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for a living planet

WWF Action for Sustainable Sugar making it sweeter for nature



Environmental Impacts of Sugar



More than 145 million tonnes of sugar (sucrose) is produced per year in about 120 countries. To assess the effect of sugar production on the environment, CABI Bioscience, in partnership with WWF, undertook a review of the environmental impacts of sugar cultivation and processing. The main impacts identified are summarised below.

HABITAT LOSS

Historically, substantial areas have been cleared for cane cultivation, leading to the loss of habitats including rain forest, thorn forest and savannah. While the rate of habitat destruction has slowed in recent years, the area under cultivation has is still expanding. The area assigned to cane in Queensland, Australia rose by over 40 percent between 1989 and 1998 contributing to the loss of approximately 60-80 percent of coastal freshwater wetlands. Growing global demand is expected to lead to a further expansion of the area for growing sugar.

WATER SCARCITY

The world is facing a growing water crisis and agriculture is by far the biggest water user taking 70 percent of withdrawals on average; more in many dry countries. Sugar cane is a deep-rooted, water intensive crop which remains in the soil all year round using some 7,000-45,000 litres of water per hectare of crop grown. Even in areas where sugar cane is fed by rainfall, the crop affects river flow by intercepting run-off from the catchment and drawing heavily on underground water supplies.

The construction of dams and irrigation systems in Pakistan over the last 60 years has compromised the existence of the endangered Blind River Dolphin, which was found throughout the Indus and its tributaries 100 years ago but now exists in just six totally isolated sub-populations.

The development of intensive irrigation systems has also led to water wastage; in many cases only 30-35 percent of the water withdrawn for farming reaches the crop and the rest is lost from irrigation channels and fields.

WATER POLLUTION

High water use is generally associated with significant runoff of polluted water. In some areas 70 percent of fertilisers applied are lost from farmland, undermining farmers' profits and harming ecosystems. In beet studies across Europe only 8-44 percent of fertiliser applied was used by the crop.

Cane and beet processing also results in polluted effluent. When sugar mills are cleaned annually a tremendous amount of organic matter is released, usually straight into nearby streams. This reduces oxygen levels in the water, killing freshwater biodiversity; in 1995 sugar mill cleaning in Bolivia resulted in the death of millions of fish in local rivers.

Alcohol production from cane or beet results in the by-product 'vinasse', which is routinely dumped into rivers: 13 litres of vinasse are produced per litre of alcohol.

DEGRADED SOILS

Estimates of soil losses due to wind erosion under sugar beet range from 5-18 tonnes per hectare per year in the USA. In cane growing areas, steep slopes are often planted, resulting in soil loss due to the intense rainfall that many tropical areas receive. Soil losses during harvest are also a cause for concern; ten percent of the total beet harvest and 3-5 percent of the cane harvest is soil (tare).

AIR POLLUTION

Most sugarcane mills burn bagasse (fibrous waste produced during milling) as fuel. While bagasse is a renewable energy source, if pollution control equipment is not installed fly ash in the atmosphere can impact on nearby communities. Burning of cane prior to harvest also causes air pollution, increases soil erosion and reduces cane quality by reducing sucrose content by up to five percent.



Social Impacts of Sugar

The sugar sector contributes towards social development by producing employment for many as well as providing primary schools and clinics in many poor areas. Nevertheless, there are a range of negative social issues associated with sugar production that undermine the sustainability of its production, particularly in developing countries.

LOW PRICES AND DEVELOPMENT OUTCOMES

Sugar production plays a key role in the economies and employment of a number of developing countries. However production and export subsidies provided to sugar farmers by the EU and the US Government have been singled out for criticism (and campaigns) by a range of development organisations because farmers in poor countries cannot compete. Where production is predominantly small-scale, producers are particularly at risk of disruption to their livelihoods.

POOR WORKING CONDITIONS

Jobs in cane production, are among the most hazardous in the agricultural industry. In some cases cane cultivation wages do not provide enough food to cover the calories burned on the job. In northeast Brazil sugarcane workers have the lowest life expectancy of any group and their children the highest infant mortality rate.

CHILD LABOUR AND INDENTURED LABOUR

According to the International Labour Organisation and the Central Bureau of Statistics there are 1.9 million child labourers in Western Kenya but the number of child labourers could be as high as five million. Child and bonded labour is also reported to be a significant issue in the Dominican Republic, Maharashtra (India) and in El Salvador.



WATER SCARCITY

Water use for sugar cultivation reduces availability for social needs in water-scarce countries. By 2025 40 percent of the world's people will face a chronic water shortage. In the Maharashtra province of India sugarcane is grown on just four percent of the cultivated area but consumes about 50 percent of the state irrigation supply. Women in surrounding villages walk up to 15km to collect water for drinking, cooking and hygiene.

