

NATURE CONSERVATION AND/OR INDUSTRIAL DEVELOPMENT

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Охрана окружающей среды и/или индустриальное развитие

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Industrial development has been, in many parts of the world, a sentence to condemn nature to a ravaging rhythm of destruction and disgrace. The lack of knowledge of the delicate relationships that sustain the equilibrium of local ecosystems leads to a series of aggressions against nature that causes damages hardly recoverable. Industries' chimneys and trees will not coexist if the industrial planners do not take into account, in their projects, the principles of sustainable development. In principle, two opposite attitudes can be assumed to face this unwanted conflict: either the industrial development process is conceived and planned to coexist with nature, conserving it, or the industrialization has to be aborted to maintain nature unchanged, preserving it like it is. That is the real divergence: to conserve or to preserve nature. This text intends to show that, when correct measures and precautions are taken before and during the process of industrialization of a given region (or a country), nature can be conserved, and we will be in the presence of a «win-win» situation. The examples given - good and bad — have been selected from the process of industrialization that took place in Brazil in the last two hundred years. During this period several challenges had to be faced and new solutions have been conceived in order to take advantage of peculiar conditions prevailing in the country.

Индустриальное развитие во многих частях света является приговором природе к опустошительному ритму разрушения и уничтожения. Отсутствие знаний о деликатных отношениях, которые поддерживают баланс местных экосистем, ведет к насилию против природы, которое наносит едва поправимый ущерб. Индустриальные трубы и деревья не смогут сосуществовать, если проектировщики производств не будут принимать во внимание принципы устойчивого развития. Два противоположных мнения могут быть рассмотрены в этом нежелательном конфликте: или процесс индустриализации понимается и планируется, как сосуществование с природой, сохраняя ее, или индустриализация должна быть остановлена, чтобы сохранить природу неизменной, как она есть. В этом реальное расхождение: беречь или сохранить природу. В статье показано, что если правильные меры и предостережения приняты заранее и в процессе индустриализации данного района или страны природу можно сберечь, мы окажемся во взаимно-выигрышной ситуации. Примеры «хорошего» и «плохого», что дала индустриализация, имели место в Бразилии за последние 200 лет. В течение этого времени перед страной стояло ряд проблем и необходимы были новые решения, чтобы успешно использовать особую ситуацию, существующую в стране.

Introduction

During the early years of the 19th century Brazil was still a colony of Portugal. A luxuriant nature has attracted the attention of the scientific world and many naturalists have visited the region. Among them, Charles Darwin has spent a couple of months in Brazil, in his first contacts with the tropics, during his famous voyage around the world.

Until 1808 the colony was closed to merchants from all countries, and industrial activities were forbidden by the ruling colonial power. Mining was restricted to gold and precious stones, which were shipped directly to Lisbon. Agricultural activities were limited to sugar production for exporting, and subsistence farming was sufficient to feeding the settlers. Forest exploitation was concentrated in extraction of brazilwood, a product widely used in Europe as a dyer. As far as it concerned means of transport by land were used oxen carts, horses and mules;

sailing boats at sea and rowing canoes in the rivers completed the impacts of transportation on the natural habitat of the colony. Along this same period, however, the Industrial Revolution, as we call it now, was spreading all over Europe — the steam era had started and coal reigned; railways were under construction everywhere; cities were growing as forested areas diminished.

In Brazil the first heavy industry had been installed only in 1815 — a small size ironworks — leading the way to the mining of iron ore, also in small scale. The first railway started running as late as 1852, near the capital city of Rio de Janeiro. These first expressions of industrialism were still compatible with the preservation of the primeval nature, mainly because this industrial development had taken place predominantly along the coast, far from the inland forested areas, that were preserved.

While some industrialized regions in the world already faced severe pollution, caused by the intensive use of coal, the absence of coal in most parts of Brazil led the country to using biomass — native woods and forests of

eucalyptus, cultivated since the early years of the 20th century, supplied the railroads and the steam boilers with firewood, a renewable fuel, and had contributed with charcoal for the incipient pig iron industry that had been established in a few areas of the country.

