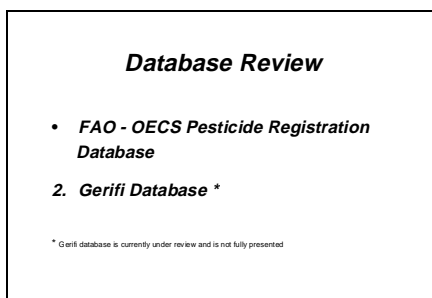
BMP manual produced

The project aims to produce research outputs that are generic to the Caribbean region. It will not necessarily develop new BMP practices, rather it will highlight those that are appropriate to different categories of farmer, focussing on those for small-scale, poor farmers.

2.4.2 Database review



This document is the annotated Power-point slide show of the DFID NRSP project R7668 (left) database presentation made to the Co-ordinating Group of Pesticide Control Board's 6th Annual General Meeting held in Dominica, 19-21 June 2001



The presentation related to a review conducted by MRAG within this project of two Pesticide registration databases available within the Caribbean.

Platforms

- FAO-OECS database is installed on Access 2.0
- Gerefi is installed on Foxpro
- Both of these database platforms are now out of date.
- Gerefi is still DOS based.
- Access 2.0 is an early Windows version.

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Gerefi Software

- High dependence on external IT inputs
- Needs upgrading to Windows based version
- Limited report generation
- Gerefi only looks at one country, OECS looks at 9 countries
- Need to create additional databases for new programmes (e.g. pest control operators)

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FAO-OECS Software

- Choice of software
 - The Pesticide Registration Database consists of two Microsoft Access v2.0 databases, one containing the data, the other is the application to access the data.
 - The database software used is now three versions behind the current version of Microsoft Access (2002), and support for the package is growing scarcer.
 - Microsoft Access v2.0 is also not 100% guaranteed to work with newer operating systems such as Windows 2000.
 - It is suggested therefore that if the database were to be used that it should be upgraded to a more recent database version and reviewed before use.

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What do they do – data?

Data stored	FAO-OECS	Gerefi
Pesticides	★	★
Applicant details	★	★
Agent details	★	★
Import licenses	★	★
Export control		★
Manufacturers	★	
Pesticide operator	★	
Pest control co's	★	
Premises	★	
PCB inter-comm	★	
Quality control		★
Inspection		★

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The Gerefi database was only received for review in the week prior to the presentation. Comments about Gerefi capability were therefore our current understanding prior to review by MRAG's in-house database specialist. The finalised review of both databases will be made available.

Note that tables under these general headings contain significant information on company and product details.

What do they do – reports?

Outputs	FAO-OECS	Gerefi
Registrations (pesticides, manufacturers, import, export, etc according to data stored)	★	★ (includes residues and QC)
User query by type of registration/pesticide	★	★ (for registration only)
Summary details (registration, pesticide, statistics)	★	★
Label information	★	?

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Note: many of the query and report functions in Gerefi either don't work or are not currently used. Some features of FAO – OECS (interactive training, glossary) appear in the menu but have no associated software underneath.

**FAO – OECS
Database Structure 1 / 2**

- **Table Definitions**
 - Table definitions do not seem to have been defined clearly, with little regard for space (text fields are often 255 characters long which is excessive)
 - Very few lookup tables for standardised categories of available responses which can save space and make the database more efficient.
- **Database Normalisation**
 - The database is not normalised. There is a great deal of duplication in the database, with very little flexibility.

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Table Definitions

Example: Country of Origin in Importation is Text(250). ISO country codes could be used Text(2) linked to a Countries Table.

Table definitions for exporting / importing data restrict the database to use in the countries already defined. No new members could use the database without rewriting parts of the code.

Database Normalisation

Database normalisation is defined as a series of steps followed to obtain a database design that allows for efficient access and storage of data in a relational database. These steps reduce data redundancy and the chances of data becoming inconsistent.

Example of bad structure and normalisation is the CONSTITUENTS table, where the number of active ingredients in a pesticide is limited to 3 (non-active to 10). This cannot be changed. There should be a daughter table that records the active and non-active ingredients.

Database Structure 2 / 2

- **Indexing and Primary Key / Foreign Key Relations**
 - Database designed around one central table (Pesticide). This is not a very efficient design, and referential integrity is not maintained.
- **Naming Conventions**
 - No naming conventions are used in the database, though full table and column names are usually very descriptive and are consistent throughout.

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Indexing and Primary Key / Foreign Key Relations

No referential integrity is really applied here. So you can therefore delete a pesticide from the list but all the data associated with it would remain “orphaned” in the database. Again space is wasted.

