DFID Natural Resources Systems Programme

Policy and Management Strategy Document

Management of agro-chemicals for improved public and environmental health

A Strategy For Improved Agro-Chemical Use And Management For The Wider Caribbean

CGPC

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In Jamaica:
Hyacinth Chin Sue, Pesticides Control Authority
Tara Dasgupta, Department of Chemistry, UWI Mona
Peter Edwards, Centre for Marine Science, UWI Mona
Peter Espeut, Caribbean Coastal Area Management Foundation
Brandon Hay, Caribbean Coastal Area Management Foundation
Craig Perue, Department of Chemistry, UWI Mona
Leslie Simpson, Caribbean Agricultural Research and Development Institute
George Warner, Centre for Marine Science, UWI Mona
Dale Webber, Department of Life Science, UWI Mona

In St Lucia
Natalie Boodram, Caribbean Environmental Health Institute
Rufus Leandre and Extension Officers, Ministry of Agriculture, Forestry and Fisheries
Andrew Lewis, Caribbean Environmental Health Institute
Guy Mathurin, Pesticides Control Board
Julius Polius, Ministry of Agriculture, Forestry and Fisheries

Authors:
Chris Mees, Nicole Esteban and Stephanie Seddon-Brown

MRAG Ltd
47 Princes Gate, London, SW7 2QA
UK

EXECUTIVE SUMMARY

There is an urgent need for effective agro-chemical management in the Caribbean to increase potential for international trade in agricultural products and protect the global environment. Improper use of agro-chemicals has been shown to have harmful effects on human health and the environment. Correct management and use can bring social and economic benefits.

Key prioritised recommendations developed through the Coordinating Group of Pesticide Control Boards of the Caribbean (CGPC) for improved agro-chemical management in the Wider Caribbean include:

1. Harmonised procedures for agro-chemical management should be adopted throughout the Wider Caribbean:
    - Model legislation on Pesticides and Toxic Chemicals should be ratified and adopted. This will dictate the administration, use and monitoring of agro-chemicals.
    - Administrative procedures should reflect the requirements of the harmonised legislation and be promoted.
    - A locally owned and managed database should be developed for harmonised administration and information sharing.
    - Regionally acceptable (or local) standards for Maximum Residue Limits should be established, in the absence of which the Food and Agriculture Organisation (FAO) / World Health Organisation (WHO) Codex Alimentarius standards should be applied where possible.
    - Regional environmental reference sites need to be established.
2. Sustainable financing and cost recovery mechanisms must be investigated, and where necessary novel and creative means found, to develop capacity, and to fulfil all the functions of the various institutions involved in all aspects of agrochemical management. External sources of funding must be explored and fully utilised.
3. Communications experts should be engaged for communication, education and training purposes; change-management concepts should be applied.
4. Undertake an institutional analysis and evaluation of the capacity and resource needs of Pesticide Control Boards (PCBs) and other relevant executing agencies (e.g. extension services, monitoring and research agencies, medical laboratories) throughout the Wider Caribbean. Duplication of effort should be rationalised.
5. PCBs must be adequately staffed and financed to administer and implement national legislation relating to agro-chemicals. There should be a dedicated full time staff. The composition of the Board of Directors should include representation from the private sector and persons with experience in ecological issues and the fate of agro-chemicals in the environment.
6. GAP and Best Practice Codes of Conduct for agro-chemical use need to be implemented, particularly for domestic products not already covered by existing arrangements.
7. Promote implementation and further research on Integrated Pest Management (IPM) and Integrated Management of Pests and Pesticides (IMPP) as a means of improved management of use of pesticides.
8. Socio-economic analyses, including cost-benefit analyses, should be conducted for different farming practices, including options for agro-chemical use (e.g. IPM).
9. Carefully designed public health monitoring plans must be developed. Ensure adequate analytical capacity to enable monitoring for compliance with standards for public health (i.e. medical and food residue monitoring laboratories).
10. Carefully designed long-term environmental monitoring plans must be developed (from the farm to the sea).

These recommendations can be implemented via both national and regional actions. There is a need for national governments to act promptly and, concurrently, to initiate regional actions co-ordinated through the CGPC to inform their national programmes. National Governments and the CGPC should develop prioritised plans of action to achieve implementation of their respective components of the strategy and to identify local and external sources of funding.

ACRONYMS

C&E	Customs and Excise
CARDI	Caribbean Agricultural Research and Development Institute
CARICOM	Caribbean Community and Common Market
C-CAM	Caribbean Coastal Area Management (Jamaica)
CEHI	Caribbean Environmental Health Institute (St Lucia)
CGPC	Coordinating Group of Pesticide Control Boards in the Caribbean
DFID	Department for International Development (UK)
EU	European Union
FAO	Food and Agriculture Organization
GAP	Good Agricultural Practice
ICENS	International Centre for Environmental and Nuclear Sciences (Jamaica)
IICA	Inter-American Institute for Cooperation on Agriculture
ICM	Integrated Crop Management
IMPP	Integrated Management of Pests and Pesticides
IPM	Integrated Pest Management
LBS	Protocol on Land Based Sources of Pollution
LWI	Land Water Interface
MAFF	Ministry of Agriculture, Forestry and Fisheries (St Lucia)
Min. Ag.	Ministry of Agriculture
MRAG	Marine Resources Assessment Group Ltd (UK)
MRL	Maximum Residue Limit
NPA	National Plan of Action
NRSP	Natural Resources Systems Programme (of DFID)
OECS	Organisation of Eastern Caribbean States
PCA	Pesticides Control Authority, Jamaica
PCB	Pesticides Control Board
PIC	Prior Informed Consent
POPs	Persistent Organic Pollutants
UNEP	United Nations Environment Programme
UWI	University of the West Indies
WHO	World Health Organization

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1 SETTING THE SCENE

There is international recognition of the need to control agro-chemical pollution. Although developing countries use 10-25% of the world's pesticides, they suffer up to 50% of the reported cases of acute poisoning and 73-99% of the reported fatalities among pesticide applicators. Farmers in developing countries are especially at risk because of inadequate training or inability to read instructions for application of hazardous pesticides[1]. In the Caribbean, it is the poor and socio-economically disadvantaged who are at greatest risk. Toxic loadings must be reduced, and better health and safety practices employed to protect people's health.

Problems that have been identified in respect of the use of agro-chemicals include illegal imports and their use, repackaging of chemicals by vendors without labelling, incorrect application, inadequate application equipment and failure to wear protective clothing. Resulting problems include harm to human health (poisoning), impacts on environmental pollution, exacerbated by lack of soil conservation measures and resulting sedimentation, and impacts on non-target species.

The environment of the Wider Caribbean region is especially vulnerable to agro-chemical pollution because of the small size of its islands, a consequence of which is that pollutant sources within watersheds are closely linked to the wider coastal and marine environment, and pollutants therefore, may be found in high concentrations in coastal waters. The Cartagena Convention (1983) and its Protocol on Land Based Sources of Pollution addresses this problem, and outlines the obligations of Caribbean states in ameliorating agro-chemical pollution.