However, two dramatic events in the years 1930s had changed drastically this state of sluggish industrial growth in the country: firstly, in 1929, the Stock Market crash had reduced radically the international exchange of goods and the flow of resources for investment, and secondly, Second World War also had influenced deeply this unique process of industrialization, because it had supplied Brazil with specialized manpower fleeing the warring countries, and had rendered impossible the imports of machinery and manufactured goods. Local solutions to speed up industrial production had to be quickly developed and new manufacturing industries had sprung up, especially in Sao Paulo region.

The impacts of industries on local ecosystems

The interfaces between an industrial facility and the environment around it are critical for some types of industry: steel mills, petrochemical complexes, foundries, power plants. They use to be incompatible with vulnerable ecosystems like wetlands, protected forests and some coastal systems. The process of industrialization in Sao Paulo State led to a high concentration of industries around Santos coastal region that deserves mention as a negative example.

A reliable supply of hydroelectricity, the proximity of harbour facilities, plentiful supply of manpower and raw materials, and dependable road accesses were positive location factors to attract heavy industries to that area. However, soil quality and the proximity to an unstable mountain-chain became, as time has shown, quite negative factors that compelled industries already installed to bear unexpectedly heavy costs concerning to the recovery and extra protection of the forested mountain areas affected by acid rain. In addition, the bad air quality resulting from the industries emissions required heavy investments in air control systems, and forced the removal of housing compounds from an area that was seen initially as a source of manpower for the industries.

This is a classic example of a planned industrial district where the economical location factors were all favourable, but the environmental location factors were not taken into account.

The impacts of transport

Among the basic location factors required by an industrialized region stands the accessibility to efficient, reliable and cost-effective means of transport. The pre-existence of a good network of railroads, or easy access for trucks and industrial vehicles, is essential to this industri-

alization process. Brazilian experience in this field is not satisfactory. An old fashioned network of railways, most of them built in narrow gauge, did not help the choice of new sites for manufacturing industries. For large mining complexes and heavy industries it was necessary to modernize the existing lines or to implement completely new ones. The high investment costs for new railways, however, gave chance to motor roads to expand intensely during and after the 1950s. From the environmental standpoint that was a bad option, but concerning to accessibility the motor roads network enhanced a dispersed pattern for a choice of industries locations.

The construction of roads to crisscross a country through virgin regions encompasses two key aspects: the planning of the land use and the location of human settlements, which should not disrupt the original ecosystems along the roads. This is one of the most serious and controversial problems carried by the industrialization process in pioneer areas. It should be considered that in most cases the difference in investment costs between a poorly planned road, harmful to the environment, and its equivalent conceived for a low environmental impact is relatively small.

Unfortunately, the use of rivers and inland waterways to move raw materials and to transport finished products in Brazil did not deserve priority, and the burden of the commercial transport is still supported by the roadway, being it paved or not paved.

The impacts of industries on the conservation of natural resources

Non-renewable natural resources are frequently victims of indiscriminate industrial development, if production processes and product design do not take into account the limitation or impossibility of nature to replace these resources. Mining activities and intense exploitation of forests frequently lead to exhaustion of resources and abandonment of old industrial sites. A region once stable will become a degraded region that poses severe problems for its population. Abandoned mines and mining towns, deforested areas, contaminated aquifer reserves are clear testimonies of the depletion of non-renewable natural resources. Jobless workers and unhealthy environmental conditions are the major consequences left behind the extinction of local natural resources and the moving away of industries.

However, the careful use of natural resources and a shift to renewable raw materials can avoid the inconveniences of an industrial downgrading. In Brazil, the thirst for petroleum in times of shortage, and the absence of coal in most of its regions encouraged solutions that enhanced the use of renewable raw materials. These solutions have unexpectedly oriented the country industrial development towards some ecologically-friendly paths. Two successful examples to avoid the depletion of natural resources are the use of wood extracted from planted trees, and the employ of ethanol for moving vehicles. It

should also be considered that ethanol, as a raw material to produce ethylene, is now a doorway to re-invent the petrochemical industry without using petroleum.

