

Indian Sugar Sector Network Report

Scoping and Sustainability Analysis

Within the initiative

Sustainable Industrial Networks and Its applications on Micro
Regional Environmental Planning (SINET)



**Partner
Organizations**



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Asia Pro Eco Programme

Is a five years programme launched by European Union in 2002, The main target is to adopt policies, technologies, and practices that promote cleaner, more resource efficient, sustainable solutions to environmental problems in Asia. The programme provides support through grants to policy reinforcement, operational and practical dialogue, diagnostic studies, technology partnership and demonstration projects, in the field of environment. The programme supports non profit organizations from EU and Asia.

About SINET

The aim of sustainable industrial network and its application on micro regional environmental planning is to interpret and adapt an understanding of the natural system and apply it to the design of the man-made system, in order to achieve a pattern of industrialization that is not only more efficient, but which is intrinsically adjusted to the tolerances and characteristics of the natural system. An industrial system of this type will have built-in insurance against environmental surprises, because their underlying causes will have been eliminated at the design stage. A micro-region is a distinct territorial unit with clearly marked boundaries below the regional level, but above the village level. Micro-regional environmental planning attempts to coordinate the planning activities of the various actors within a limited territorial unit.

The project will look at analyzing and documenting various success and failure stories of industry networks from Sweden/Europe and India/Asia, and to ascertain their impacts on environment and sustainability aspects of the respective micro regions. Emphasis will also be placed on creating awareness on the influence of industry network (key economic activity) on the micro region's environmental and sustainability aspects.

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Scoping and Sustainability Analysis of Sugar Sector

The sugar sector network basically comprises of the sugar cane farms, the local harvesters, the sugar mill, the local transporters, the distilleries/breweries, the co-generation units, small paper and pulp industries, the Khandsari units and the press mud bio-compost manufacturing units. In a given micro-region (area of the micro-region can vary from 15 to 35 Kms), these units may operate independently or in collaboration with each other, thereby, forming a network.

Each individual link of the network leaves its environmental footprint in the form of desirable or undesirable effects on the environment. This chapter assesses the sustainability as well as the unsustainability aspects of the sugar sector.

Economic Sustainability

- **Sugarcane farming:**

Most of the Indian farmers have been diverted towards the sugarcane farming in sugarcane producing regions. Farmers plant the sugarcane to make profit; it gives high yield/acres of land. In India, sugar is an essential item of mass consumption and the cheapest source of energy, supplying around 10% of the daily calories intake. With rising income of the farmers, India's sugarcane cultivation area is 4-4.5 million hectares (ha) (around 2.7% of India's total cropped area). The production of sugarcane in 2006 was more as compared to last year.

- **Driver for revenue generation:**

During harvesting season, different service providers like harvesters, transporters got engaged into the activity and benefited economically.

- **Contribution towards national economy:**

Indian sugar industry sector is the second largest sugar producer in the world (after Brazil) and was considered for around 1% of GDP of the country during financial year 2005. Sugar sector contributed ~Rs. 17 billion annually to national exchequer and treasuries of various state governments by way of excise duty and purchase tax on sugarcane.

- **Value added products:**

Sugar industry supports downstream industries thereby producing value added products like electricity, alcohol, industrial chemicals, compost manure. These were the major sources of revenue for the micro-regions studied.

Economic Unsustainability

- **Variation in supply of sugarcane due to dwindle in payment paid to the farmers:**

The Indian sugar industries follow predictable cycle of atleast 4-5 years. Shortage of sugar leads to an increase in prices. Mills pay higher prices for cane which tempts the farmers to switch to sugarcane farming. This result in a glut in both cane and sugar and this depresses sugar prices. When cane payments to farmers get dwindled and delayed, farmers switch to other cash crops which lead to a fall in production of sugarcane as well as sugar.
- **Old technology & low prices offered for sugarcane:**

Most of the co-operative sugar mills, operating in India, are plagued by the problems of obsolete technologies and financial constraints. They are not the preferred choices for the sugarcane farmers for supply due to the low price offered for the produce. Therefore, it has been observed in the study that other than the mandatory quota of sugarcane that has to be supplied to a cooperative operating in a given region, the farmers supply rest of the produce to the private sugar mills in their region. This resulted in the non-efficient functioning of the co-operatives, which operated well below their crushing capacity and produced low and inferior quality sugar that did not command a high price in the market. But, there are few instances, like Warana cooperative sugar mill in Western Maharashtra, backed by strong member support, where the cooperative is robust and has contributed in a major way to the social and economic upliftment of the micro region.
- The Khandsari units often operated from the backyards of the farmers growing sugarcane and unlike sugar, they were not subjected to the stringent regulations by the government. The Khandsari and Gur are rich in iron content and used to prepare many traditional sweet dishes. These units were the main reason for diversion of sugarcane flow. This built up a pressure on to the sugar mill and could be seen during the fall in sugar cane production.

