Node: Suite Summary[1,2]

Caribbean: Best practice for pollution amelioration

Context

Pollution from agriculture can impact negatively on a broad spectrum of people, especially in regions such as the Caribbean where much of the population lives near to water. Fishers and farmers are among the poorest people in the Caribbean. Their livelihoods are critically dependent on fertile soils and healthy marine ecosystems. Agricultural pollution can raise the costs of agricultural production through soil contamination, phyto-toxicity and pest resistance, threatening poor farmers' livelihoods. It can threaten public health (e.g. residues on food) and it can reduce the competitiveness of food exports by raising concerns about food safety standards. Down-stream, agricultural pollution can undermine fishers' livelihoods and impact on other ecosystem services by degrading sensitive aquatic resources of the coastal zone, particularly coral reefs, thereby endangering tourism amenity value.

Projects within this Suite have researched how agricultural pollution, due to both sedimentation and agro-chemicals, influences coastal waters and the livelihoods based upon them. Case study evidence was collected from St Lucia and Jamaica and complemented by secondary data from diverse literature sources. Subsequent work built on this knowledge by identifying and disseminating options for pollution monitoring and amelioration. This included development of an integrated approach for regional and national scale management of agro-chemicals across the Caribbean region.

Research Topics

- What is known about sediment and agro-chemical pollution from agriculture in the Caribbean?
- How does agricultural pollution influence tropical coastal zone natural resources?
- Where pollution occurs, how can the sources be reduced and the effects ameliorated?
- To what extent can research influence a range of relevant stakeholders within and beyond the two case study countries (St Lucia and Jamaica) to ameliorate agriculture-sourced pollution?

Projects

This Suite consists of three projects (see below for project linkages), R7111 (Review of currently available information on pollution of coastal waters by sediments and agro-chemicals; 1998), R7668 (Impact and amelioration of sediment and agro-chemical pollution in Caribbean coastal waters; 2000-2003) and R8364 (Promoting an holistic approach to agrochemical management in the Caribbean; 2004-2005).

R7111 was initiated in response to widespread concern over the degradation of coastal living resources in the Caribbean, the causes of which were thought to include agricultural

[1] This document summarises NRSP's work in one of its Uptake Promotion Node: suites. For further details and links to project and project documents see http://www.nrsp.org.uk/6.aspx

[2] This document presents research funded by the UK Department for International Development (DFID) for the benefit of developing countries. The views expressed are not necessarily those of DFID.

pollution. The project reviewed available information on the movement of sediments and pollutants of agricultural origin into the coastal zone in the Caribbean and their impacts on coastal resources. Four types of agricultural pollution of the coastal zone were assessed: soil erosion leading to siltation; nutrient enrichment; pesticide contamination; and agro-industrial pollution.

R7668 sought to close some of the knowledge gaps identified in R7111. It used primary and secondary research in St Lucia and Jamaica to evaluate the impacts of land-based sources of pollution on coastal waters. It focused on sedimentation and agro-chemical pollution because these are viewed as two of the most serious threats to the integrity of Caribbean coastal ecosystems. Outputs from R7668 included a strategy for improved use and management of agro-chemicals and for the reduction of sedimentation in the coastal zone.

R8364 promoted uptake of the strategy for improved use and management of agro-chemicals that had been developed by R7668. The four elements of the strategy were:

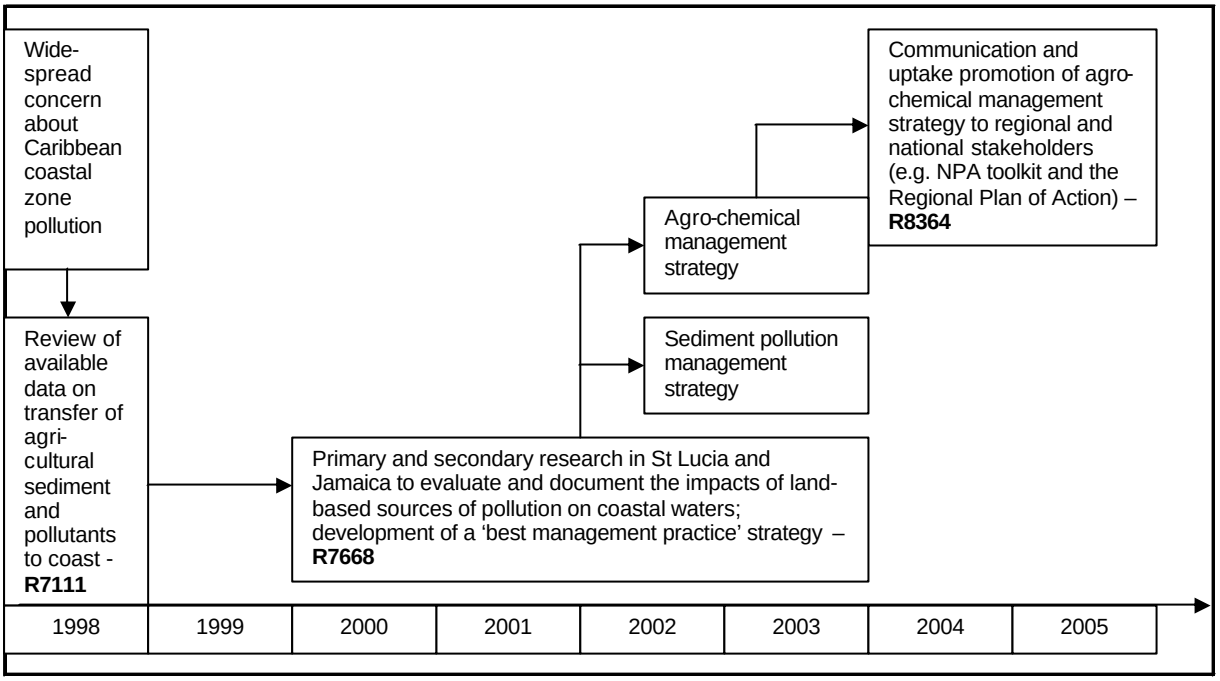
1. Harmonised agro-chemical management across the Caribbean.
2. Good Agricultural Practices (GAPs) e.g. integrated pest control.
3. Environmental and public health monitoring and research.
4. Development of mechanisms to support strategy implementation – sustainable financing, communications and capacity building.

At the regional level the strategy was to harmonise the multiple existing systems employed for agro-chemical management in order to ensure a more efficient system for importers, regulators and farmers. The Co-ordinating Group of Pesticide Control Boards of the Caribbean (CGPC) was responsible for promoting this strategy and in 2004 collaborated to develop a Regional Plan of Action (RPA). This included the specification of priority proposals for: 'Good Agricultural Practices', sustainable financing of the CGPC Strategy, institutional arrangements, a regional database, change management and a research strategy to develop a monitoring programme.

At the national level (where the elements of the strategy needed to be better coordinated) the strategy was promoted within the two case study countries from R7668, St Lucia and Jamaica. In addition, a toolkit for implementing a National Plan of Action (NPA) was designed to aid in the development of improved agro-chemical use and management at the national level in other Caribbean countries. Providing such support to national level action planning was important because these plans were required to implement the regional strategy.

Research products from the research were made available to the wide range of stakeholders at different levels and in accessible and usable formats.

Project links within Caribbean Suite 3: 1998 - 2005



Outputs

Findings

Limited information was found on the flux of nutrient and pollutant loads into near-shore coastal waters. Few studies directly linked pollution cause and impact on coastal living resources.

Agro-chemical pollution

R7111 and R7668 found a lack of research into the fate of agro-chemicals in St Lucia and Jamaica. Records indicated a long-term increase in the quantities of agro-chemicals both imported and manufactured in St Lucia, Jamaica and the wider Caribbean. In the absence of contrary evidence, this suggested that increased use of agro-chemicals could be having a negative impact on coastal zone resources.

A survey of farmers in Jamaica found widespread use of agro-chemicals but limited evidence of consequent environmental damage. Literature sources indicated problems with use of agro-chemicals such as repackaging of chemicals by vendors without labelling and incorrect application. According to secondary sources, pesticide contamination has been detected in river and estuarine shrimp in Jamaica and is believed to potentially have a significant impact on the reproductive health of fish. However, there is a paucity of baseline data on the concentration of nutrients and pesticides in the coastal waters around both St Lucia and Jamaica. A baseline snapshot survey of pesticide levels in the coastal zone of St Lucia did not detect agro-chemicals in any of the samples.