Given limited resources, the emphasis should be to reduce imports of the more toxic pesticides and control the administration and distribution chain, thus reducing toxic agro-chemical loadings. At the same time, better practices should be employed in the use of agro-chemicals, and their fate should be monitored.

The current study has examined the amelioration of agro-chemical pollution with specific reference to two case study countries (Jamaica and St Lucia), and developed a strategy for improved agro-chemical management for the wider Caribbean. More details on specific tasks needed to implement 'A strategy for improved agro-chemical management' (Section 2) are given in Box 1, Section 3, 'Looking for more information?'. The strategy presented in this report was derived through the production of nine project reports, summarised into five briefs with detailed recommendations. The project team reviewed these in early June 2003. A synthesised list of recommendations was compiled, presented and reviewed at a workshop during the 8th Annual meeting of the CGPC in St Vincent and the Grenadines in June 2003. Amendments were made to the recommendations, and a strategy and mechanisms to achieve implementation were developed for them. Recommendations were subsequently prioritised, endorsed and approved (Box 2, Section 3). The CGPC also recommended during its closed session that:

- The 'strategy' and its recommendations be promoted to national governments, by the CGPC, for adoption and future implementation;
- A policy statement, relating to the strategy and its recommendations is presented to the CARICOM for potential support.

The formulation of a prioritised work plan would augment these actions.

This report is intentionally brief. For further information the reader is referred to the original project documents. The full titles of the reports and briefs are shown in Box 3, Section 3.

[1] Source: PCA (2003) Summary Annual Report April 2002 - March 2003. Paper presented to CGPC in St Vincent & Grenadines. June 2003.

2 A STRATEGY FOR IMPROVED AGRO-CHEMICAL MANAGEMENT

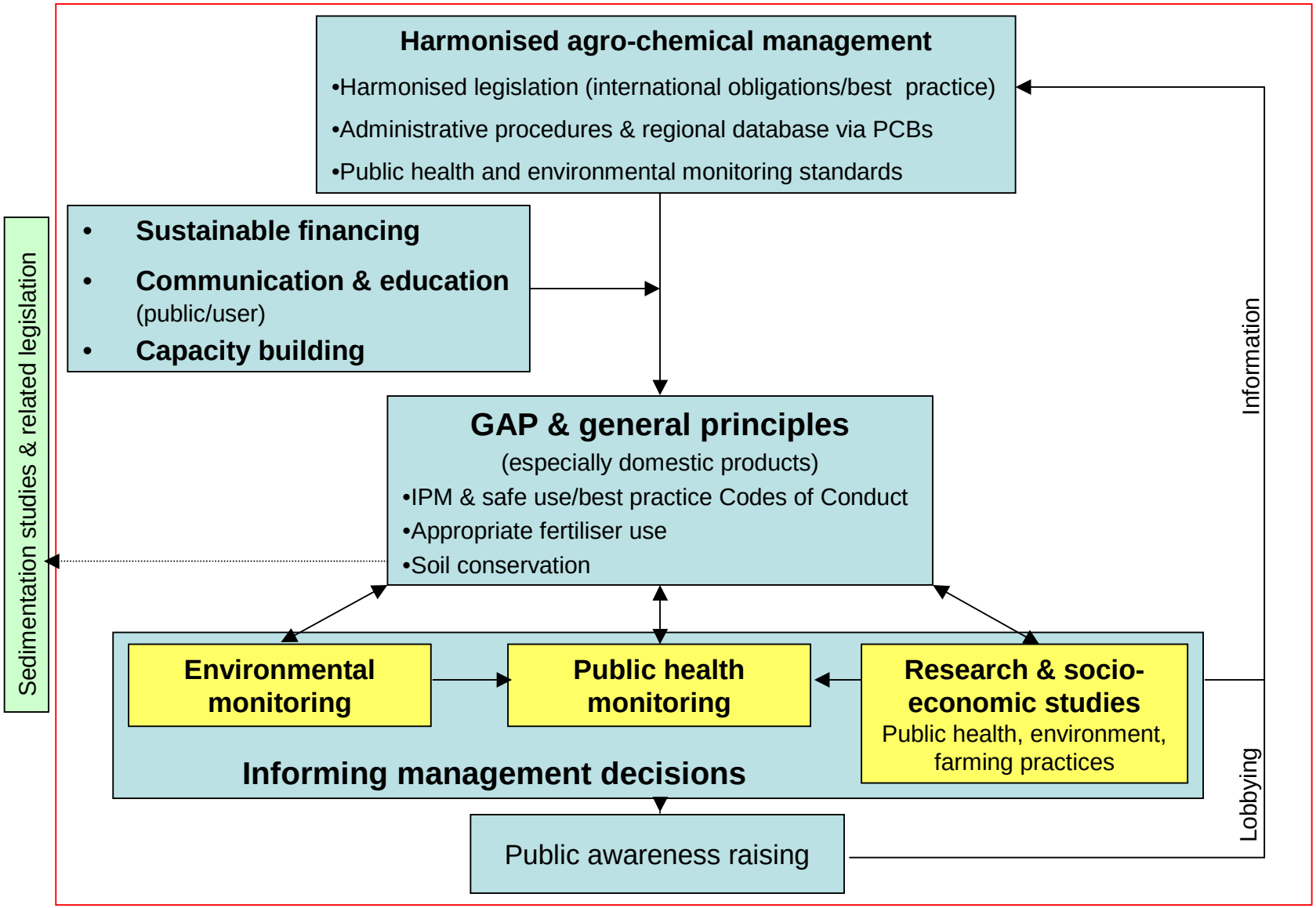
2.1 Strategy framework

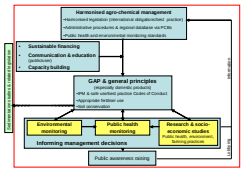
The following strategy for improved agro-chemical use and management was derived to incorporate all the recommendations that resulted from research on impacts and amelioration of agro-chemicals in Caribbean coastal waters (DFID, NRSP Project R7668). The strategy covers various aspects of agro-chemical management including the need for harmonised legislation across the region, the incorporation of good agricultural practices (GAP) and general principles, public health and environmental monitoring and research, and socio-economic studies. Cross-cutting issues that impact and support the system are shown to be public awareness, sustainable financing, communication and education, and capacity building. Furthermore, there is a link through GAP (and soil conservation) to the sedimentation studies conducted during this project. Although these studies have an impact on the GAP and general principles used, they are shown outside of this strategy as sedimentation will not be a focus of this report.

