

# **Integrated Assessment of Trade-Related Policies and Biological Diversity in the Agricultural Sector in Mauritius**

## **A Case Study on the Sugar Industry**

### **Summary**

#### **1 Introduction**

The integrated assessment (IA) in Mauritius focused on the impact of Mauritius's Multi-Annual Adaptation Strategy (MAAS) 2006-2015, on economic, social and environmental sustainability in the sugar sector, with an emphasis on biodiversity and ecosystem services. The island's agricultural sector is dominated by the production of sugar cane for export. The MAAS was put in place by the Government of Mauritius in response to challenges facing the country's sugar sector as a result of changes in international trade policies and agreements. In particular, the MAAS responds to reforms under the European Union's Sugar Protocol whereby Mauritius, along with other Africa, Caribbean and Pacific (ACP) countries, loses longstanding and generous trade preferences associated with sugar exports to the EU. Through the MAAS the Government of Mauritius sought to develop an accelerated restructuring programme for the sugar sector.

The production of sugar cane in Mauritius is closely linked to sustainability. Sugar cane production uses roughly 85 per cent of all agricultural land and the industry employs over half of all agricultural workers. While its absolute importance has declined in recent years (as the production of food crops has increased), it remains the most important agricultural crop in Mauritius from an economic, social and land-use perspective. It is therefore appropriate that sugar cane be the subject of the IA, which examines the major components of sustainability: economic, social and environmental.

Given the relationship between land use and sugar cane, a focus on biodiversity related impacts in this IA is also relevant. Mauritius is a small island yet boasts very high levels endemism and a rich diversity of terrestrial and aquatic species. This biodiversity provides a range of valuable ecosystem services and supports the tourism sector, which is vital for the country's economy. However, over time, levels of diversity have been altered by human activities and close to half of the original known endemic land vertebrates are now extinct. Of the 23 species that remain, several are critically endangered. Mauritius has been classified by the International Union for the Conservation of Nature as a Centre of Plant Diversity, but is also ranked third in the world for number of threatened plant species.

There are several threats to the rich biodiversity in Mauritius. These include threats from invasive alien species, limited stocks of freshwater, land degradation, damaging human activity and climate change. Deforestation has also been a significant cause of declining species diversity and native forests now cover less than two per cent of the island. Moreover, the focus of modern agriculture on relatively few crop species and the strong

reliance on inputs, such as chemical fertilizers and pesticides and high-yielding crop varieties, has led to a decline in the gradual loss in the genetic diversity of several crop species.

## **2 The context of the integrated assessment**

### **2.1 The sugar industry in Mauritius and international trade**

Agriculture has traditionally been the backbone of the Mauritian economy, and it is dominated by sugar cane production. Overall, sugar production accounts for roughly half of all agricultural activity, 62 per cent of agricultural exports, and contributes around 25 per cent of Mauritius's export earnings. Sugar cane also supplies around 20 per cent of the island's energy needs through the production of electricity from bagasse.

Traditionally, much of the sugar cane production in Mauritius has been exported to the EU under the preferential terms of the ACP-EU Sugar Protocol. The Sugar Protocol, which has been in place for several decades, offered ACP sugar-producing countries preferred access to the EU market, with annual quotas and guaranteed prices. These prices were well above international prices for sugar on the open market. As part of the transition to the new regime defined by the Economic Partnership Agreements (EPAs), ACP countries experienced a decline in their guaranteed minimum price for sugar to the EU. Over four years to 2009, the price fell by 36 per cent, and ACP producers now face competition from other ACP countries as well as Least Developed Countries (LDCs) and non-ACP countries for access to the EU market. The Sugar Protocol came to an end on 1 October 2009.

At 507 000 tonnes, Mauritius enjoyed the largest quota under the Sugar Protocol. Sugar exports to the EU alone contributed annual net foreign exchange earnings of €216 million, or 17 per cent of the country's foreign exchange earnings, and contributed up to 4.5 per cent of gross domestic product. Mauritius will therefore be among the countries most affected by the falling price paid for sugar by the EU. A loss of €895 million is expected over the nine-year period during which the new sugar regime will be implemented. The losses associated with the new regime are expected to have a significant impact on Mauritius, particularly given that the revenue that had been procured from the Sugar Protocol was important for stimulating economic development, promoting diversification and supporting services throughout the country. It is likely that the economy will go through structural change as the agricultural sector moves away from its almost exclusive dependence on sugar and becomes more diversified.