User Interface

- **General Impression**
 - An orderly user interface to the database is provided, allowing access in a well defined manner to the data. The pathways for data entry and editing are very structured, though certain menu items of importance such as “Backup and Restore Database” items should be promoted.
- **Ease of Navigation / Flow of Use**
 - The database has a button based menu structure that is modal in operation, only allowing each user to access one database function at a time. This function must be completed or cancelled before beginning the next. This is actually quite restrictive and more recent database applications allow much more flexible access.

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General Impression

Well structured, but does not allow multi-tasking. Backup and restore should be first of second level options as they are quite important and they should remind users to backup regularly.

Database Forms 1 / 2

- Number of Forms
 - The number of forms in the database greatly exceeds what is required, a number of forms in fact have multiple versions for the same form still in the database. This takes up space and can cause confusion for future development.
 - The high number of forms is often due to the non-normalised structure of the underlying database tables reliant on large queries generated from a number of database tables, which will result in slower access speeds.
 - Often the database has a number of virtually identical duplicate forms which has been caused by the duplication in table structure.

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Number of Forms

Non-normalised structure causes big problems here, relying on complex queries which are often difficult to manage even with the virtually empty dataset used to test the database.

Duplication for address details here is a problem. There are twelve different forms for adding the same information !

Database Forms 2 / 2

- A number of database forms when accessed directly from within Microsoft Access rather from the user interface, give a "Query is too complex" error, highlighting the poor design of the database.
- Complexity of Forms
 - The forms within the database are quite simple. They are usually presented in a series, with all related data being entered in order. This information could quite easily be displayed on one database form, with tabbed pages or a number of "sheets" made visible at relevant points. This would be a much more efficient way of presenting, adding and editing data.

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Database Reports 1 / 2

- Reports Available
 - Reports are presented in the database to print details of registrations of all different types and reviews of the registrations.
 - A query function is also available to query different types of registration, pesticide, use etc. This will report the data to screen but unfortunately the functionality to report this to file or to a printer is not available. It would also be extremely useful and simple to implement to allow a user to select one item from a set of query results as displayed on the screen and then open up the relevant form to edit or view this data.

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Reporting is poor in the database. You can only really print out what has been entered in a couple of formats.

The querying is good but lacks any reporting functionality. This *ad hoc* reporting is one of the most useful functions of any database.

Database Reports 2 / 2

- Functionality
 - In terms of the basic functionality the reports seem to work correctly, but it would be advisable to submit a larger test database to the reports to test them further.
- Applicability
 - Due to the current unavailability of the equivalent reports from the systems currently in use it is not possible at this time to comment on the applicability of the database reports.

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Additional Features 1 / 2

- What is included ?
 - Summary details
 - Label information
- Value of additional features ?
 - The ability to query the database by a variety of criteria is very useful, though this is let down by the inability to "do" anything with the data presented on screen, either to go to the data itself or print it out.
 - The label information is useful, though it would be more appropriate to link this into the details of a particular pesticide.

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Data Exchange and Import / Export Protocols

- What is provided ?
 - Data exchange protocols are provided between all the countries registered in the database. All the details recorded are not exchanged, only a subset of the data but this is not really a problem.
- What is needed?
 - The current system although well defined in what is sent and to which countries it does not allow any flexibility in extending the system to allow new members to join. The definitions for each country are hardwired into the database tables. It would also be useful to allow a general export facility to allow normal users (who do not have full access to the system) to select data they would wish to export to be used in separate summary spreadsheets or other documents.

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What is provided ?

The system works fine for existing member countries but could not accommodate new members. At present there are 9 states: Antigua & Barbuda; Dominica; Grenada; Montserrat; St Kitts & Nevis; St Lucia; St Vincent & Grenadines; BVI; Barbados. Registration details for CARICOM countries are included but these countries cannot use the database to administer their system the way it is currently set up.

Backup and Restore Procedures

- Ease of Use
 - The backup and restore procedures supplied with the database are simple and easy to use.
- Accuracy
 - Tests of the backup and restore procedures show no problems exist.
- Disaster Recovery Plan
 - It is suggested that a "Disaster Recovery Plan" be developed and supplied with the database in the event of a major hard disk failure or other "Act of God" e.g. fire in the building.

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Backup and Restore

These items should be a higher priority on the menu tree.

Security 1 / 2

- How is database security implemented ?
 - Database security is implemented through the standard in-built security features of Microsoft Access 2.0.
- User groups and access rights defined.
 - User groups have only been defined for two groups of users "Administrators" – who should have rights to all aspects of the database and "Operators" – who can only add and edit data and cannot modify the application in any way.