Reduced flow into the Indus Delta as a result of abstraction for irrigation, coupled with drought, has compromised the health of the mangrove forest leading to a decline in fish and shrimp which contribute to the livelihoods of many. About 80 percent of the five million people who once earned a living from fishing or river boat work in the Sindh Province have now left – most in search of work in Pakistan's biggest city, Karachi.



Better Management Practices

Sustainability does not necessarily mean reduced productivity and profits. Measures introduced to reduce environmental impacts can deliver economic benefits to farmers and to mills. This provides an opportunity to reconcile the needs of environment and people with the long-term development of the sugar industry.

Better Management Practices (BMPs) do just this, addressing environmental concerns such as water overuse and pollution and economic considerations such as crop yield and maintenance of long-term soil health. There are locally-adapted BMPs in use or development that reduce the environmental and social impacts of sugar growing and processing.



FARM LEVEL

Irrigation efficiency can be greatly improved resulting in decreased water use, increased yields and reduced problems such as water-logging and soil salinisation. At least 30-40 percent of the water used for sugar cultivation could be saved by applying irrigation solutions such as skip-furrow irrigation, or over 50 percent with drip irrigation. With drip irrigation, fertiliser use can also be decreased dramatically, reducing input costs and decreasing polluted run-off.

On-farm biodiversity can be conserved through the maintenance of natural buffers, such as wildlife corridors and riparian zones. These are often marginal areas for farming and help conserve water and prevent soil loss. Riparian zones also act as biofilters, trapping and removing nutrients so they do not run into river systems. Farm planning models have been established for this purpose.

Trash mulching is where cane is not burned prior to harvest and the leaves are cut from the plant and left on the soil. This provides various benefits, such as improving the organic content of the soil, preventing evaporation and reducing soil erosion.

Other BMPs which help the farmer as well as the environment include:

- planting of drought-tolerant varieties;
- minimum tillage to prevent soil compaction;
- the use of certain mill by-products;
- creating contours in cane cultivation to prevent soil erosion; and
- planting barriers in beet fields to reduce wind erosion.



MILL LEVEL

Closed-cycle milling, meaning that no water is taken into the mill, is already practiced in some countries. Zero pollution milling which involves totally recycling treated effluents for use in cooling towers and spray ponds is also becoming more common.

By-products can be used by the farmer as bio-fertilisers in place of chemical products

- Filter cake (press mud) can be used as a phosphorus-rich fertiliser or in cement manufacture;
- Vinasse can potentially be used as a potassium-rich fertiliser;
- Boiler ash can be used as a soil conditioner or for road compaction;
- Bagasse can be used to fuel the boilers, or for chipboard manufacture.

Excess electricity generated from steam can be sold to local power companies.



WWF Action



As part of its Global Freshwater Programme, WWF aims to reduce the amount of water and pollution in sugar production as a step towards a sustainable industry and the conservation of freshwater ecosystems.

WWF is working with partners to develop and test BMPs which are viable from an environmental, social and economic perspective and to create an environment that facilitates BMP uptake.

AWARENESS

Farmers do not always have access to knowledge about BMPs, or cannot access credit needed to support investment in BMPs. Building the capacity of farmers is an important strand of WWF's field work, using approaches such as Farmer Field Schools. Helping to organise farmers into cooperatives is also important for capacity building as this:

- enhances access to credit facilities, business services and extension support
- reduces costs through bulk purchasing of seed and fertiliser and by pooling the costs of machinery, harvesting and transport to the mill

RESEARCH

Many BMPs stem from farmer innovations or local research centres. WWF is working with these groups and local NGOs to identify and test BMPs that are suitable and economically viable, and to help develop manuals, Environmental Management Systems and farm land use plans for BMP implementation.

EXTENSION

Governmental and industry sugar extension services are critical for the uptake of new farm practices. Extension services often lack the capacity to reach a large number of farmers. WWF is working with extension services to distribute knowledge about the benefits of BMPs.

NATIONAL POLICIES

National policies can act as an accelerator for BMPs adoption, or as a constraint. Ensuring that environmental (river) flows and social water needs are met is a key provision, so that water saved goes in part to sustaining ecosystem services. Another important policy issue is how farmers are paid for their cane, for example sucrose-based or weight-based payments.

TRADE POLICY

The EU Common Agriculture Policy (CAP) and the US Farm Support encourage over-production of sugar in rich countries and dumping of subsidised sugar on the world market. By depressing the world price, and allowing unfair competition policies, these regimes undermine livelihoods and environmental standards in poor countries. The EU's Sugar Regime is currently undergoing an overhaul. WWF is advocating for changes that will mean:

- European production being cut by about eight to ten million tonnes;
- preferential access being granted to environmentally sustainable sugar from developing countries; and
- money from the EU Common Agriculture Policy being used to finance development aid packages linked to raising environmental and labour standards in developing countries.

