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# The risks of environmental degradation in Bogotá, Colombia

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**THE ISSUE OF** Bogotá's deteriorating environment is a matter of concern not only for its 4.5 million inhabitants, but also for the inhabitants of several other regions of this northernmost of South American countries. Such regions include the banks of the Bogota river on its westwards course from Colombia's capital down the steep foothills of the Andes and into the Magdalena river, the longest river in the country. Bogotá's environmental demands have also had an impact on the vast ecosystem of the Eastern Plains which stretch eastwards from the foothills of the Andes towards neighbouring Venezuela.

The city's physical expansion is threatening to urbanize the land towards the west and north of the city along the plateau on which it sits, where some of the country's most fertile soil is to be found. Yet no institution has taken responsibility for controlling the city's three percent annual population growth. The effects of the high degree of pollution in the waters of the Bogota river, of growing volumes of uncollected rubbish in the city streets, of an increasingly chaotic and congested vehicle traffic, of unchecked mining of quarries within and around the urban perimeter, the gradual destruction - and even extinction - of elements of the native fauna and flora, the drying-up of swamps and the growing pollution of underground waters, the inhospitability of landscapes criss-crossed with electricity cables, towers, antennae and all sorts of hindrances to the enjoyment of public space: year after year, all these appear to become more and more intractable.

## I. URBANIZED 'SABANA'

**DESPITE THE FACT** that the flat lands of the 'Sabana de Bogota' (the plateau on which the city lies) contain some of the most fertile soils in the world, only around 5,000 hectares of the Sabana's 279,000 hectares are presently under cultivation. An estimated 130,000 hectares of this are used for livestock production. This low intensity in land use facilitates the indiscriminate expansion of urbanization at relatively low densities of occupation, to the point that Bogotá now sprawls for some 300 square kilometres. Around one-fifth of 'Sabana' land with a high agricultural value has been lost to urban development.

A scarcity of water in the dry season and frequent floods in the rainy season have become chronic problems for the metropolitan region. Although the region can be said to be endowed with plentiful rainfall throughout the year, in recent years bottlenecks in the distribution system have led to a growing scarcity of water and to some conflicts among users. It may not be long before large agricultural irrigation projects serving 20,000 hectares around the metropolitan area suffer

the effects of such scarcity.

A few government projects have gone some way towards alleviating these problems. But much remains to be done. The recently finished Chingaza project, located some 40 kilometres north-east of the city, should help solve the shortages of potable water for some years to come. However, the main problems now facing the water authorities are ensuring a constant supply of water for the poorer and more distant areas of the city at a reasonable cost and also setting priorities for the use of the reservoirs. The volumes of water stored behind hydroelectric dams are still too low to satisfactorily combine the supply of water for human consumption and electricity generation. Although, in theory, energy demand should not exceed that which can be produced with the residual water volumes left after properly catering for human consumption, a compromise has yet to be reached.

The large Sumapaz water management project, due to begin operation early in the new century, will divert the course of the Sumapaz river to inject new, cleaner water into a falling Bogota river. The impact of this project on some of the largest rivers flowing through the Eastern Plains is yet to be assessed, as the site of the project, the Páramo de Sumapaz (a moorland area 3,000 metres above sea level located in the north-east of the city) is a main source of water for the river system that irrigates this area.

## II. WATER SUPPLY AND ITS DISPOSAL

**LOSS OF WATER** in the city's distribution network may be due to two main causes: leaks in obsolete sections of the network and inadequate controls on over-consumption where water meters are deficient or non-existent (as in the case of illegal connections). Bogota's Water Supply and Sanitation Board estimates suggest that every second some five cubic metres of water are lost due to leaks.<sup>(1)</sup>

Many of Bogota's industries do not treat the wastewater they generate prior to discharging it into the sewage network. As a result, pollution in rivers such as the Tunjuelito - a tributary of the Bogota river flowing through the south of the city - have reached disquieting levels, to the point that the activity of aerobic bacteria has been inhibited, therefore hindering the adequate treatment of sewage waters. The high degree of pollution in the Tunjuelito river is largely due to the presence of heavy metal ions such as cadmium or lead, which are highly harmful to the human body if ingested directly through untreated water or indirectly through vegetables watered with it. Many tanneries and plastic-processing plants pour untreated wastewater into the Tunjuelito.