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Security 2 / 2

- Problems with Security
 - The Administrator role given with the database does not have full access to the underlying database structure. This has been reserved by the company that have developed the database.
 - The Microsoft Access 2.0 security implemented, does not allow later versions of Microsoft Access to get at the data held in tables or the user interface application. In fact having multiple versions of Microsoft Access installed may cause problems with the operation of the database. This is a major consideration as other databases in use may be developed in newer versions of Microsoft Access.
 - The database is currently only setup for single user access.

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Problems

This is a maintenance issue and ownership of the database should reside within the Caribbean, not externally. Could do with multi-user access over a network. No network install was provided as an option so the database goes on a single machine only.

Documentation

- User help files
 - No internal user help files are available. This facility is now expected with most database packages.
- User documentation (external manuals)
 - The user manual supplied is fully defined, going through examples of each procedure. Due to the repetition though within the database and the forms, this is unfortunately carried through to the manual making the manual larger than it need be.
- Technical documentation
 - No technical documentation was available as the database is supplied commercial product.

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Recommendations

- Database is in working order, although it would need upgrading and updating before being used.
- It is suggested that if updated and upgraded the database be converted to allow concurrent multi-user access, a more flexible approach to data access and to allow for expansion to cover more countries / sites within a country.
- It is suggested that a formal user requirements analysis for the users groups concerned be performed to define the scope before any updating / upgrading is performed.

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Before upgrading the system, a User Requirements Analysis is needed.

One option is that this project conducts a formal user requirements analysis of CGPCB member states. (This issue was discussed in Plenary).

Discussion

- Question of database sustainability and maintenance
- Applicability to task(s) required
 - Applicability of the database to the tasks required is not possible without an analysis of user requirements. To this end, details of systems currently in place and requirements for future use throughout the Caribbean are required (preliminary feedback through workshop discussion, to be followed up with user requirements analysis)

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Question of database sustainability and maintenance: Need single organisation in the region to take on this responsibility.

2.5 Locations of sampling sites in Roseau, Soufriere and Mamiku watersheds

Sampling site locations were discussed with a number of institutions during the first project trip and it was concluded at the time that sampling should take place at four different stations in three watersheds: Roseau, Praslin/Mamiku and Soufriere (see First Trip Report). One of the objectives of this trip was to locate suitable monitoring stations. Key information was collected at the Project Workshop and during meetings with MAFF Extension Services about general location of different farming activities in each watershed and then visits were conducted to define exact locations. Table 2.18 summarises information collected about the watersheds and describes selected monitoring stations.

Table 2.18 Study watersheds: site locations and description

Roseau	<p><i>Watershed area: 49.1km²</i></p> <p><i>Boundaries (main towns/villages are Millet, Dame de Traversay, Durandeau, Sarot, La Treille, Vanard, Jacmel, Jean Baptiste, Morne d'Or, Belair, Perou, Fond Manger, Collietown, Massacre, Roseau Distillery, Derriere Lagoon, Bois d'Inde, La Croix Maingot):</i></p> <ul style="list-style-type: none"> • <i>Upper watershed - from the forest reserve to Mont Gimie</i> • <i>Southern boundary - down the Venus/Anse La Raye ridge to Roseau</i> • <i>Northern boundary – down the Ladelac Sarrot ridge to Marigot</i>
<u>Station 1</u> (upper valley)	<p>N 13°54.876'</p> <p>W 60°01.678'</p> <p>One of the main tributaries of the Roseau river passes through a pipe culvert under a road through the Park Estate. Cultivation of bananas, coconut palms, root crops. Site is close to a corrugated shed.</p>
<u>Station 2</u> (mid valley)	<p>N 13°55.576'</p> <p>W 60°59.536'</p> <p>This location is just below the confluence of tributaries to the main river. Area of cultivation of bananas, coconut palms, mango trees, pineapple, mixed vegetables (chilli peppers, tomatoes). Access to the river from below the village of Durandeau (path from road to the right of the first white house in the village).</p>
<u>Station 3</u> (lower valley)	<p>N 13°57.346'</p> <p>W 61°01.229'</p> <p>The lower valley is intensively farmed with large banana plantations along both banks of the river. Sampling site is by the main coastal road bridge next to the school.</p>
<u>Station 4</u> (shore)	<p>Exact sampling point not defined</p> <p>At the outlet of Roseau River there is a narrow beach (with fishing boats) and no visible reef. The access road to the beach is from behind the distillery south of the river.</p>