The strategy relates to the requirements for agro-chemical management across the wider Caribbean. However, it is noted that amongst the countries consulted, a range of levels of implementation of the recommendations exist. For example, in Jamaica, the administrative system is well advanced, and some of the recommendations are already being implemented. St Lucia has based its new Pesticides and Toxic Chemicals Act (2001) on the OECS model legislation. As has been the case, continued sharing of experience and information via the CGPC will help inform the amelioration of agro-chemical management systems throughout the wider Caribbean. The development of national plans to implement these recommendations will recognise the existing status of various actions, and prioritise those where action is still required.

The success of the strategy will be shown through a range of indicators, not given in the strategy framework. These underlie the strategy. Verifiable indicators will be collected via existing mechanisms and reported in the annual reports and statistics of the institutions involved (e.g. the quantities of imports, the numbers of licences issued). Progress towards achieving implementation of the strategy over time will also be apparent in such reports. The monitoring of the impact of successful implementation of the strategy upon human health and the environment is indicated in the framework within the box ‘Informing Management Decisions’.

Strategy For Improved Agro-chemical Use And Management

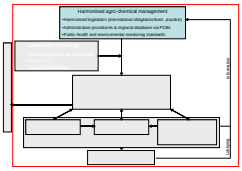




2.2 Implementing the strategy as a whole

The following sections describe mechanisms for implementing the recommendations contained within this strategy. The strategy requires action at both the national and regional level. There is a need for national governments to act promptly and concurrently, to initiate regional actions co-ordinated and agreed by the CGPC to inform their national programmes. National Governments and the CGPC should each develop prioritised plans of action to achieve implementation of their respective components of the strategy and to identify local and additional funding from external agencies including the private sector. The required actions are indicated in Box 1, which may be used as a basis to derive a plan of action. PCB members should inform national governments of these requirements and co-ordinate the development of national plans of action.

Nine projects for implementation at a regional level to better inform national governments have been identified. These projects are mostly scoping studies that will inform the potential need for additional resources. They are short term in nature. Recommended actions arising from the projects however, may be long term and will require sustainable financing mechanisms to support them. The CGPC should co-ordinate the commissioning of these projects. It is also suggested that the CGPC appoint members tasked with the responsibility to develop terms of reference for each project in order to achieve this. The CGPC should then identify sources of funding (including those through the private sector) and implement each project appropriately. These regional projects would be aimed at providing information to support national endeavours, however the national actions must be sustainable.



2.3 How to implement harmonised agro-chemical management

Given the complexity and number of tasks involved in administering agro-chemical control, and the lack of national resources to address all the tasks, harmonisation of administrative arrangements is seen as a means of making better use of limited resources in the region. This would bring benefits to the Pesticide Control Boards (PCBs) administering the system, to other authorities involved in agro-chemical management, and to applicants wishing to register or import products.

- Model pesticides legislation for the Caribbean region has been developed by the Legal Unit of the Organisation of Eastern Caribbean States (OECS). If this model is adopted nationally, it will bring considerable benefits (cost-savings, shared resources, etc.) including the following:
    - to address international obligations that are currently not fully met throughout the Wider Caribbean;
    - to establish common administrative procedures and a framework for best practice management and use of agro-chemicals; and
    - to establish common regional public health and environmental monitoring standards.

A regional database for recording registration and management of pesticides is a valuable tool to support the process of harmonisation and enable information sharing.

Governments must widely adopt and implement the model legislation to enable and support harmonisation. This requires the establishment of Pesticide and Toxic Chemical Control Boards for administration and control of the management system, thus achieving implementation of common administrative procedures throughout the Wider Caribbean. Experience should continue to be shared through the established regional body, the CGPC.

The OECS should review and update the model legislation to reflect the recommendations arising from the 8th Meeting of the CGPC, including[2]: changes in the recommended Board composition and minimum schedule of meetings; sustainable financing mechanisms for the PCB; and, legislation concerning public end users of agro-chemicals. Recommendations for these amendments should be communicated to the OECS by the CGPC via a policy paper or other written communication.

International obligations also provide for common standards. It is necessary for relevant regional bodies and government departments to bring Conventions and their Protocols (e.g. LBS Protocol to Cartagena Convention, and Rotterdam Convention for Prior Informed Consent (PIC)) to the attention of the Ministry of Legal Affairs in each country, and to lobby for governments to ratify, sign and implement them where this is not already done.

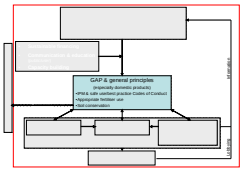
Pesticide and Toxic Chemical Control Boards must be adequately staffed and financed (see Section 2.6) with a dedicated full-time staff and appropriate Board membership, including representation from the private sector and persons with experience in ecological issues and the fate of agro-chemicals in the environment.

[2] Note that these changes may be implemented directly at a national level, prior to any changes to the model OECS legislation.

Once legislation is adopted, mechanisms for harmonisation should include a regional database for administration and information sharing. This should be implemented through a locally owned and managed database. In order to achieve this, a project proposal needs to be produced and funded locally or via an external agency[3]. Such a project would have two phases: firstly, to conduct a regional user requirements analysis, an evaluation of the institutional capacity (for use and management), the available resources, and sustainable financing; and secondly, to develop the database and provide training and capacity building for its sustainable use.

In addition to legislation and administration, harmonisation also includes development and acceptance of regional public health and environmental standards (see Section 2.5) which may or may not differ from WHO/PAHO standards, as appropriate.

[3] The 8th CGPC meeting in 2003 endorsed a recommendation for MRAG to develop such a proposal and seek funding.



2.4 How to implement GAP and general principles

A framework for good agricultural practice (GAP) aims to produce safe food through the use of suitable soil management practices, and appropriate and safe application of agro-chemicals. GAP incorporates best practices for integrated crop management (ICM), integrated pest management (IPM) and takes into account alternatives to pesticides. Amongst international certification schemes, the EUREPGAP scheme defines minimum standards acceptable to EU retailers, which are important since Caribbean exporters now need to comply with these standards. Furthermore, the US Certification scheme has other standards which Caribbean countries must also comply with. Plans to institutionalise GAP for selected commodities in the Caribbean region have been initiated through the OECS and promoted via CGPC. Additionally, a large number of internationally recognised codes of conduct and best-practice guidelines for the use and application of agro-chemicals exist, including some developed specifically for the Caribbean region.

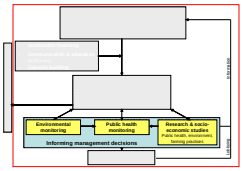
- GAP, IPM and Best-practice Codes of Conduct must be promoted to reduce agro-chemical use and promote alternative solutions.
- Training, communication and education of farmers is vital.
- Soil testing should be conducted on farms to ensure appropriate use of fertilisers.
- Soil conservation and water management practices are essential to reduce run-off and agro-chemical application and pollution.
- Within national systems, jurisdiction for all user groups needs to be defined and duplication of effort reduced to rationalise the use of limited resources.