Other rivers which flow past Bogota, such as the Fucha and the Salitre (see map) are not as heavily polluted with chemical waste as the Tunjuelito; they receive large volumes of untreated sewage waters. The Water Board has recently initiated a programme to control and treat particular industrial effluents, by far the most noxious source of pollution not only of the Bogota and Magdalena rivers (of which the Bogota is a tributary) but also a source of increasing pollution of sea-water along Colombia's Atlantic coast at the point where the Magdalena ends its course.

Plans for a long-term programme to clean the waters of the Bogota river include the construction of a treatment plant near Alicachin (a point where highly polluted effluents flow into the river) as well as a wastewater collector running parallel to the river. Improvements to the river's present hydraulic conditions would help reclaim some 10,000

1. Jaramillo, Samuel (1988), 'La Evolución del Suministro de los Servicios de Agua Potable y Desague en Bogotá', CEDE-UNIANDÉS, paper presented to the *CIUDAGUA Conference*, Canelones (Uruguay), July 31-August 6 and R. Pérez Carmona, official of Bogotá's Water Supply and Sanitation Board (EAAB), lecture delivered at CIDER, April 1988.

hectares of fertile land on the east bank. The cost of these plans is estimated at over one billion US dollars.

The benefits of a programme such as this are enormous and include: a reduction in the capital and maintenance costs of water supply systems in the small municipalities downstream on the Bogota river; a halt to the destruction of fish resources in the Magdalena river; an improvement in the quality of water used for human consumption and irrigation; a decrease in crop and other agricultural losses originating in the deterioration of soils which would otherwise have a high agricultural value; and the rehabilitation of spaces for recreation. Unlike many other capitals, Bogota's inhabitants do not perceive the river and creeks as potential recreation spots, as in most people's lifetimes they have been highly polluted and therefore unusable for such purposes.

### III. LANDSLIDES AND FLOODS

**GEOLOGICAL AND GEOTECHNICAL** dimensions must be included in the study of phenomena such as wetland drainage, erosion, urbanization in areas subject to floods or landslides, groundwater pollution and the disposal of dangerous residues. For instance, Bogota's newest sanitary infill, Doña Juana, is located in an area where a highly porous and permeable soil and bedrock may cause aquifers underneath - used as sources of potable water - to be contaminated.

Similarly, several studies point to the existence of areas highly prone to landslides and of areas where, due to microclimatic and geological reasons, there is high rainfall and growing deposits of silt and sediments. Drainage pipes may often be clogged up and inoperative and, as a result, such areas are highly liable to flooding.

In the districts where heavy quarry mining takes place, such as Tunjuelito (in the south) and Usaquén (in the north), hill erosion has increased dramatically. And yet, these extractive industries have failed to meet the social costs of the ensuing deforestation, erosion and soil instability, silting and blocking of sewers, air and water pollution and of the risk of loss of human lives resulting from landslides.

### IV. AIR AND REFUSE

**IF THE FEW** existing measurements available can be relied upon, the degree of air pollution in Colombia's capital city is above permissible levels for long-term exposure. Motor vehicles are the main source of air pollution. The city's most polluted area is its southern half, where heavy lorry traffic can be found. It is in this area that most manufacturing activity and illegal garbage dumps are located; and it is also the area in the city with higher population densities and lower average incomes.

Bogota produces over 1.5 million tons of garbage every year, of which only about half is collected and disposed of by the local authorities.<sup>(2)</sup> The environmental and health impacts of government-owned large garbage dumps such as those of El Cortijo, Gibraltar and San Martin and of smaller 'spontaneous' rubbish tips spread around the city, where users who lack the service are forced to dump their refuse, cannot be underestimated. The 2,500 tons of garbage left uncollected every day are partially recycled informally and partially

2. Editor's note: Bogota's newly elected administration for the period 1988-1990 has put forward a privatization plan whereby private enterprises would collect up to 40 percent of the city's garbage; in December 1988 this was still at a trial level.



simply left to rot in small rubbish tips or in canals, in sewers or on the streets. This is certainly one of the most urgent problems facing the city's population at present, as can be seen from the fact that many poor districts which lack this service are perceived by the local authorities as being under a constant state of sanitary emergency.