In this context of uncertainty, interventions such as farmer training on 'best management' of agro-chemicals may be justified by application of the precautionary principle. However, interventions that constrain poor farmers' livelihoods and potentially exacerbate poverty

should be avoided where possible. Further research is urgently required to i) understand if, when and where agro-chemicals are being misused and, ii) how any misuse of agro-chemicals impacts on different people and different ecosystems.

Sediment pollution

Evidence from previous studies reviewed in R7668 indicated that, after hurricanes and storms, sediment pollution was the second most important factor causing reef decline with potentially costly consequences for the environment, poor fishers' livelihoods and tourism-related employment opportunities. Sedimentation affects corals both directly, by killing them, and indirectly, by reducing their resilience to other forms of disturbance or stress and by disrupting coral replenishment. In turn, this increases the impacts of storms and tourism damage. But the sources of sediment pollution in the coastal zone are poorly understood.

The economic value of coral reefs to the St Lucian economy was assessed to be substantial. The total value of the fishery was estimated at US$86,000-133,000 in 2000/1. Visitors spent an estimated US$7.3 million on diving and snorkelling tours in 2000, highlighting the importance of good quality coastal living resources for tourism. Research indicates that reefs lost almost 50% of their coral cover between 1995 and 2001. Three per cent of the losses in shallow water and 19% in deeper water were attributed to sedimentation.

A literature review revealed studies indicating severe soil erosion in St Lucia and Jamaica, although estimates of soil erosion are notoriously unreliable. Surveys of farmers' opinions about soil erosion in St Lucia and Jamaica did not provide strong support for the existence of a soil erosion problem on agricultural land. In St Lucia, the study concluded that "soil erosion is not a major problem despite the high rainfall conditions".

Monitoring of sedimentation rates along the coastline of St Lucia revealed correlations with rainfall, indicating a terrestrial origin for much of the sediment input. Yet whether or not soil erosion from agricultural land currently constitutes a significant source of sediment load into coastal zones remains a question open to investigation. More empirical research into soil erosion on agricultural land, other land-based sources of sediment (e.g. construction activities), and the transportation and deposition of eroded sediment downstream is required.

An important observation was that Marine Protected Areas are not able to protect coral reefs from chronic sedimentation, nor from natural impacts such as heavy rain and hurricanes. Therefore, although marine reserves can aid the recovery of fish stocks, they may mask the negative effects of sedimentation and reduce the importance with which sedimentation is perceived as a problem.

Research messages

- There is a lack of research data linking the sources (and extent) of agro-chemical and sediment pollution and its impacts on coastal living resources. However, these pollution processes are difficult to analyse because of their high variability across space and time. This suggests a need for i) integrated studies that quantify the flux of agricultural pollutants into coastal waters and their long-term impacts on coastal resources; and ii) application of the precautionary principle.
- There is a need for more long-term monitoring of coastal natural resources and collection of baseline data.

- Based on current knowledge it is possible to promote uptake of precautionary 'best management practice' recommendations (e.g. harmonised regional agro-chemical management, 'Good Agricultural Practices' such as integrated pest management and environmental monitoring) for ameliorating the pollution risk from agro-chemical use.
- Regional and national promotion efforts are important for gaining ministerial support for a regional strategy. However, lobby workshops are particularly useful for bringing together all the member states and key regional stakeholders for achieving widespread endorsement.
- Coral reefs were estimated to be worth around US$7.4 million to the St Lucian economy in 2000/1, largely due to tourism amenity value. The high economic value of the reefs justifies enhanced protection efforts.
- Marine Protected Areas aid recovery of fish stocks but policy makers should be aware that they can mask the negative impacts of sedimentation.
- Sediment pollution (from multiple sources) is a key cause of coral reef degradation - more action (as well as research) is needed to reduce such pollution.

Key research products

CGPC Documents

- Mees, C., Esteban. N. and Seddon-Brown, S. 2003. CGPC 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.
- Gopaul, H., Howard, C., Isaacs, A. and Mees, C. 2005. Development, implementation and monitoring and evaluation of a NPA for agrochemical management in the Caribbean. NPA Tool-kit Volume 1. Annex I of the Final Technical Report of project R8364.
- Gopaul, H., Howard, C., Isaacs, A. and Mees, C. 2005. Development, implementation and monitoring and evaluation of a NPA for agrochemical management in the Caribbean. NPA Tool-kit Volume 2. Annex I of the Final Technical Report of project R8364.