GAP and Best-practice Codes of Conduct are implemented through a number of institutions. Implementation should be spearheaded through the establishment of a national coordinating body, which should include representatives from the Ministries of Agriculture, Health, Environment, Trade, Bureau of Standards, PCB, Agricultural Boards and the private sector[4]. This body should have a mandate that includes:

- Ensuring that supporting policy and legislation are in place. This can be achieved through a review of national legislation in relation to international/regional requirements for GAP/Best Practice. Required changes should be highlighted to the Ministry of Legal Affairs in each country through a policy brief;
- Keeping relevant implementing agencies informed of the requirements of GAP/Best Practice (e.g. Extension Officers, PCB staff) through workshops, written reports, etc., and developing their capacity (see Section 2.6);
- Promoting public awareness, farmer training and extension delivery to all producers, processors and exporters in relation to GAP/Best Practice (see Section 2.6); and

[4] Note that the concept of a National Agricultural Health and Food Safety System with a National Advisory Body, including representatives from agriculture, health, trade, environment, producer organisations, exporters and importers is currently being promoted through the CGPC.

- Developing and promoting locally relevant alternative agricultural practices such as IPM, appropriate fertiliser use and soil conservation (e.g. via the promotion of existing technologies through the extension services and training, etc; and, where necessary, appropriate national and regional research – see Section 2.5).
- Ensure that all categories of farmer are covered by the mandates of implementing agencies and adhere to the requirements for GAP, including domestic producers not already covered by existing arrangements. This requires an institutional analysis.



2.5 How to inform management decisions

Long-term monitoring programmes and targeted research are essential when evaluating the impact and fate of agro-chemicals both on the environment and on public health. Furthermore, socio-economic studies need to be conducted to better evaluate the impacts on public health, the environment and also on the farming practices that may be used in the region. At a regional level, greater collaboration between Caribbean states is needed, assisted by relevant regional bodies, through partnerships for collaborative research as well as improved mechanisms for sharing of information. It may be possible to pool resources for the Wider Caribbean countries, such that research and long-term monitoring programmes could be funded through a regional agency or body like the CGPC.

- Agro-chemicals are known to accumulate in the environment and to have detrimental effects on human health and the environment.
- There is a lack of knowledge about the chronic and acute effects of agro-chemical use on people, including occupational exposure, environmental pollution and food contamination. Both new research and a compilation of existing studies are required to inform public health programmes.
- There is insufficient monitoring and research throughout the Wider Caribbean into the fate of agro-chemicals in the environment. Long-term environmental monitoring programmes and targeted research activities, including bioaccumulation and toxic effects of agro-chemicals in the environment, should be established.

Public health monitoring

In relation to requirements for public health standards within national legislation, the specifications of a monitoring plan for acute and chronic effects of agro-chemicals on human health need to be developed. It is noted that Jamaica has a health reporting system that could form the basis of a monitoring plan. This system could be discussed at CGPC and, if appropriate, promoted by them to other Caribbean Ministries of Health. Otherwise, this can be achieved by means of a project undertaken at a regional level by an appropriate institution (e.g. CEHI) and recommendations communicated to Ministries of Health through project reports, policy briefs, workshops, etc. This will inform national public health monitoring plans and avoid duplication of effort. At the same time, this project should also evaluate regional and national capacities for public health monitoring and analysis in order to determine what levels of analytical capacity are required at a national level, and what can be shared at a regional level. Sustainable financing mechanisms should be explored (see Section 2.6).

The CGPC should immediately commission a report to investigate acceptable maximum residue limits (MRLs) based on existing standards (e.g. Food and Agriculture Organization (FAO)/ World Health Organization (WHO) Codex Alimentarius and PAHO standards) that could be applied throughout the Wider Caribbean. This report should be delivered to the CGPC and recommendations should subsequently be promoted by PCBs to their Governments for adoption by national Bureaux of Standards. This report should also highlight areas where MRLs are lacking and indicate priorities for targeted research to develop locally relevant

MRLs. The CGPC should identify sources of funding (including the private sector) and develop project proposals for appropriate organisations to implement research priorities. Once MRLs are established, the CGPC/PCBs should inform importing countries, trading partners, consumers, supermarkets and agro-processors of the locally applied standards via consultations, brochures and the media.

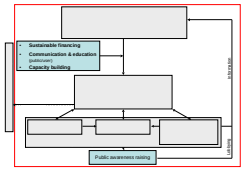
Environmental monitoring

A technical working group should be established to develop a National Plan of Action (NPA) for the amelioration of agro-chemical pollution (as detailed under Annexe IV of the LBS Protocol to the Cartagena Convention). This group should include members from a wide variety of stakeholders (Ministry of Agriculture, PCBs, national environmental agencies, etc). One component of the NPA should be a carefully designed long-term environmental monitoring plan. A regional initiative would inform national governments and avoid duplication of effort. This can be achieved through a regional project by an appropriate institution (e.g. CEHI) and recommendations communicated to relevant Ministries through project reports, policy briefs, workshops, etc. At the same time, this project should also evaluate regional and national capacities for environmental monitoring and analysis in order to determine what level of analytical capacity is required at a national level, and what can be shared at a regional level. Sustainable financing mechanisms should be explored (see Section 2.6).

At a regional level, there is a need to establish reference sites and harmonisation of standards for permissible levels of agro-chemicals in the environment. The CGPC should immediately commission a report to investigate acceptable reference conditions and standards. This report should be delivered to the CGPC and recommendations should subsequently be promoted by PCBs to their governments for adoption by national environmental agencies. Furthermore, this report should indicate priorities for targeted research. The CGPC should identify sources of funding (including the private sector) and develop project proposals for appropriate organisations to implement research priorities. Once established, these standards should be incorporated into the NPA.

Research

The CGPC should coordinate the establishment of priorities for targeted research and socio-economic studies (including cost-benefit analyses) in relation to farming practices and the impacts of agro-chemicals on human and environmental health. A project should be commissioned to achieve this (using a similar approach to that described above). The project should develop a comprehensive research strategy indicating priorities and a schedule for implementation. The strategy and prioritised recommendations should also be communicated to national governments and relevant research organisations (e.g. UWI, CARDI) via a report. Funding to implement the strategy, or components thereof, should be sought from international donors, national governments and the private sector. A technical sub-committee, or appointee of the CGPC, should monitor implementation of the research strategy to avoid duplication of effort and periodically review the strategy.



2.6 How to support the system for agro-chemical management

- Limited human and financial resources are the major constraint to the full implementation of national and regional obligations and best-practice codes of conduct for agro-chemical management.
- Sustainable financing mechanisms are required to maintain systems for administration and control of agro-chemicals, to finance environmental and public health monitoring programmes, and, to ensure that communication, training and education programmes are implemented.
- Public awareness raising, training, communication and education of the private sector (including farmers) is vital.
- Within national systems, jurisdiction for all user groups needs to be defined and duplication of effort reduced to rationalise the use of limited resources.