## V. HEALTH AND THE ENVIRONMENT

**THERE IS A** closely-knit relationship between the environment and living conditions within it. This is all the more apparent in poorer, illegal subdivisions and squatter settlements, where a high incidence of environment-linked diseases can be found. According to data from Bogota's Health Secretariat, and excluding perinatal complications, the most common diseases among infants under one year of age are enteritis and diarrhoea-related diseases, as well as respiratory and skin disorders. The proliferation of such illnesses can be linked directly to the lack of an adequate supply of potable water, lack of sewage and drainage systems and of street surfacing, and to the proximity of stone and sand quarries. Although the current Bogota Fourth Plan administered by the Municipal Government and funded largely by the Interamerican Development Bank will go some way towards improving infrastructure coverage in Ciudad Bolivar (which encompasses some of the poorest districts in the south-east of the city) it will fail to cater for many of the area's poorer inhabitants.

Many of the causes of respiratory diseases can be traced back to air pollution resulting from an obsolete and poorly maintained vehicle stock, asphalt production plants, brick factories and so on, most of which are concentrated in the city's south, south-western and south-eastern districts. As noted earlier, these also happen to be the poorest.<sup>(3)</sup>

Other, poorly documented, health disorders can be attributed to traffic congestion and to low-quality public services. These include such diseases as heart and coronary problems, physical and mental stress, arthritis, back problems and high blood pressure. Diagnoses of more common diseases such as influenza, pneumonia, VD and other 'social diseases' are rarely - if ever - directly linked to bad environmental conditions. A highly common occurrence in hospital emergency wards is secondary craneo-encephalic traumatism resulting from road accidents, but it is rarely given any attention in public health diagnoses.<sup>(4)</sup> Finally, other common health problems worth noting among Bogota's population are the increasing incidence of tumours and even deaths which may be traced back to the growing use of chemicals at work and sprays in everyday life.<sup>(5)</sup>

In the context of deteriorating conditions, however, some recognition must be given to recent improvements in health care at the workplace. Statistics about accidents at work are becoming increasingly available. There, the worst problems have been identified as coming from three types of polluting agents: physical (noise and extreme temperatures in the work environment), chemical (gases, vapour, smoke and dust) and biological (viruses, fungi and bacteria).<sup>(6)</sup>

## VI. FOOD

**PRACTICALLY ALL FOOD** products originating in establishments operating with a license from the City's Health Secretariat appear to conform to minimum hygiene standards.<sup>(7)</sup> However, there are thousands of unlicensed establishments supplying food products to schools, hospitals, open markets and street sellers and other places

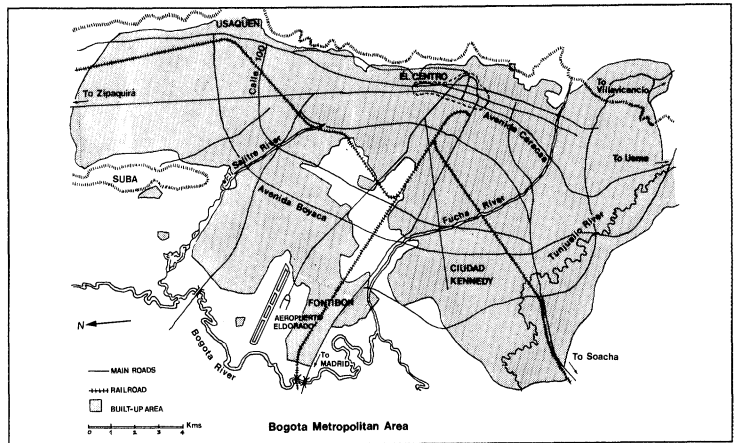
3. Bogota Health Secretariat (1987), 'La Contaminación del Aire en Bogotá 1983-1986' (mimeo.) and Prada, G. (1977), 'Estudio sobre la Contaminación de Origen Automotor en Bogotá', ITT.

4. Vivas, J. et al. (1988), *El Sistema Nacional de Salud*, FEDESARROLLO-Organización Panamericana de la Salud, Bogotá, pp. 147-149.

5. Data obtained from Bogota Health Secretariat. See also Casas, F. (1988) 'Marco Institucional del Manejo Ambiental de Bogotá', CIDER-UNIANDES, Bogotá (A CIDER Working Paper).

6. See note 5.

7. See note 5.



where controls are difficult to enforce. Cases of food poisoning and infectious diseases are rarely reported because often those affected are unaware of the causes of their disorders and must simply endure their consequences.