Soufriere	<p><i>Watershed area: 17.2km²</i> <i>Boundaries:</i> <i>Forested ridges either side of Soufriere valley. Main towns/villages are Soufriere, Ruby, La Perle, Zenon, Cressland, Diamond, Esperance, Fond St Jacques, Toraille, Belvedere, Migny, St Phillip.</i></p>
<u>Station 1</u> (upper valley)	<p>N 13°50.428' W 61°01.143' Sampling site on Jeremy River (main tributary of Soufriere River) just above Migny village. Area of cultivation of mixed vegetables (dasheen, celery, parsley, cucumber, tomato, cabbage). Access to river on path below first yellow house on the left after main village.</p>
<u>Station 2</u> (mid valley)	<p>N 13°51.272' W 61°02.325' Site below confluence of main tributaries to Soufriere river and just above falls from Ravine Toraille. Very steep banks adjacent to river with farming of breadfruit, pumpkin, banana, root crops and coconut palms. Lots of pools with sediment in the river. Access to river just above the road to Zenon.</p>
<u>Station 3</u> (lower valley)	<p>N 13°51.382' W 61°03.316' Sampling station along the straightened section of the river through Soufriere town. Access to river from road by playing fields.</p>
<u>Station 4</u> (shore)	<p>Exact sampling point not defined Much of Soufriere Bay is protected by fringing reef with sediment below the reef slope. Sampling will be conducted adjacent to sediment traps monitored by York.</p>
Mamiku/ Patience	<p><i>Watershed area: 16.0km²</i> <i>Boundaries: forested ridges either side of Mamiku valley. Main towns/villages are Mamiku, Mon Repos, Patience and La Pointe.</i></p>
<u>Station 1</u> (upper valley)	<p>N 13°52.279' W 60°55.775' (approx site) The river is largely covered with vegetation and has very steep banks. The majority of farming plots are small with some larger banana fields closer to the main road. Small farming plots adjacent to river are planted with mango trees, coconut palms, bananas and mixed vegetables (celery, cabbage, cucumber). Access along rough track to corrugated shed, then down to river using farm track.</p>
<u>Station 2</u> (mid valley)	<p>N 13°52.041' W 60°54.076' The river passes under road through an area of well tended banana plantations (interspersed with some coconut palms). Some small plots of breadfruit trees. The valley is much wider and flatter. Sampling point below bridge.</p>

<u>Station 3</u> (lower valley)	N 13°52.080' W 60°53.929' Banana plantations continue almost to the shoreline. Sampling point seaward of the main coastal road near a campsite.
<u>Station 4</u> (shore)	Exact sampling point not defined Sampling will be conducted close to the site of sea moss culture in Praslin Bay.

2.6 Administrative management of agro-chemicals in St Lucia and Jamaica

Flow charts to indicate administrative management systems (import and manufacture in Jamaica, import only in St Lucia) had been prepared with information collected during the last project trip. Administrative systems were again discussed during meetings and the flow charts have now been updated as shown in this section. These flow charts are yet to be finalised pending results of further studies/feedback from recipients of this document.

Figure 2.1 Agro-chemical import management system – Jamaica
Agro-chemicals import - Jamaica