### **2.2 Developments in the sugar industry in Mauritius 2006-2015**

Mauritius produces sugar cane on roughly 72 000 hectares. Land under cane production is expected drop to around 63 000 hectares in the future as a result of conversion of agricultural land to non-agricultural use (by the corporate sector, large- and medium-sized growers, the Sugar Investment Trust and the State Land Development Company). Small growers (those owning less than one hectare) can convert their agricultural land to

non-agricultural use without paying land conversion tax if the land is situated in areas where such conversion is permitted. It is expected that production will be either abandoned or shift to other land use in marginal and economically and environmentally sensitive areas.

The drop in land area under cultivation is expected to lead to a reduction in cane production from 5.2 to 4.75 million tonnes. Nevertheless, sugar production is expected to reach 520 000 tonnes as a result of increasing yields. Increasing yields will result from increased access to irrigation and improved growing practices, the use of high-yielding varieties and/or ones with higher sucrose content (although gains in this regard could be mitigated by losses resulting from the more extensive use of mechanical harvesting), and by increased cane and sugar yields for small growers that have regrouped to take advantage of economies of scale.

The seven countries that supply raw sugar to the EU that have been found to be more competitive than Mauritius have the capacity to supply over 3.5 million tonnes. This is equal to the volume cap in the “double-trigger” safeguard mechanism, which means that Mauritian exports to the EU are potentially at risk under the new trading regime. However, Mauritius has an advantage over other ACP and LDC producers with respect to white sugar for direct consumption, taking into account food standards and just-in-time delivery.

In the future, therefore, the Government of Mauritius should promote the export of white sugar. At present, levels of white sugar produced in Mauritius that comply with EU food standards are low. However, studies show that white sugar could be produced and exported. One Mauritian company has already made plans to upgrade its existing white sugar production for the EU market. From 2009-2010, three companies are expected to export roughly 300 000 to 350 000 tonnes of white sugar annually. In addition to meeting the EU standards (Grade II), these companies must adhere to strict just-in-time delivery schedules.

### **2.3 The Multi-Annual Adaptation Strategy 2006-2015**

The MAAS is the Government of Mauritius’s response to the changes in the Sugar Protocol, to aid in the adaptation process and take advantage of the package of “accompanying measures” offered by the EU to ease the transition to the new trading regime. It seeks to protect the long-term viability and sustainability of the sugar industry and ensure that it can continue to make an important economic and social contribution to Mauritius.

There are several elements associated with the MAAS designed to help the industry and its workers adapt to the new trading reality and safeguard a future for the sector. Key among these are a focus on ways to (i) reduce costs of production (through factory closures, centralization, and restructuring of the workforce), (ii) generate additional revenue (such as through increasing value added), (iii) efficiently use by-products (such as for producing renewable energy) and (iv) contribute to poverty alleviation (by

establishing voluntary retirement and re-training programmes). These features are included in an Action Plan that contains the following specific elements:

- regrouping small growers (this involves 12 000 hectares of land with yields increasing by 20 per cent and costs decreasing by 20 per cent);
- providing irrigation to over 7 000 hectares of land;
- a voluntary retirement scheme (VRS) involving the voluntary termination of contracts of employment by roughly 7 200 employees;
- the closure of seven factories;
- the commissioning of five 42 megawatt/82 bar and one 35 MW/82 bar bagasse and coal power plants;
- the commissioning of two ethanol distilleries; and
- the development and implementation of an ambitious research programme to develop and release for commercial cultivation high-sucrose and high-fibre content sugar cane to improve both sugar and energy production.

By pursuing these policies, the Government hopes to transform the sugar industry into an industry that moves away from producing raw sugar towards producing several types of sugar (raw, special, industrial and white), and also produces electricity from bagasse and ethanol from molasses. Once implemented, the policy should result in higher-value products, sufficient production to meet all of Mauritius's trade commitments, and reduced dependence on imported fossil fuels by increasing the contribution from sugar cane to national electricity production and increasing the production of ethanol. Among cultivated crops, sugar cane is one of the most efficient converters of solar energy into renewable biomass. Looking to the future, sugar cane has the potential to be transformed into several associated high-value-added products including proteins, pharmaceuticals, vaccines, polymers and textiles.