Although petroleum still is the absolute master in power generation around the world, experience amassed in the construction of large hydroelectric projects in Brazil during the years 1950—60s allowed the integration of the country with a grid of high-tension power lines that supplies the industrialized areas with renewable clean energy.

Socio-cultural impacts caused by industry

The presence of industries in a populated area carries several impacts that cannot be left to chance. Industrial development usually attracts inter-regional migrations and along with them come needs for shelter and house building, public transport, healthcare, educational establishments, etc. When the expansion of the urban areas surpass that of a medium-size city, the metropolitan region so formed runs the risk of expanding into a mega city, giving origin to administrative and logistical problems of great complexity.

On a very large scale, the concentration of several industries in an area leads to levels of pollutants that affect particularly air quality in the region and, as a consequence, the health of the inhabitants in surrounding areas. Therefore, the concept of industrial district, that became so popular some decades ago for congregating several industries at the same micro-location, is now under scrutiny and is being reviewed.

It is correct that savings in energy consumption and transport costs that result from the proximity of complementary industrial facilities encourage the grouping of correlated industries and services. But such economies and savings should not be achieved at the cost of a poor quality of life of those that work and live in these industrial areas. A better environment improves people's performance, and hence their productivity.

Two examples of an efficient integration of industrial facilities with socio-cultural values can be found, in Brazil, in two petrochemical complexes built in the 1970s in the outskirts of two regional capital cities, in the Northeast and the South respectively. Collective facilities provide the centralized treatment of all waste generated by the industries that integrate each of these two complexes, assuring therefore the cleanliness and healthiness of surrounding inhabited areas.

Industrial Development aligned with Nature Conservation

The concept of sustainability, brought into discussion after the Brundtland Report was made public in 1987, persuaded many organizations, particularly industries, to review their responsibility in regard to the triple bottom line of environmental, economical and social accountability.

The protection of the environment became the subject of a large spectrum of laws and standards that regulate the theme. At the international stage, a set of treaties, conventions and protocols now guides industries to a more accountable attitude regarding the ecological and social variables. Systems of norms as the ISO 14000 are now part of the vocabulary used by most industries, particularly those active in the global market.

A sound environmental management system (EMS) became an important tool to assure the correct administration of the interfaces between industry and the environment, giving a measure of its intervention in the natural ecosystems and in nature as a whole. Experience shows that when environmental variables are correctly identified and well managed, industrial development and nature conservation become mutually compatible, naturally.

It is constant and relevant the participation of Brazilian delegates in the international forums that elaborate and periodically review the ISO standards series 14000, devoted to environmental management. An evidence of the acceptance of ISO standards by local industry is the fact that, as of the beginning of 2009, more than 3.500 organizations in Brazil had already internationally certified their EMS according to the environmental standard ISO 14001.

Conclusion

The integration of the Industrial Development theme into a regional or national policy of Nature Conservation is feasible and can be highly beneficial to the human society, if common sense prevails and correct techniques are in use.

Such pact of coexistence must include, however, several precautions taken before the surveyors' teams arrive at the future industrial state and before the lumbermen start to clear the land. These precautions should comprise the choice of cleaner technologies, the option for ecodesigned products, the adoption of a sound eco-management system, and last but not least, the accessibility to environmental education for all participants and stakeholders.

Industrial activities can coexist with nature, but the human society must definitely restrain its consumption spree in favour of more ecological attitudes. In this regard the compulsion to grow — economic growth, financial growth, sales growth, — should be opposed whenever possible by the concept of equilibrium — ecological equilibrium, nutritional equilibrium, psychological equilibrium, population equilibrium, and so on. If correct choices are made in due time, nature will be conserved and industrial activities will meet the requirements of the future generations.