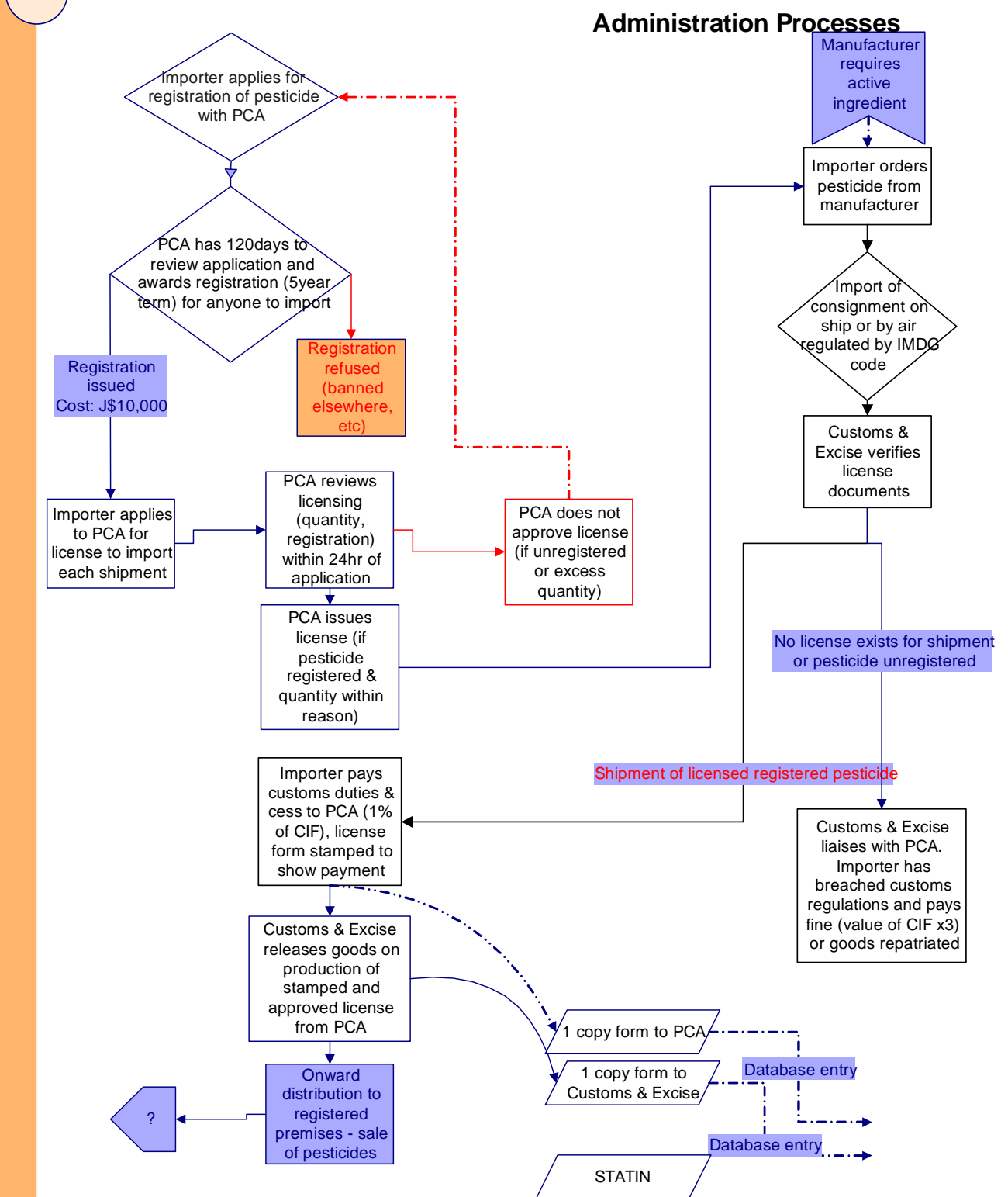


Figure 2.2 Agro-chemical manufacture management system - Jamaica

Agro-chemicals manufacture - Jamaica