A related policy focuses on the regrouping of small farmers. Known as the Field Operations Regrouping and Irrigation Projects (FORIP), it targets small- and medium-sized growers and seeks to promote mechanization and, through land re-grouping, create larger plots to help growers take advantage of economies of scale. This would minimize the risk of moving out of sugar cane production. The FORIP will allow capacity building and ease adoption of good management practices (GMP).

By 2015, following the implementation of the Action Plan, it is expected that sugar production in Mauritius would stabilize at a level of around 520 000 tonnes grown on 63 000 hectares. Roughly 20 per cent of this would come from "regrouped" small farmers. Production at this level would be sufficient to ensure that Mauritius continues to export sugar to the EU. By this time, it is expected that the cost of production would have been reduced significantly, enabling Mauritius to compete in the EU market with ACP, LDC and EU sugar and iso-glucose producers.

### **3 The integrated assessment**

#### **3.1 The process**

The Mauritius country study was undertaken between April 2007 and November 2008. It was undertaken by the Ministry of Agro-Industry, Food Production and Security (MAIFPS) and was implemented by the Agricultural Research and Extension Unit (AREU). Several partners were involved in the IA from within the MAIFPS, from other government departments, and from outside government. Project implementation (including research and organizing workshops and stakeholder meetings) was the primary responsibility of the core team, composed of representatives from MAIFPS and AREU. A National Steering Committee made up of representatives from relevant government ministries and services was responsible for developing and monitoring the implementation of the IA and a Technical Committee managed operations and field activities.

The IA was launched at a workshop on 23 April 2007. During the course of the project several meetings and workshops were held, including a capacity building workshop, brainstorming sessions, focus group meetings, and national stakeholder workshops. In addition, the core team attended three international review meetings, which were organized by UNEP and held in Geneva. The IA relied heavily on data generated during the national meetings and workshops, along with data from relevant national reports and statistics, documentation on the UN Convention on Biological Diversity, the EPA, the European Community Trade Desk, UNEP, and local government publications.

### **3.2 Methodology**

The IA employed the methodology described in the Policy Assessment Manual on Trade, Agriculture and Biodiversity, developed by UNEP in collaboration with the World Conservation Monitoring Centre and the Secretariat of the Convention on Biological Diversity.<sup>1</sup> The methodology included a thorough literature review, a field survey and focus groups, scenario building, root cause analysis and risk assessment. The IA focused on both small farmers and on large corporations.

A conceptual framework was developed identifying the inter-relationships among the drivers of change (the EU sugar reform and the MAAS), agricultural activities and land use (through diversification and agro-forestry, abandonment, or infrastructure development). It also identified related impacts on agricultural biodiversity, ecosystem services, food security and the well-being of farmers.

The framework helped to develop a common understanding among stakeholders on the complex relationships between the sugar industry and sustainability, biodiversity and ecosystem services. It also helped to highlight the vital role that the sugar industry plays in Mauritius with respect to providing social services (such as housing and health care) to rural communities and important environmental services. For example, sugar cane is the most efficient sequester of carbon of all cultivated crops. However, cane cultivation and

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<sup>1</sup> The IA was developed using the draft manual (June 2007) with the working title “Incorporating Biodiversity into Integrated Assessment of Trade Policies in the Agriculture Sector.”

sugar production are also associated, *inter alia*, with poor air quality, waste disposal challenges and negative impacts on water quality as a result of effluents, which affect aquatic biodiversity.

The IA adopted a process that consisted of the following four analytical steps:

- identifying the relevant economic, social and environmental issues as drivers of change to develop indicators;
- determining the baseline for the IA;
- identifying and developing policy options (scenarios); and
- conducting the analysis and discussing results.

Key indicators selected for consideration by the core team included the following:

- the increase in use of pesticides in crops other than sugar cane;
- the loss of beneficial insects associated with host plants present on rock piles in sugar cane fields;
- the impact of diversification on number of cases of pesticide poisoning (health and livelihood of population around the fields); and
- the contribution to cultural heritage and landscape for ecotourism.