Environmental Sustainability

- Sugarcane is a renewable, natural agricultural resource because besides sugar, it provides biofuels, fiber, fertilizer and variety of by products/co-products with ecological sustainability.
- Sugarcane, a perennial grass-plant is one of the most efficient plant in converting carbon dioxide & sunlight into carbohydrate and storing energy through photosynthesis. It is important to note that each acre of sugarcane removes 33 tonnes of excess carbon dioxide from the air and, returns 21 tonnes of fresh oxygen annually.
- The local transporters play an important role in transferring the harvested sugarcane from the farms to the sugar mills. In the present study, the different modes of transfer used were bullock carts, trailers and trucks. Bullock carts were the most preferred means as they did not emit air emissions but used for transportation only over short distances or within the micro-

region.

- Indian sugar industry sector is well organised and is also associated with traditional cottage industry like Gur/Khandsari. Recently, the fuel ethanol concept has been introduced which is being widely practiced in Brazil, but in India there are some sugar factories which have started producing power alcohol. Government has resolved that from November 1, 2006, 5% ethanol-doped-petrol will be supplied in the following nine states including four Union Territories:

States: Andhra Pradesh, Gujarat, Haryana, Karnataka, Maharashtra, Punjab, Tamilnadu, Uttar Pradesh, Chandigarh

Union Territories: Damman and Diu, Dadra and Nagar Haveli, Goa, Pondicherry

- Most of the Clean Development Mechanism (CDM) projects are coming up in the sugar sector; as it has a huge potential for carbon credit. Most of the sugar industries have become self sufficient in terms of their energy requirement. Excess amount of energy has been supplied to the grid. The co-generation units used to produce electricity using bagasse as the feedstock in the boilers instead of coal, thus, are saving a huge amount of money, as the bagasse is usually obtained from the nearby sugar mills for a pittance as compared to the coal. On the other hand, these units are supplying electricity to the local grid or alternatively supply it to the sugar mill or distilleries, thereby, earning revenue. This also contributed towards the upliftment of the region with reduced dependency on the state supplied electrical energy.
- Small paper and pulp units are using bagasse as a raw material in the manufacture of paper. Depending on the size of the unit, bagasse is either used as an add-on raw material or a substitute raw material. This helped in conserving the bamboo plants to a certain extent and also served a mean of waste (bagasse) recycling. The quality of paper produced was the only drawback as the paper produced was of inferior quality.
- The press mud comprised of the impurities that were separated during the sugar manufacturing process. It has been used to produce bio-compost and sold either to the sugarcane farmers or in the local market. In other cases, some chemical additives have been added to the bio-compost to prepare a chemical fertilizer having enhanced nutrient value for the plants.

Environmental Unsustainability

- Agrochemicals and sediments can pollute nearby watercourses.
- Problems such as siltation and eutrophication of nearby surface water bodies were found in the study areas which might be due to soil erosion, flood irrigation techniques, etc.
- Sugarcane is a deep-rooted crop and can have a great impact on river flow as it reduces runoff from the catchment into rivers and draws heavily on ground water resources.