Administration Processes

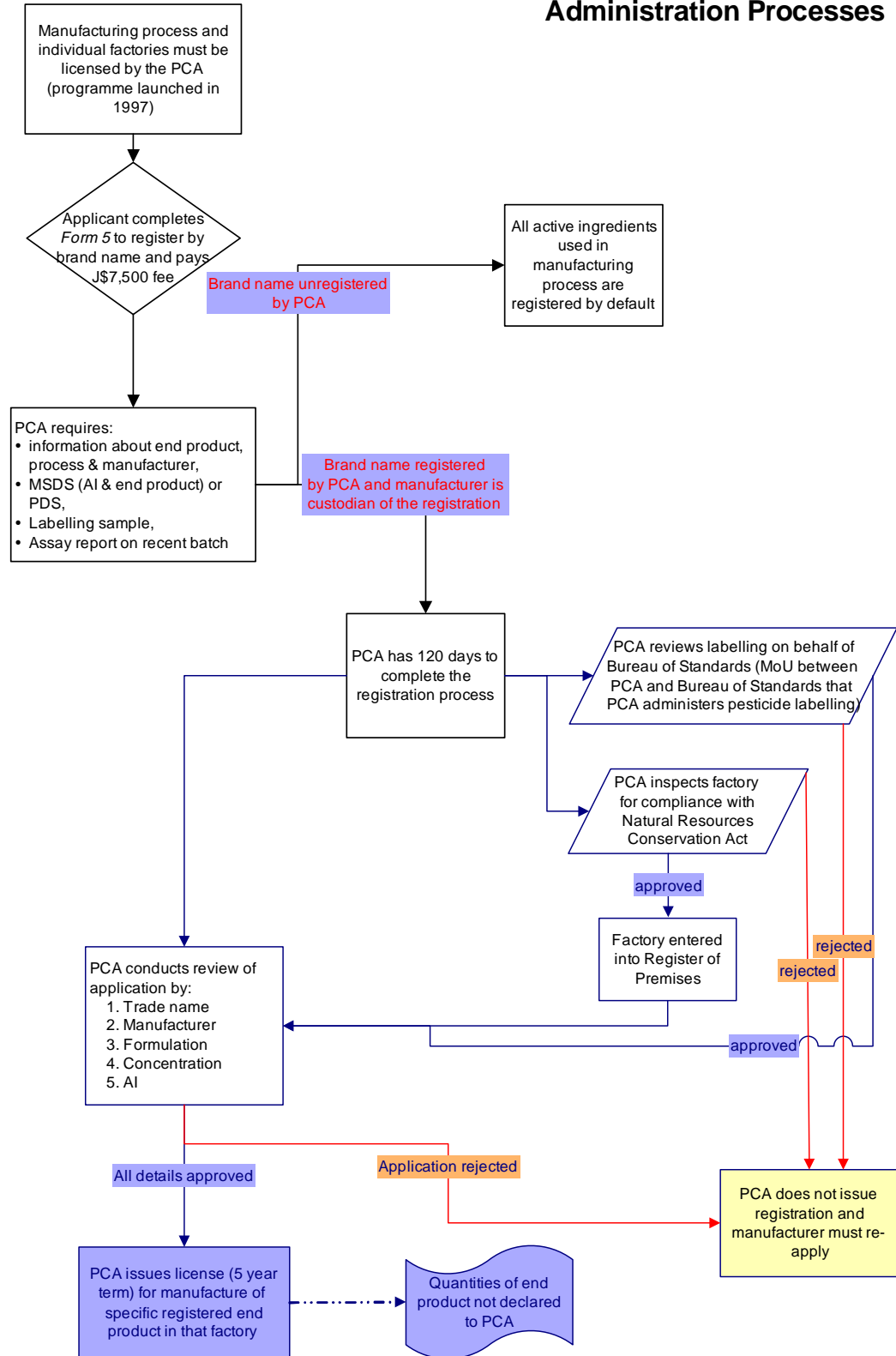
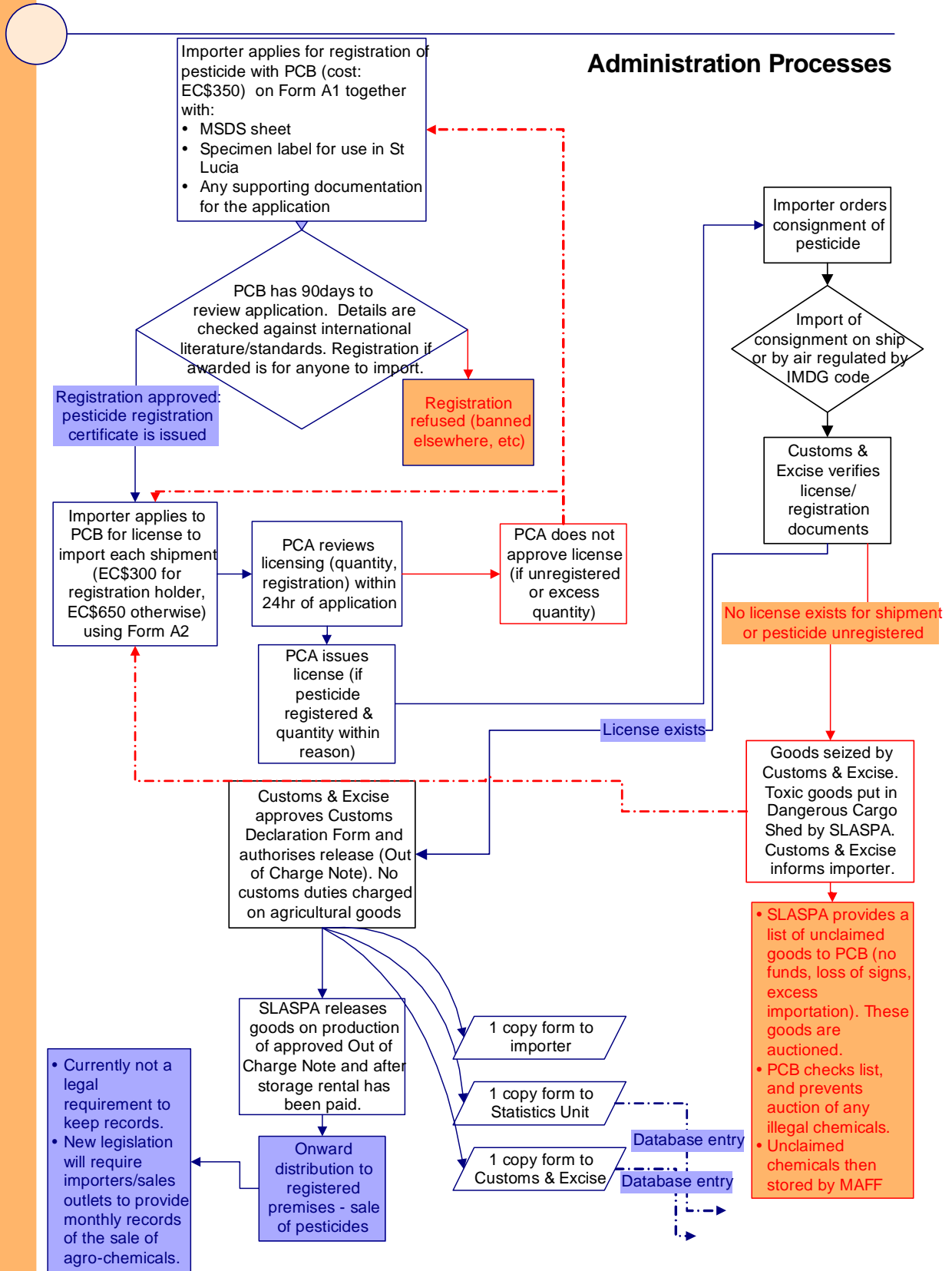