Sustainable Financing

At a national level, Ministries of Finance and Planning should investigate the feasibility of alternative cost-recovery mechanisms for agro-chemical management, to include financing of administration, monitoring, education and public awareness raising. Suggested mechanisms that national governments could immediately implement include: a tax levy on imports, permits and licence fees (with regard to registration, import, manufacture, export, premises, retailers, users and applicators, etc) and penalties for infringements of the legislation.

At a regional level, a complementary study of sustainable financing mechanisms for the administration, monitoring, education and public awareness raising relating to the use of agro-chemicals, will inform national governments about generic alternative funding options. This can be achieved by means of a project undertaken at a regional level by an appropriate institution in collaboration with national Ministries of Finance and Planning who would submit country-specific feasibility studies for compilation and review[5]. Study results and ensuing recommendations should be communicated to Ministries of Finance through written reports, policy briefs, workshops, etc. This information may be incorporated into national financial plans. The Ministries of Finance should be approached through the Ministries that govern the PCBs. The CGPC should coordinate the request for such a project.

At a national level, changes in financial arrangements should be communicated well in advance through the legal Gazette, and other appropriate publications and media.

Communication and Education

There are three areas in which communication and education are important:

- Training (Capacity building) for staff within the system, i.e. administrative staff of the PCB, Port Authority and Customs and Excise officers, Agricultural extension officers, scientists in monitoring and research laboratories, etc;

[5] The experience from Jamaica, which has a financing mechanism for the PCA, will be relevant.

- Training of the private sector involved in agro-chemical use, i.e. manufacturers, distributors, retailers, end users (farmers, pesticide control applicators), etc; and
- Public awareness raising (particularly for children, the most vulnerable group, and for medical professionals).

Training of all staff within the system should be delivered by the PCB. This may be achieved by appointing a training officer to identify, develop and implement training courses and materials for other agencies involved in the system. Agricultural extension officers will require additional training in other aspects not covered through PCBs via existing established mechanisms. Provision should be made to attract adequately trained staff from universities for monitoring and research (see also Capacity Building).

Training of staff within the PCBs (e.g. nominated training officer) in the requirements of implementing common legislation and procedures can be achieved by means of a project undertaken at a regional level by an appropriate institution (e.g. by OECS, CEHI) and implemented through a regional training of trainers workshop. The CGPC should coordinate the request for such a project. Training of staff within PCBs in other important areas of agro-chemical management may also be achieved via participation in relevant international meetings.

Training of users of agro-chemicals (related to good agricultural practice; storage, labelling, sale, use and disposal) should be delivered by a combination of the PCB and agricultural extension services. This may be achieved by appointing a training officer within the PCB and via existing Communication Units within the Ministry of Agriculture to identify, develop and implement training courses and materials for users. Where necessary, communications experts should be engaged to advise training of trainers within the PCB and the agricultural communication unit. Additional media (e.g. bulletins, TV, radio, etc) should be employed by the PCB and Communication Unit to deliver messages to users in an appropriate format suited to the educational standard of the target group.

Training of training staff within the PCBs and extension services in change-management procedures can be achieved by means of a project undertaken at a regional level by an appropriate institution (e.g. by OECS, UWI) and implemented through a regional training of trainers workshop. The CGPC should coordinate the request for such a project.

Improved public awareness of human health and environmental issues related to agro-chemicals should be delivered by a combination of the Ministry of Health, Ministry of Agriculture, PCBs and external agents such as the WHO and the FAO. Their Communications Units and training staff should develop materials in conjunction with the media for widespread communication to the public via TV, radio, newspapers, workshops, exhibitions, posters, etc. Additionally, these groups should work with the Ministry of Education to include these issues in school curricula. Medical professionals should be targeted separately and specific materials developed to inform them. Training of medical staff is appropriate.

Capacity Building

As a matter of national priority, Ministries of Planning should undertake an institutional analysis and evaluation of the capacity and resource needs of PCBs and other relevant executing agencies for agro-chemical management (e.g. extension services, monitoring and research agencies, medical laboratories, etc) to inform relevant Ministries. This would complement and inform the study on sustainable financing mechanisms (see section on financing).

At a regional level, a complementary study of institutional arrangements should compile national reports, and evaluate national and regional capacity and existing initiatives. This will inform governments of what needs to be developed at a national level and where regional capacity exists or needs further development, e.g. where insufficient national capacity exists, regional research and monitoring support could be provided by CEHI or UWI. This can be achieved by means of a project undertaken at a regional level by an appropriate institution in collaboration with national Ministries of Planning who would submit country-specific institutional studies for compilation and review. Study results and ensuing recommendations should be communicated to Ministries of Planning, Health or Agriculture with responsibility for the PCBs, through written reports, policy briefs, workshops, etc. This will further inform national institutional arrangements. The CGPC should coordinate the request for such a project.

To address capacity needs throughout the system governments need to evaluate to what extent activities will be contracted out against being performed 'in-house'. In the case of the latter, provision should be made to attract adequately trained staff from universities by relevant Ministries. Particularly in relation to monitoring and research, contracting out may be a sensible alternative to the development of government-established laboratories. The private sector, including universities, could be funded to undertake research and monitoring on their behalf.

3 LOOKING FOR MORE INFORMATION?

Box 1 Detailed actions on how to implement the strategy for improved agro-chemical management in the Caribbean.

National or regional action required	Implementer	Action	How to communicate and action required
How to implement harmonised agro-chemical management			
National	Legal department	Review, draft and implement pesticides and toxic chemicals act.	Via local technical committee (Board representation?) inform all relevant implementing agencies of obligations. Via Government Information Service inform wider public of changes in legislation.
National	Min. Ag. Or Min. Health	Establish a staffed and equipped PCB with appropriate Board composition. Establish a sustainable financing mechanism for the PCB (see below).	CGPC to develop a policy paper to inform governments of appropriate requirements.
Regional	OECS legal unit	Review and update model legislation.	CGPC to develop policy paper / written communication to OECS outlining recommended additions to the legislation.
National	PCBs; CGPC	National Governments sign and implement relevant international protocols (e.g. PIC, POPs).	PCBs and CGPC to prepare policy statement. PCBs to lobby governments.
Regional	Via project for a local web-host and PCBs	Establish a locally owned and managed database: develop project proposal (i)[6] (MRAG); fund and implement project.	Via CGPC, develop project outputs in a policy brief to inform governments of requirements.
National	PCBs	Fund, support and utilise the regional database.	PCBs to share information via the database.
How to implement GAP and general principles			
National	Government	Establish a national coordinating body to oversee the implementation of GAP / Best-practice Codes of Conduct.	Policy brief prepared by Min. Ag. / Min. of Health/ PCB.
National	GAP co-ordinating body / legal department	Review national legislation in relation to requirements for GAP / best-practice, certification and ensure supporting legislation is in place.	Policy brief produced by co-ordinating body to Min. Legal Affairs or equivalent.
National	Relevant Ministries represented on co-ordinating body	Build capacity of GAP implementing agencies.	Min. Ag. PCBs etc develop training / education / certification programme and implement.
National	Min. Ag. Extension services / PCB	Promote GAP and best-practice codes of conduct (and certification where appropriate) to all agro-chemical 'users'. Test soils to advise appropriate fertiliser use. Raise public awareness.	Min. Ag. (ICENS in Jamaica) test soils – advise farmers. Min. Ag. Communications Unit / PCBs etc develop training / education programme and implement.
National	Min. Ag. Communicat-ions Unit / PCB	Develop locally relevant alternative agricultural practice through research and development projects.	Via Communications Unit, incorporate project outputs into training / education programme.
National	Min. of Planning (Min. Ag., PCB)	Undertake an institutional analysis to ensure that all categories of farmer are covered by mandates of	Min. Planning to prepare report on institutional arrangements and relevant implementing agencies to