Street food vendors are a special case in that they are highly widespread and rarely comply with minimum standards of hygiene. However, not all illnesses associated with the consumption of favourite popular fare as 'fritanga' (an assortment of largely fried food, including beef and pork) have an immediate effect; common long-term consequences include liver and colon cancer and cirrhosis. Another potential source of food-related diseases is highly contaminated food products produced abroad which, though rejected in their countries of origin under strictly enforced controls, find their way into the Third World. These include products which have been subject to high levels of radiation, manufacturing by-products unfit for human consumption and so on, sold cheaply to poorer countries.

High levels of alcohol and drug consumption and their associated effects are becoming increasingly common health disorders among Bogota's inhabitants. But quite apart from the dependency and the social effects of such products, there are growing risks facing the population originating in the consumption of other substances such as:

- methyl alcohol (or methanol): although unfit for human consumption it is often sold under the guise of alcohol. The consequences of cheap imitations of commercially produced liquors can range from intoxication to permanent blindness and even death;
- mineral food dyes: these are often carcinogenic substances used to dye wines and other liquors;
- components of 'crack': Colombia's ranking among the world's largest suppliers of cocaine means that the drug and this cheaper by-product (smoked in the form of cigarettes or injected) are easily and cheaply available in Bogota's streets; the process of transforming cocaine into 'crack' involves the use of highly harmful substances such as methanol, petrol, sulphuric acid and brick dust.

## VII. PUBLIC SPACE

**THE 'RECLAMATION' OF** public space for the city's inhabitants is an essential component of any attempt to humanise the city. Pedestrians suffer the hardships of an unequal competition for the use of streets and pavements. Cars, buses, motor-cycles, petty traders and manufacturers, garages and pedestrians vie with one another for what appears to be an ever-shrinking and overcrowded public space. Bogota's open space has become a scarce resource, particularly in the

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city centre and along its main thoroughfares and main streets. This explains the success of schemes such as the 'ciclovias' (cycle-ways) whereby some of the city's main streets are closed to motor vehicle traffic on Sunday mornings for the exclusive enjoyment of pedestrians, roller skaters and cyclists, and the appeal of initiatives to restore the collective character of the street.

Street-widening and the construction of main roads have not been a solution to deeply engrained problems but have rather encouraged the proliferation of private vehicles. Proposed solutions such as a rapid-transit system would certainly help alleviate street congestion, improve public transport services and reclaim for the city's inhabitants some areas originally intended for public recreation. But the costs of designing and building such a system which range in the thousands of millions of US dollars, appear to be beyond the city's (and the country's) financial reach.

### VIII. INTER-INSTITUTIONAL CONFLICTS

**FACED WITH THE** multiplicity and growing scale of environmental problems, state actions remain highly fragmented and are often duplicated by several departments. There is an almost complete absence of a unified set of environmental policies.

The institutional separation between the government of Bogota's 'Distrito Especial' (an administrative area encompassing most municipalities within the conurbation) and the administration at CAR (an institution in charge of land use and environmental monitoring covering mostly the Bogota river basin) illustrates such problems. CAR's activities include, among others, water management for part of Bogota's urban area; the control and licensing of industries which generate potentially polluting by-products in the area within its jurisdiction (and outside the 'Distrito Especial'); the control of tree-cutting and water use on the mountain range along the east of the city; and the large-scale programme to clean up and correct the course of the Bogota river mentioned earlier. In the face of recent legislation strengthening the autonomy of local authorities and some older inter-institutional agreements on industrial effluents, solutions aimed at improving coordination among government departments would seem to be at hand. But there seems to be a lack of political will to do so.

Community action has not played an important part in putting pressure on the authorities to find better solutions to environmental problems in general and supply of public services in particular. The roots of this may be in the political conditions created through an agreement signed in 1958 between Colombia's two ruling parties, and so most forms of popular participation were channelled through officially-approved Community Action Committees - 'Juntas de Acción Comunal'. This practically outlawed other forms of more genuine popular participation and protest. No environmental action subcommittees or the like may be found among the over 1,200 Community Action Committees spread around the city.

This short article has left untouched many subjects which ought to be included in a more thorough analysis of Bogota's environmental conditions. These include very important issues such as environmental education (non-existent among the city inhabitants) as well as the environmental impact of construction technologies and materials, and the impact upon the city's inhabitants of street and air traffic noise. It is my belief that only through an integral view of the city's recent development will environmental problems be tackled adequately as part of a planning strategy for Bogota's future.