- Burning of cane to speed harvest causes air pollution and increases erosion.
- Erosion is a significant issue in areas under sugar cane cultivation, since erosion rates in tropical agro-ecosystems are usually greater than the rate of soil formation.
- Cane harvesting caused a significant removal of soil with the roots in the farmers' fields. Declining soil quality was associated with cane production, due to soil compaction, loss of organic matter, salinization and acidification.
- Conventional tillage, i.e., deep ploughing, commonly promoted erosion by exposing soil aggregates to rainfall and drastically changed the soil structure of the areas.
- Acidification was also more prevalent in cane growing areas, largely due to the use of inorganic nitrogenous fertilizers such as urea and ammonium sulphate.
- Most of the farmers were using the flood irrigation pattern which resulted in huge wastage of water, electricity and salinization of the soil which was another important cause of lower productivity.
- Sugarcane milling generates bagasse as fuel in boilers, which produces particulate matter, nitrogen oxide and sulphur. If the pollution control equipment is not installed at the mill, the fly ash, generated during the operation, escapes to the atmosphere and can affect the population with irritation in eyes, nose, throat and lungs and can damage crops.
- Most of the time, it was observed that the sugar industries discharged their wastewater, i.e., spent wash during the rainy season in the nearby rivers and other surface water bodies which resulted in severe contamination of the surface water resources.
- The distilleries that were using the molasses to produce potable alcohol or other chemicals like spirit, fuel alcohol, etc., also produced some waste during their manufacturing process. There were also some air emissions that spread foul odour in the vicinity of the distillery. Ideally, the distilleries should ensure proper treatment of liquid and gaseous emissions which is the major part of their environmental footprints.

Social Sustainability

- **Employment generation:**

Sugar factories, located in rural areas, support huge economic activity, with about 45 million sugarcane farmers, their dependents and agricultural labors. This figure constitutes 7.5 % of the total rural population. Besides, about 0.5 million skilled and semiskilled workers, mostly from the rural area, are engaged in the sugar industry. In the areas under present study also, most of workers employed were from the local populace. This resulted in economic upliftment of the people involved.

- **Contribution to public infrastructure/health care/education:**

Sugar Industry has been a focal point for socio-economic development in the rural areas by way of mobilizing rural resources, generating employment, providing higher income opportunity, and transport and communication facilities. Further, many sugar factories have established schools, colleges, medical centers and hospitals for the benefit of the rural population.

- **Secondary industry/business:**

Some of the sugar factories have diversified into byproduct based industries and have invested and started distilleries, organic chemical plants, paper and board factories and cogeneration plants.

Social Unsustainability

- **Impact on the ground water:**

Sugarcane, being a cash crop, offers an attractive proposition to the farmers for cultivating it. But, the farming can be sustainable only if, it is done in the high yielding areas where the soil suitability and availability of adequate water offer conditions conducive for growing sugarcane. Cultivating sugarcane in water scarcity areas will worsen the availability of surface and ground water to the local population for other essential uses. This may affect the social life of the community.

- **Change in the cropping pattern:**

It is essential to follow the proper cropping pattern/ crop rotation, according to the agro climatic condition, to improve the biophysical properties of the soil and reduction in pest incidence. But in case of sugarcane production, because of its high value as cash crop, most of the farmers started to take the advantage and did not adopt the ecological farming practices. This affected the fertility of land thereby reduced the production which in turn affected the social life.

- **Health impact due to burning of bagasse:**

The unburned particles, which came out of the stack, contained silica which is very harmful. It has created health related problems. Fly ash, generated during milling operation, used to escape to the atmosphere and affected the population with irritation in eyes, nose, throat and lungs and might damage the crops. The burning of leaves also caused severe air pollution. The cane leaves can be an excellent source of fodder if, not burnt.

- **Poor working condition:**

In addition to the farm laborers, the local unemployed youth found temporary employment to harvest the standing crop of sugarcane. They were involved in harvesting the cane manually with little or no protective gears and many times faced severe cuts and bruises to their hands

due to the rough leaves and stumps of the cane. In addition, they were also exposed to the dust and ash that was generated when the leaves were subjected to controlled burning for faster harvesting.

- Sugarcane is a deep rooted crop and uses a lot of water; it is very sensitive to soil water deficits. In many areas, it is usually from 100% of water by irrigation, although in other areas, it is rainfed. The crop can have a great impact on the river flow and the ground water. WWF ranks sugar as the third “Thirstiest” commodity crop, typically requiring 1500-3000 liters of water per kg of crop. Being cash crop, sugarcane has given a special attention by the farmers.
- The distilleries are seen as a source of addicting the men folk of the region.

Summarizing the above, it was concluded that the sugar sector comprised of sustainable as well as unsustainable characteristics from the point of view of economical, environmental and social aspects. To have sustainable industrial networking in the sugar sector, more synergies should be developed among the existing units to reach to the zero waste discharge levels that are very much a possibility within this sector network.

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