[6] Regional projects for coordination through the CGPC have been numbered i–ix. References to those projects are marked, e.g. 'from a regional review project # ii'

National or regional action required	Implementer	Action	How to communicate and action required
		implementing agencies and address any omissions / duplication.	adjust accordingly.
How to inform management decisions			
Public health monitoring			
National	Ministry of Health	Develop a public health monitoring plan for acute and chronic effects of agro-chemicals on human health, and implement. Update the plan following recommendations arising from a regional review project # ii.	Ministry of Health to provide details of existing plans, infrastructure and capacity to regional review project.
Regional	Appropriate body, e.g. CEHI	CGPC to commission a regional project (ii) to develop the specifications of a public health monitoring plan for acute and chronic effects of agro-chemicals on human health. The project should also define what must be done at a national level and what can be achieved at a shared regional institution.	Project team to prepare a report and briefing documents on requirements of a public health monitoring plan for agro-chemicals, and via regional seminar inform relevant national implementing agencies for incorporation of recommendations into national plans.
National	Bureau of Standards, Ministry of Health, PCB, Ministry of Agriculture	Apply locally appropriate MRLs, in the absence of which apply FAO/ WHO Codex Alimentarius. Update and adopt the MRLs following feedback from regional project report # iii.	PCBs / Bureau of Standards to inform importing countries, trading partners, consumers, supermarkets and agro-processors of the locally applied standards via consultations, brochures and the media.
Regional	Appropriate body, e.g. CEHI; UWI, external consultants	CGPC to commission a report (iii) to investigate acceptable MRLs based on existing standards (e.g. FAO /WHO Codex Alimentarius) that could be applied throughout the Wider Caribbean. This report should also highlight areas where MRLs are lacking and indicate priorities for targeted research to develop locally relevant MRLs.	Project team to prepare a report and briefing documents on MRLs, and via regional seminar inform relevant national implementing agencies for incorporation of recommendations into national plans. CGPC members to lobby for implementation.
Environmental monitoring			
National	A wide group of stake-holders: Min Ag, PCBs, national environmental agencies, etc Ensure PCBs within this group.	Establish a technical working group to develop a National Plan of Action for the amelioration of agro-chemical pollution (as detailed under UNEP's LBS Protocol, Annexe IV) to include plans for long-term environmental monitoring – implement. Augment the plan following recommendations from regional project report # iv (see also Report 8 of the current project)	Technical working group to inform Ministry of Legal Affairs to ensure supporting legislation is in place, and to inform all relevant implementing agencies of necessary action.
Regional	Appropriate body, e.g. UWI, CEHI, External consultants / agencies	CGPC to commission a regional project (iv) to: • develop the specifications of a monitoring plan for the effects of agro-chemicals on the environment; • to investigate the feasibility of establishing shared reference sites; • to define harmonisation of standards for permissible	Project team to prepare a report and briefing documents on environmental monitoring, and via regional seminar inform relevant national implementing agencies for incorporation of recommendations into national plans. CGPC members to lobby for implementation.

National or regional action required	Implementer	Action	How to communicate and action required
		levels of agro-chemicals in the environment. The project should also define what must be done at a national level and what can be achieved at a shared regional institution.	
Research			
Regional	Multi-disciplinary project team: scientists, medical practitioners, agronomists, socio-economists, etc via appropriate body	CGPC to commission a project (v) to establish, and develop a schedule of implementation for, a comprehensive research strategy based on prioritised targeted research (to include socio-economic and cost-benefit analyses) in relation to: farming practices, and, the impacts of agro-chemicals on human and environmental health.	Project team / CGPC to communicate the strategy and recommendations to national governments and relevant research organisations (e.g. UWI, CARDI) via a report and prioritised recommendations. Funding to implement the strategy, or components thereof, should be sought from international donors, national governments and the private sector. A technical sub-committee or appointee of the CGPC should monitor implementation of the research strategy to avoid duplication of effort and periodically review the strategy.
How to support the system for agro-chemical management			
Sustainable financing			
National	Ministry of Finance; Ministry of Planning	Investigate the feasibility of alternative cost-recovery mechanisms for agro-chemical management, (administration, monitoring, education and public awareness raising) (e.g: tax levy on imports, permit and licence fees penalties). Implement appropriate cost recovery mechanisms. In due course, update mechanisms based on recommendations of the regional review report # vi.	Communicate changes in financial arrangements well in advance to those affected through the legal Gazette, and other appropriate publications and media. National Governments to provide information on local feasibility studies for review in project # vi.
Regional	Appropriate Financial body	CGPC to commission a regional study (vi) of sustainable financing mechanisms for all aspects of agro-chemical management.	Review team to prepare reports and policy documents, deliver via CGPC members and seminars etc.
Communication and education			
National	PCB	Appoint a training officer within the PCB to identify appropriate training needs throughout the system. Develop appropriate training in house or contract out training services.	***Aimed at staff within all agencies in the system for agro-chemical management.*** PCB training officer to develop and implement training courses and materials.
Regional	Min. of Ag. Communicat-ions Unit of extension services	Train agricultural extension officers in GAP, best practice for aspects not covered through PCBs.	Communications unit to deliver appropriate training to extension staff.
Regional	OECS legal department	CGPC to commission a regional training of trainers workshop (vii) for the requirements of implementing new common legislation arising from OECS.	Project team to deliver training course to PCB training officers and other relevant staff.
Regional	UWI or other appropriate	CGPC to commission a regional training of trainers workshop (vii)	Project team to deliver training course to PCB training officers and