Figure 2.3 Agro-chemical import management system – St Lucia
Agro-chemicals import - St Lucia



2.7 Workshops

Two project workshops were organised by MRAG and overseas collaborators, and attended during the trip. Workshop Proceedings have been prepared for distribution to Extension Officers, and electronic copies of the Proceedings are available on MRAG's web site ([www.mragltd.com/LWI interface/R7668](http://www.mragltd.com/LWI%20interface/R7668)). Information about the workshops is detailed below:

2.7.1 Jamaica

This workshop was held on 11 June 2001 at Biology Lecture Theatre, UWI Mona Campus. In addition to project management (MRAG, CMS, CARDI, DoLS, DOC), the workshop was attended by 36 RADA extension officers from the two study watersheds (Wag Water and Rio Cobre), staff from RADA head office and researchers from the Faculty of Agriculture. The Opening Session focussed on the background to the project and preliminary outputs. The first Technical Session centred upon farming and soil conservation practices in the two study watersheds; and the second Technical Session concentrated on the project questionnaire in terms of applicability to the study watersheds and standardisation techniques.

2.7.2 St Lucia

This workshop was held on 26 June 2001 at the Still Restaurant in Soufriere. The workshop was organised by MAFF Extension Services (in particular the Soufriere regional office) and MRAG. In addition to project management (MRAG, MAFF Extension Services, CARDI Jamaica), the workshop was well attended by 40 extension officers from all seven extension regions in St Lucia and by a representative from CARDI St Lucia. Presentations had been organised by Guy Mathurin (Crop Protection Officer and PCB Secretary) and Anthony Philigence (Coordinator for the MAFF Soil and Water Conservation Programme). Unfortunately Mr Mathurin was unable to attend due to commitments through the Quarantine Awareness Week. The Project Team were subsequently interviewed by MAFF for their weekly radio programme on Radio St Lucia.

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4 ANNEXE 1: ITINERARY

Itinerary

R7668 (trip #2)