Final Technical Reports

- British Geological Survey. 1998. Review of pollution of costal waters by sediment and agro-chemicals: issues in watershed management, transfer of agro-pollutants and sediments and their impact in coastal zones. Final Technical Report for project R7111. Newcastle: University of Newcastle and Durham: University of Durham.
- Roberts, C. and Mees, C. 2003. Impact and amelioration of sediment and agro-chemical pollution in Caribbean coastal waters. Final Technical Report for project R7668. York: Environment Department, University of York and London: MRAG Ltd.
- Chin Sue, H. 2005. Promoting an holistic approach to agrochemical management in the Caribbean. Final Technical Report for project R8364. Jamaica: Pesticides Control Authority.

10 project reports

- Report 1: Importation, administration and harmonisation of agrochemical management in St Lucia, Jamaica and the wider Caribbean.
- Report 2: Review of soil management and farming practices, including the use of agro-chemicals in the Caribbean.

- Report 3: Toxicity review for agro-chemicals in St Lucia and Jamaica.
- Report 4: The fate of agro-chemicals in the land-water interface, with reference to St Lucia and the wider Caribbean.
- Report 5: The fate of agro-chemicals in the land-water interface, with reference to Jamaica and the wider Caribbean.
- Report 6: Environmental survey of agro-chemicals in the land-water interface of St Lucia.
- Report 7: Database review and user requirements analysis prepared for the Coordinating Group of Pesticide Control Boards of the Caribbean.
- Report 8: Environmental monitoring options.
- Report 9: Management options for the use of agro-chemicals in the environment.
- Report 10: Policy and management strategy document. Management of agro-chemicals for improved public and environmental health - a strategy for improved agrochemical use and management for the wider Caribbean.

6 Agro-chemical Pollution Information Briefs

- Brief 1: Management of agro-chemicals for improved public and environmental health.
- Brief 2: The fate of agro-chemicals in the land-water interface in St Lucia and Jamaica: Environmental monitoring.
- Brief 3: The quantification and toxicity of agro-chemical imports into St Lucia and Jamaica.
- Brief 4: The on farm use of agro-chemicals and associated soil management and farming practices in St Lucia and Jamaica.
- Brief 5: Harmonisation of agro-chemical management in the Caribbean.
- Brief 6: Management options for the use of agro-chemicals.

Impacts

- The recommendations and strategy on ameliorating agro-chemical pollution were endorsed and adopted by the CGPC in June 2003.
- The agro-chemical strategy was an agenda item of the CGPC annual meeting in 2004, leading to development of the Regional Plan of Action (RPA) for agro-chemical management.
- At the time of writing (December 2005) promotion of the strategy for agro-chemical management is being coordinated regionally through the CGPC and it is envisaged that the recommendations will be integrated into national plans to satisfy the requirements of the Land Based Sources (LBS) Protocol to the Cartagena Convention.
- As a result of promotion activities and seeking additional resources to improve agrochemicals management, UNEP Chemicals sponsored two sub-regional workshops in Jamaica and Trinidad.
- At a national scale, Jamaica has started developing a National Plan of Action for improved agro-chemical management; St Lucia has begun discussions and set up a board; and St Vincent and St Kitts have also adopted recommendations from the strategy.
- Ministers of all 15 CARICOM member states were sensitised to the strategy, and ministers endorsed it during the May 2005 Council for Trade and Economic Development (COTED) meeting.

Further work

Further promotion of the products from this Suite, especially of the NPA toolkit, is required to maintain momentum for their implementation and monitoring at local, regional and national levels. However, lack of knowledge of pollution sources and their dynamics remains a fundamental problem for more effective and targeted action. The research required includes i) integrated studies which quantify the flux of agricultural pollutants into coastal waters and determine their long-term impacts on coastal resources; ii) baseline studies of freshwater and coastal water quality and on-reef sedimentation rates throughout the Caribbean region, followed by establishment of a long-term monitoring system.