### 3.3 Specific focus of the integrated assessment

The IA focused on the following two options for the future of the sugar sector in Mauritius:

- 1) **Sustaining sugar cane production under current conditions taking into account policies contained in the MAAS.** These policies included: intensification, increasing value-added, optimizing the use of by-products to restructure and sustain the sugar sector on suitable land, increasing the production of direct-consumption sugar, centralization and factory closures, reorganization in the labour market, implementing the FORIPs, and increasing the use of by-products through increased electricity and ethanol production.
- 2) **Moving out of sugar cane production in marginal areas where cultivation is not profitable.** Three different scenarios were examined to assess the likely impact of changes in land use. These scenarios were (a) abandonment, (b) conversion from sugar cane to other agricultural uses (such as food crops, livestock or agro-forestry), and (c) conversion of land to non-agricultural uses (such as integrated resort schemes and residential and infrastructure projects).

### 3.4 Findings

#### 3.4.1 Impacts of the policies in the MAAS

Faced with the current changes in trade policies and the subsequent development of the MAAS, the IA identified several impacts on the environment and on biodiversity. Overall, from an environmental perspective, the IA showed that the implementation of

the MAAS Action Plan will help preserve the benefits already associated with the sugar industry and, through its activities, would add additional positive impacts. For example, re-grouping of land under the field operations would provide an opportunity for improved soil and water conservation practices to be introduced more widely among small growers. The closure of older polluting factories during centralization and the introduction of clean technologies and processes at the remaining factories would help reduce negative the environmental impacts of the milling sector. Environmental benefits would arise from improved stack emission controls within the power generation sector and the increased use of renewable fuels, such as bagasse (assuming sufficient bagasse is burnt to offset the carbon dioxide emissions from increased use of coal in co-firing). Global environmental benefits could arise from the local production of ethanol as a fuel substitute. Finally, the maintenance of production in marginal areas would help control the risk of soil erosion in upland areas.

The sugar industry has traditionally contributed significantly to social development and welfare in Mauritius through its role as a service provider to rural communities. Despite the planned closure of seven sugar mills over the next 10 years, implementation of the 'Blue Print' for centralization will ensure that essential services, such as housing, healthcare, education and training, recreational facilities and financial assistance, are still provided for three to five years following the closures. The relatively generous cash and in-kind compensation offered to workers as part of the VRS will contribute to the financial security of rural communities. The provision of land is also valuable. It provides a means to grow subsistence crops and/or to build a house. Land is also an asset that can be handed down to future generations.

The closure of mills will result in a reduced workforce, but seasonal employment will continue, and training is available to acquire skills in other fields. The sugar industry has mechanisms to ensure that the benefits in the sector are distributed among workers and their dependents. These mechanisms include the Sugar Investment Trust and involve support to the institutions and organizations associated with the sector and its workers.

Finally, the re-grouping of farmers proposed under FORIP, centralization, and maintenance of production in marginal areas, will provide significant social benefits to small farmers by increasing cost efficiency and lowering the risk of investment. It provides an opportunity for intensification of production and increased returns, while encouraging community cohesion and capacity building.

Overall, implementing several of the policies associated with the MAAS (including a movement to higher value-added production, such a direct-consumption sugar) would require investment and upgrading. These policies could maintain the competitiveness of the Mauritian sugar industry by reducing the costs of production and improving yields and revenues. The overall impacts of factory closures and centralization will depend on the effectiveness of the social programmes under the MAAS for early retirement and retraining. They could have a positive impact on the environment as a result of the elimination of discharges into water and emissions into the air from older and less efficient factories. Investment in the remaining factories could increase efficiency and

help to finance the modernization of equipment. Movement towards increasing ethanol production could have positive impacts in some areas allowing the industry to fully capture value added, providing consumers with cheaper energy, and eliminating the negative impact on air quality of burning fossil fuels. On the other hand, sub-sectors in the industry, such as molasses production, could suffer.

From a social perspective, there would be pressure on the programmes under the MAAS, such as the voluntary early retirement scheme, and re-training programmes, to avoid increasing poverty and transform the workforce to take on more skilled positions. There are likely to be negative impacts on rural communities, and a loss of around 40 000 jobs. The regrouping of small-scale sugar cane planters into larger blocks that are mechanized and planted with only one sugar cane variety would destroy the habitat of many natural enemies and predators and reduce crop biodiversity.