Chris Mees/Nicole Kenward

6 – 30 June 2001

Wednesday 6	<i>Travel (JM2 LHR 1250hrs – Kingston 1800hrs)</i> <i>Hotel: Four Seasons (tel: 876 926 8805, fax: 876 929 5964)</i>
Thursday 7	1000: UWI (Peter Edwards, Leslie Simpson, Raymond Martin) 1330: PCA (Hyacinth Chin Sue, Marcia Thomson) 1500: CARDI (Leslie Simpson, Raymond Martin) 1630: UWI (Tara Dasgupta) 1800: Dinner (George Warner, Four Seasons)
Friday 8	1000: C-CAM (Peter Espeut, Brandon Hay) 1400: CARDI (Leslie Simpson) 1500: UWI (Tara Dasgupta)
Saturday 9	Field site visit: Wag Water watershed
Sunday 10	
Monday 11	Project workshop with MAFF RADA extension officers Biology Lecture Theatre, UWI, Mona Campus (9.30-4.30)
Tuesday 12	0930: Round-table (UWI, DoC, CMS, DoLS/CARDI/C-CAM) 1400: PCA (Hyacinth Chin Sue, Marcia Thomson) 1530: CM – UWI Information Services (Garvin Gordon) 1530: NK – UWI/CMS (George Warner)
Wednesday 13	0900: UNEP (Tim Kasten) <i>Travel (BW415 Kingston 1245hrs – Bridgetown 1730hrs)</i> <i>Hotel: ASTA Beach Resort (tel: 246 427 2541, fax: 246 426 9566)</i>
Thursday 14	LWI Programme Development Meeting (no project activity)
Friday 15	LWI Programme Development Meeting (no project activity)
Saturday 16	<i>Travel (LI372 Bridgetown 1455hrs – St Lucia 1535hrs, LI102 St Lucia 1605hrs – Dominica 1650hrs)</i> <i>Hotel: Roxy's Mountain Lodge (tel/fax: 767 448 4845)</i>
Sunday 17	
Monday 18	Report writing
Tuesday 19	Caribbean Group of Pesticide Control Boards - annual meeting Fort Young Hotel, Roseau Project presentation: background and preliminary research findings
Wednesday 20	Caribbean Group of Pesticide Control Boards - annual meeting Fort Young Hotel, Roseau Project presentation: review of regional databases (FAO/OECS and Geref)
Thursday 21	Caribbean Group of Pesticide Control Boards - annual meeting Fort Young Hotel, Roseau
Friday 22	<i>Travel (LI101 Dominica 0725hrs – St Lucia 0805hrs)</i> <i>Hotel: Auberge Seraphine (tel: 758 453 2073, fax: 758 451 7001)</i> 1030: MAFF Extension Services (Rufus Leandre)
Saturday 23	<i>Hotel: Still Plantation, Soufriere</i> Field site visit: Soufriere watershed
Sunday 24	
Monday 25	0830: MAFF Extension Services (Rufus Leandre) 1100: CEHI (Joth Singh) 1430: SLASPA (Dermot Saltibus) 1530: PCB (Guy Mathurin)
Tuesday 26	Project workshop with MAFF agricultural extension officers Still Restaurant, Soufriere (8.30-4.30) 1700: St Lucia Radio interview (MAFF weekly programme)
Wednesday 27	1030: Department of Planning

	1130: MAFF Extension Services (Rufus Leandre, Sidney Philips) Watershed site visit (Roseau) 1930: Dinner (Kai Wulf)
Thursday 28	Watershed site visit (Soufriere) 1000: MAFF Extension Service (Rufus Leandre, Ricardo George) 1100: CEHI (Andrew Lewis) 1400: Customs & Excise (Brian Wardrope) 1500: DoF (Leroy Ambrose, Sarah George) 1600: PCB (Guy Mathurin)
Friday 29	Watershed site visit (Praslin/Mamiku) 1200: WASCO (Raphael Eudovique) <i>Travel (JM35 St Lucia 1330 hrs – Montego Bay 1525hrs, JM01 Montego Bay 2355hrs)</i>
Saturday 30	<i>Travel (arrive LHR 1505hrs)</i>

5 ANNEXE 2 – CONTACT DETAILS

(NB. List of contacts are sorted by country and last name)

First Name	Last Name	Company/Institution	Job Title	Country	Business Fax	Business Tel	Email Address
Florita	Kentish	Pesticide Control Board - Antigua	Chairperson	Antigua		268 4624962	diragr@candw.ag
Richard W.	Beales	DFID Caribbean	Senior Natural Resources & Environment Advisor	Barbados	1 246 4307959	1 246 430 7947	r-beales@dfid.gov.uk
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Joan	Steer	Department of Agriculture	Plant Protection Officer	Caymans		345 9473090	ciagric@candw.ky
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Henry	Shillingford	Dominica Conservation Association		Dominica		767 4484098	domcona@cwdom.dm
Craig	Pratt	Environmental Vulnerability Project		Fiji			Craig@sopac.org
Guido	Marcelle	Pesticide Control Board - Grenada	Chairperson	Grenada		473 4403273	guimacel@caribsurf.com
Basudeo	Dwarka	Pesticides Board - Guyana	Registrar	Guyana		592 2251045	moas12@guyana.net.gy
Jan	Auman	Coastal Water Quality Improvement Project	Chief of Party	Jamaica	876 7543913	876 7543910/2	ard@cwjamaica.com
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Howard F.	Batson	U.S. Agency for International Development	Office of the Environment	Jamaica	876 9299944	876 9263645/9	hobatson@usaid.gov
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