RESPONSIBLE BUSINESSES

Managing social and environmental risks is important for the sugar industry and food companies, due to regulatory pressures as well as shareholder and consumer expectations. Progressive multinational companies are already helping to drive international demand for sustainably-produced goods. To accelerate this process, the International Finance Corporation (IFC) and WWF have initiated a dialogue process with sugar producers, retailers, and investors on the BMPs needed to make sugar production more sustainable, for integration into sourcing criteria.



Where WWF is Working



WWF is currently working in a number of regions around the world where sugar is a key crop, including the following:

THE INDUS BASIN, PAKISTAN

Up to 90 percent of the freshwater resources in the Indus Basin is used for agriculture, of which sugarcane is a major crop. This comes at cost to local communities and ecosystems in the Basin. Most sugar plantations are irrigated using flood (surface) irrigation, where only a small percentage of the applied water is used by the crop. Though it is the 5th largest producer of sugarcane by area, Pakistan is only the 15th largest producer of sugar, highlighting the potential benefits that could be made.

KWAZULU NATAL, SOUTH AFRICA

Cane cultivation in South Africa is focused in KwaZulu-Natal (KZN) and Mpumalanga. Although sugar is mainly rainfed in KZN, cultivation has significant potential for reducing stream flow in this province where 60 percent of South Africa's water is produced. Many wetlands and riparian zones have been planted with cane and steep slopes exceeding 30° are often planted. About 2000 commercial growers produce 75 percent of the sugar and 48,000 small growers contribute about 13

percent. South Africa is the seventh largest exporter of sugar in the world. The industry invests in research and has adopted environmental guidelines and a grower group is developing a performance-based Environmental Management System.

KAFUE BASIN, ZAMBIA

The Kafue Basin is the main area of sugar cultivation in Zambia and supports 40 percent of Zambia's population. Zambia's sugar is both consumed locally, and exported to other African countries and to Europe (40 percent). The Kafue Flats is a dynamic ecological system for which relatively small management changes can have far-reaching effects. Although sugar only takes a small percentage of the river flow, it is expected that expansion of the industry will occur in the Kafue Flats. The opportunity exists to engage with the industry to ensure that growth occurs in a sustainable manner, minimising the negative impact of sugar production on the Kafue Flats ecosystem.

THE UPPER GODAVARI BASIN, MAHARASHTRA, INDIA

Sugar cultivation in India is mainly located in the states of Maharashtra and Uttar Pradesh. Maharashtra, in the upper Godavari, is a drought-prone area and sugarcane cultivation is leading to severe

depletion of groundwater with major impacts on the environment and local communities. While sugarcane constitutes just four percent of the total area under cultivation in Maharashtra, the crop corners 60 percent of the state irrigation supply.

THE FLORIDA EVERGLADES, US

In the Everglades, pollution caused by sugar cultivation is very high. WWF continues to work with the environmental community to encourage the government to implement policies that will result in the restoration of this globally important wetland ecosystem.

COASTAL QUEENSLAND AND NORTHERN NEW SOUTH WALES, AUSTRALIA

The area under sugar cane has increased dramatically since the early 1990s. Sugar cane now accounts for more than 40 percent of water abstracted for irrigation in Queensland. Sediments and drainage water from acid sulfate soils, coming in part from sugar farms, have impacted on coastal wetlands and the in-shore marine environment. The cane industry is currently developing a Farm Management System (FMS) with a target of 600 growers introduced to the FMS by mid-2007.

THE KONYA BASIN, TURKEY

WWF Turkey is working towards the wise use of the Konya Closed Basin. The Basin is of outstanding importance for nature conservation but is facing several threats which are set to cause irreversible changes to the hydrology and ecology of the basin. Sugar beet is the main crop in the basin and there are currently plans for the construction of dams and inter-basin water transfers for intensive beet irrigation. Therefore promoting sustainable sugar cultivation methods forms an important aspect of the work.

Further Reading

- www.panda.org/freshwater/sugar
- www.panda.org/downloads/europe/wwfsugarposition.doc
- The Environmental Impacts of Sugar (CABI Bioscience / WWF, Nov 2004)
- World Agriculture and the Environment: A Commodity by Commodity Guide to Impacts and Practices, (Jason Clay, April 2004)
- Better Management Practices and Agribusiness Commodities, Phase Two: Commodity Guides (Research Report for IFC Corporate Citizenship Facility and WWF-US, March 2004)
- Oxfam Briefing Paper 61 Dumping on the World - how EU sugar policies hurt poor countries (Oxfam, 2004)
- Agriculture Water Use and River Basin Conservation. (WWF, 2003)
- 'Thirsty Crops' - our food and clothes: eating up nature and wearing out the environment (WWF, 2003)
- South African Sugar Association's Manual of standards and guidelines for conservation and environmental management in the South African sugar industry (SASA, 2002)
- Australian Canegrowers' code of practice for sustainable cane growing in Queensland (Canegrowers', 1998).



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