With respect to the environment and biodiversity, any conversion of marginal lands to food crop production could increase soil manipulation and the use of agrochemicals. These changes in agricultural practices would increase the risk of soil erosion and water pollution with negative impacts on aquatic biodiversity in the neighbouring lagoons and rivers. Similarly, the conversion of sugar cane land to integrated resorts with golf courses would have detrimental impacts on the environment and biodiversity due to the heavy use of agrochemicals.

### **3.4.2 Moving out of sugar cane production on marginal lands**

With respect to the second line of assessment, the results of the IA showed that all three alternative scenarios posed challenges and opportunities for biodiversity and sustainability.

- **Abandonment** presents sustainability challenges in the short term from an economic, social and environmental perspective. These result, *inter alia*, from the loss of raw materials for ethanol and electricity production, potentially accelerated soil erosion and the risk of invasive species. These impacts could also have negative effects on rural communities. However, there could be a gain for biodiversity over the long term through increasing plant and animal diversity.
- **Conversion to other agricultural uses** would involve additional investment and training and could lead to a higher demand for pesticides (with negative impacts on land and water). On the other hand, production of food crops and livestock could help meet local demand for food.
- **Conversion to non-agricultural uses** could bring about higher economic returns and foreign investment as well as benefits for rural communities. But development would have to be consistent with the results of an environmental assessment to ensure the conservation of biodiversity and prevent further degradation of the land and water resources.

## 4 Policy recommendations

The policy recommendations developed in the IA were presented to guarantee the sustainability of the sugar industry and to enhance the conservation and sustainable use of biodiversity in the agricultural sector in Mauritius. The major challenge facing the sugar industry is its need to diversify to value-added sugar and export direct consumption sugar. To successfully overcome this challenge, the industry must adopt modern technology and build capacity among growers to comply with existing standards. These standards should be effectively enforced with respect to the quality of cane supplied to the factories. The existing laboratories should be upgraded to provide reliable accreditation services.

The findings of the IA have been useful to create awareness of likely impacts of trade policies on local biodiversity and natural resources. In this respect, the study found that Mauritius should develop an inventory of local agro-biodiversity and undertake capacity building in valuation techniques to assess the benefits to ecosystem services of this biodiversity.

The IA contains the following specific recommendations:

- Shift from export of raw sugar to refined direct-consumption sugar (EEC Grade II).
- Accelerate the adoption of good management practices.
- Expand research on good management practices.
- Increase capacity building with respect to extension services and the dissemination of knowledge about good management practices.
- Develop incentives to encourage environmentally sustainable food crops and fruit production systems.
- Support small farmers in marginal areas in the case of abandonment of sugar cane production to prevent land degradation.
- Reward efforts to promote sustainability.
- Regulate the movement of goods that are harmful to local biodiversity.
- Establish incentives to further encourage small farmers to re-group under FORIP.
- Develop awareness-raising activities for the public.
- Integrate strategies for the sustainable use and conservation of biodiversity into relevant sectoral or cross-sectoral plans, programmes and policies.
- Promote partnerships among stakeholders to enhance capacity to manage agricultural biodiversity.
- Undertake capacity building in biodiversity valuation techniques.
- Undertake an inventory of existing agricultural biodiversity.
- Compensate farmers conserving local species.
- Respect conditions for investment related to environmental protection and biodiversity conservation.

The IA suggests that these recommendations be viewed as a beginning. Any changes should be closely monitored to identify actions that should be taken in the future. The

recommendations from this IA contributed to the development and implementation of an integrated national policy action plan that seeks to balance national sustainability priorities and goals related to trade.

As a final exercise, the core project team identified the key challenges and successes facing the IA in Mauritius. It noted that the application of the IA methodology was challenging for several stakeholders. It was difficult for the core team to include sophisticated tools for assessment, such as valuation techniques, multi-criteria analysis, or root-cause analysis due to the lack of readily available baseline data, expertise, and time constraints. However, the team concluded that the IA had helped build institutional and human capacity related to IA methodologies, project management, and inter-institutional cooperation. It provided the institutions involved with a better understanding of the linkages between trade policy and biodiversity. The project was considered particularly useful for policy makers seeking to highlight biodiversity in the context of the economic, environmental and social dimensions of future policies.