National or regional action required	Implementer	Action	How to communicate and action required
	body	for the requirements of implementing change management procedures	other relevant staff.
National	PCB training officer; Communicat-ion Units in Min. Ag.	Identify and deliver training needs to 'users' of agro-chemicals (ie to include retailers, importers etc) (e.g. GAP, storage, labelling, sale, use and disposal practices)	***Aimed at users of agro-chemicals***. Training staff to develop and implement training courses and materials for all users
National	Government information service; PCB training officer; Communicat-ion Units in Min. Ag.	Develop materials for widespread communication to the public related to all aspects of agro-chemical use and their potential impacts – focus on human health.	***Aimed at public awareness raising***. Deliver via TV, radio, newspapers, workshops, exhibitions, posters, etc. Medical professionals should be targeted separately and specific materials developed to inform them.
National	Min Education Min Ag. PCBs	Define relevant issues relating to agro-chemicals and GAP for inclusion in school curricula. Develop appropriate materials.	Deliver classes to school children.
Capacity building			
National	Min. Planning with relevant ministries, PCBs etc	Undertake an institutional analysis and evaluation of the capacity and resource needs of PCBs and other relevant executing agencies for agro-chemical management. Identify alternatives to the development of government established facilities where appropriate, e.g. fund the private sector, including universities, to undertake research and monitoring. Implement appropriate capacity building	Via a report / information briefs inform authorities of capacity and resource needs. Provide details of national capacity for regional review report (ix)
Regional	Appropriate body, e.g. UWI, external agencies.	For aspects of agro-chemical management that can be covered regionally, e.g. shared analytical capacity, CGPC to commission a regional appraisal (ix) of institutional arrangements: compile national reports, and evaluate national and regional capacity and existing initiatives.	Implement appropriate capacity building at a national and regional level.
Implementing the strategy as a whole			
National	PCB	Develop a prioritised plan of action based on the above, including costed proposals for implementation over time. Seek national and where appropriate, external funding to implement the plan of action.	Deliver plan of action. Policy briefs. Lobby Ministers, Treasury, to seek support for implementation of the plan. Develop appropriate funding proposals directed at external agencies to augment national plans.
Regional	CGPC	Develop a prioritised plan of action based on the above commissioned reports/projects (i-ix) including costed proposals for implement-ation over time. i. Database ii. Public health monitoring iii. MRLs iv. Environmental monitoring v. Research strategy	Appoint CGPC members to develop terms of reference for each project in order to achieve this. Identify sources of funding (including the private sector) and seek tenders to undertake each project. CGPC to request via written communication that OECS update model legislation.

National or regional action required	Implementer	Action	How to communicate and action required
		vi. Cost recovery mechanisms vii. Train trainers – legislation viii. Train trainers – change management xi. Institutional arrangements.	PCB members to inform national governments of CGPC plan of - action. Deliver

Box 2 Complete list of recommendations agreed by CGPC[7]

Harmonised agro-chemical management

Legislation

- ***Model legislation on Pesticides and Toxic Chemicals* should be ratified and adopted throughout the wider Caribbean. This will dictate the administration, use and monitoring of agro-chemicals**
- Legislation concerning public end users of agro-chemicals, and their responsibilities should be considered for incorporation into model legislation
- *The UNEP LBS Protocol*, ANNEX IV Agricultural Non-Point Sources of Pollution, should be widely ratified and adopted throughout the Caribbean
- Requirements under the UNEP LBS Protocol for a national plan of action (NPA) should be developed by each State throughout the wider Caribbean based on model plans currently being developed for Jamaica and St Lucia
- Model plans should incorporate requirements specified under Annex IV for pesticides and fertilisers, IPM / IMPP (as appropriate), and the recommendations of this project. All relevant stakeholders including the PCA/PCB should be consulted in drafting the plan.
- Legal advice is needed in the further development of legislation, its incorporation into national laws, implementation and enforcement.

Administration

- **PCBs must be adequately staffed and financed to administer and implement national legislation relating to agro-chemicals. There should be a dedicated full time staff. The composition of the Board of Directors should include representation from the private sector and persons with experience in ecological issues and the fate of agro-chemicals in the environment.**
- **Administrative procedures should reflect the requirements of the harmonised legislation and be promoted throughout the Wider Caribbean.**
- **A locally owned and managed database should be developed for harmonised administration and information sharing.**
- Harmonised guidelines for pesticide registration should be promoted.
- Harmonised guidelines for certification of pesticide control operators should be promoted.
- More emphasis should be placed on enforcement and adequate provision made for inspectors to undertake this.
- It is recommended that a Prior Informed Consent procedure be adopted to give importing countries the tools and information needed to identify potential hazards and exclude chemicals they cannot manage safely.
- Systems for appropriate selection of chemicals based on their benefits, human and environmental health threats and international agreements should be regionally established and applied. In doubt, a precautionary principle should be applied.
- The need / desirability for common arrangements for licensing, definition of standards, promotion of alternatives to pesticides, and other matters should be explored at a regional level, and prioritised.
- Terms and conditions of licensing should be used as a mechanism to ensure compliance with requirements for packaging, labelling, storage, distribution and disposal.
- The greater regulation of the sale of pesticides to end-users and their responsibilities for them should be explored.

GAP and general principles for agro-chemical management

- **GAP and Best Practice Codes of Conduct for pesticide use need to be implemented, particularly for domestic products not already covered by existing arrangements.**
- Certification schemes for all users of agro-chemicals should be adopted throughout the wider Caribbean. These should include the provision of training in pesticide use and the implementation of health and safety standards, including adequate home storage and disposal.

[7] Top ten recommendations highlighted in bold.

- Public health of consumers should be given priority in national plans for the use of agro-chemicals (e.g. GAPs for domestic and export markets).
- Soil testing is required to determine precise fertiliser requirements.
- Soil conservation techniques, composting and mulching should be promoted
- Explore mechanisms to transfer greater responsibility for stewardship of agro-chemicals to intermediary bodies (industry) e.g. via terms and conditions of licensing
- Within national administrative systems, gaps in jurisdiction over particular user groups need to be addressed (e.g. In Jamaica and St Lucia, medium farms that do not export produce).

Informing management decisions

Public health monitoring

- **Carefully designed public health monitoring plans must be developed. Ensure adequate analytical capacity to enable monitoring for compliance with standards for public health (i.e. medical and food residue monitoring laboratories).**
- **Regionally acceptable (or local) standards for Maximum Residue Limits should be established, in the absence of which the FAO / WHO Codex Alimentarius standards should be applied where possible (harmonisation component).**

Environmental monitoring

- **Carefully designed long-term environmental monitoring plans must be developed (from the farm to the sea).**
- Monitoring and research must be carefully targeted taking account of the toxicity and volume of chemicals used and gaps in knowledge from past research.
- Baseline and reference data need to be established where little data and research exists.
- Monitoring priorities should be adjusted periodically to reflect changes in the knowledge base of the agrochemicals' properties, importation and usage patterns, as well as social conditions
- Evaluate the potential for locally shared reference conditions relating to similar habitats throughout the Caribbean versus the need for locally specific conditions. Compile data on undisturbed and less disturbed habitats to develop a regionally applicable set of reference conditions
- Evaluate the potential for harmonisation of standards (I.e. permissible levels in the environment) throughout the Caribbean. Jointly explore standards appropriate to the local environmental conditions, and establish national / regional standards.

Research and socio-economic studies

Public health

- Particular need for studies on the human health and social impacts of pesticides, due to: occupational exposure; and, contaminated food.
- Additional research is needed to identify whether there may be correlations between pesticide exposure and certain medical conditions such as cancers, infertility and other health effects.

Environmental health

- Conduct more locally relevant (tropical) studies into the transport, fate and persistence (degradation) of agro-chemicals and their break-down products. Studies should include terrestrial (especially soil) and aquatic (including marine) environments, and a range of agricultural areas (low to high impact) and important crops.
- More research into the bioaccumulation of pesticides (up the food chain) and the chronic toxicity of residues to terrestrial and aquatic fauna during different periods of agricultural activity.

Farming practices

- **Socio-economic analyses, including cost-benefit analyses, should be conducted for different farming practices, including options for agro-chemical use (e.g. IPM).**
- **Promote implementation and further research on IPM (IMPP) as a means of improved management of use of pesticides.**

Implementing mechanisms

Sustainable financing

- **Sustainable financing and cost recovery mechanisms must be investigated, and where necessary novel and creative means found, to develop capacity, and to fulfil all the**

functions of the various institutions involved in all aspects of agrochemical management. External sources of funding must be explored and fully utilised.

- Monitoring and research - Governments to provide adequate funding and legislative support for a central regional environmental and public health laboratory and the relevant University departments and state laboratories to monitor agrochemical use

Communication and education

- **Communications experts should be engaged for communication, education and training purposes; change-management concepts should be applied.**
- Raise public awareness of the detrimental effects of agro-chemicals and their persistence in the environment.
- Research bodies must explore better mechanisms for delivering messages from research to key policy and decision-makers.
- Messages on the correct use of agrochemicals and public safety issues must be delivered. This should encompass both targeted training of licence holders and farmers, and wider public awareness raising via locally relevant media including the TV and radio.
- Raise awareness of the benefits of GAPs (for human and environmental health); Provide farmer training in GAPs.
- Training/awareness raising of the public and staff of implementing agencies of the requirements of the legislation is needed.
- Training/awareness raising of Port Authority and Customs and Excise officers is needed in respect of the register of permitted and banned substances.
- Training in the use of a regional database for harmonised registration of agro-chemicals.
- Training and certification of Extension Officers, farmers and pesticide applicators in correct use of equipment.
- Raise awareness of the public and the medical profession of the detrimental lethal and non-lethal effects of pesticides on human health.

Capacity building

- **Undertake an institutional analysis and evaluation of the capacity and resource needs of PCBs and other relevant executing agencies (e.g. extension services, monitoring and research agencies, medical laboratories) throughout the wider Caribbean. Duplication of effort should be rationalised.**
- Investigate what must be covered at a national level and what can be achieved regionally to avoid duplication of effort and cost (e.g. training; communications and promotional material; promotion of harmonised legislation).
- Greater collaboration between Caribbean states is needed, assisted by relevant regional bodies, through a) partnerships for collaborative research; b) improved mechanisms for sharing of information.
- Particular emphasis should be placed on strengthening capacity and resources for implementing appropriate licensing, monitoring and compliance control schemes, and training and education. Additional gaps in capacity to implement the requirements of legislation and codes of conduct in respect of the use of agro-chemicals need to be fully identified throughout the wider Caribbean.
- With regard to a regional database for harmonised registration of agro-chemicals, an assessment of the institutional constraints, and capacity and resource needs is required.

Box 3 Complete list of Project Reports

Report 1: Esteban, N., P. Espeut, B. Hay, C. Mees and S. Seddon-Brown, 2003 Importation, administration and harmonisation of agrochemical management in St Lucia, Jamaica and the wider Caribbean. DFID NRSP Project R7668. C-CAM and MRAG Ltd.

Report 2: Simpson, L., 2003. Review of soil management and farming practices, including the use of agro-chemicals in the Caribbean, with particular reference to St Lucia and Jamaica. DFID NRSP Project R7668. CARDI (Jamaica).

Report 3: Dasgupta, T. and C. Perue, 2003. Toxicity review for agro-chemicals in St Lucia and Jamaica. DFID NRSP Project R7668. Chemistry Department, UWI, Mona.

Report 4: Boodram, N., 2002. The fate of agro-chemicals in the land-water interface, with reference to St Lucia and the wider Caribbean. DFID NRSP Project R7668. CEHI.

Report 5: Edwards, P., 2001. The fate of agro-chemicals in the land-water interface, with reference to Jamaica and the wider Caribbean. DFID NRSP Project R7668. Centre for Marine Studies, UWI, Mona.

Report 6: Lewis, A. and N. Esteban, 2002. Environmental survey of agro-chemicals in the land water interface of St Lucia. DFID NRSP Project R7668. CEHI and MRAG Ltd.

Report 7: Pearce, J., and N. Esteban, 2002. Database review and user requirements analysis prepared for the Coordinating Group of Pesticide Control Boards of the Caribbean. DFID NRSP Project R7668. MRAG Ltd.

Report 8: Esteban, N., C. Mees, and S. Seddon-Brown, 2003. Environmental monitoring options. DFID NRSP Project R7668. MRAG Ltd.

Report 9: Seddon-Brown, S., C. Mees and N. Esteban, 2003. Management options for the use of agro-chemicals in the environment. DFID NRSP Project R7668. MRAG Ltd.

Report 10: Mees, C., N. Esteban and S. Seddon-Brown, 2003. Management of agro-chemicals for improved public and environmental health - A strategy for improved agro-chemical use and management for the Wider Caribbean: DFID NRSP Project R7668. Policy and management strategy document, MRAG Ltd.

Policy Brief 1: Management of agro-chemicals for improved public and environmental health (2003)

Policy and Management Brief 2: The fate of agro-chemicals in the land-water interface in St Lucia and Jamaica: Environmental monitoring (2003)

Policy and Management Brief 3: The quantification and toxicity of agro-chemical imports into St Lucia and Jamaica (2003)

Policy and Management Brief 4: The on farm use of agro-chemicals and associated soil management and farming practices in St Lucia and Jamaica (2003)

Policy and Management Brief 5: Harmonisation of agro-chemical management in the Caribbean (2003)

Policy and Management Brief 6: Management options for the use of agro-chemicals (2003)

Note: All of these reports are available on the MRAG Ltd. Website (http://www.mragltd.com) as downloadable Adobe Acrobat pdf files. Select the land water interface option in the left hand margin and then select the specific project examples. The specific reports for download are under the project title.

Readers interested in the sedimentation component of this study are referred to:

Professor Callum M. Roberts
Environment Department
University of York
York, YO10 5DD
United Kingdom
email: cr10@york.ac.uk

Roberts, C.M., Barker, N.L.H., Gell, F.R.G. Schelten, C.K. and Hawkins, J.P. 2003. Impact and amelioration of sediment pollution on coral reefs of St. Lucia, West Indies. DFID NRSP Project R7668. University of York, York.