DEMOGRAPHIC AND LEGAL ASPECTS OF POLLUTION IN MEXICO

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1. Because of its high rate of population growth and urbanization, Mexico does, indeed, as a developing country, contribute a great deal to its own pollution and to the contamination of the world environment. But it is also true that this kind of pollution is lesser than the one produced by fully industrialized nations. One inhabitant of any of such nations uses more electricity than fifty-five people in the average developing country, and is responsible for the use of a much greater ammount of detergents, fungicides, defoliant sprays, and radioactive substances, than hundreds of persons living in a non-industrialized nation.

The population growth is not the same all over the world. The industrialized nations yield a slow growth rate; they take from 50 to 200 years to double their population. Such is the case of the United States, Europe, The Soviet Union, Japan, and many others belonging to this group. On the other hand, countries such as Mexico, on their way to development —countries making up about two thirds of the world's population—double theirs in less than 50 years: Indonesia in 31 years, Brazil in 22, Mexico in 20, El Salvador in 17, and so forth. These countries have very little industry, inadequate agriculture, and a high percentage of illiteracy. Their hope, naturally, is to raise their life standard and to become fully developed; but, in the process, they are slowly contributing to soil exhaustion and to the pollution of air and water. They sometimes cause even more contamination than highly industrialized societies, as their fast population growth rate goes hand to hand with not very efficient techniques and an unbalanced industrialization. They exhaust their lands and forests because of lack of know-how and, at the same time, increase the number of automobile industries to serve the higher economic strata—thus polluting the environment.

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This disparity between the high and low social classes in developing countries—plus the population growth—results in very serious pollution. In a society where 50% of the population is under fifteen years of age, it really is not surprising that illiteracy continue to expand, classrooms and teachers will be scarce, the uncultivated land will become eroded and have a very low yield, and the techniques for the exploitation of the natural resources will be inadequate.

These societies' high and middle classes, in their eagerness to catch-up with their counterparts in highly developed nations, adopt, without proper caution, the techniques and elements of the latter, producing too often a high degree of pollution in the air, water, and soil. In this manner they employ, indiscriminately, chemical products like detergents, DDT, etc., which have caused man and animal alike, along with the benefits, serious damage. The use of DDT is now being banned in many states of the American Union; but not so in countries where, because of insufficient technical know-how, and information. development is wanting. [1]

The relationship between population and contamination is a fact. Population growth carries with it the total demand for modern goods and services; consequently, the elaboration and use of these become contaminating factors when haphazard techniques are employed and the newest anti-pollution devices are not utilized. Modern technology carries, therefore, the [2] contaminating by-products that damage the developing societies. It is due to this fact that such societies put so much emphasis on anti-pollution legislation.

It is also convenient to point out the fact that the techniques employed by the industrialized nations were often created to save on human labor. This does not generally benefit the developing countries, where labor is in abundance, and where one of the bigest problems is precisely the high unemployment level, or the lack of jobs for people to produce and satisfy their needs in the best possible degree of harmony. This is why they have to satisfy their social and economic shortages with the outmost care in balancing the use of modern technology and the avoidance of unemployment.

Two factors are constant in the population growth of Latin America: One is the diminishing mortality-rate, and the other an increasing tendency to urbanize. The total population in the last decade has grown at a rate of 3% in that area, with a growth-rate in Mexico of 3.5%. The average yearly increase of population in Latin American cities is up to 5%, while

[1] *Contaminación Ambiental, Nueva Espada de Damocles.* Ed. Samo, México, 1972, p. 209.

[2] Weiss-Altaner, E. R., *Explosión demográfica y tensión económica, Demografía y Economía.* Vol. VII, núm. 2, El Colegio de México, 20, 1973, pp. 171-173.

in the area of Mexico City it stands between 5.5 and 5.7%. This fact has caused large cities a great deal of soil, water, and air pollution problems, mainly because slum zones are established in the outskirts of the factory belts, leaving its inhabitants in very poor conditions of health and shelter, and also with a lack of the basic services.

The population growth in big cities like Mexico has, therefore, played a very important role in environmental pollution. The metropolitan area of Mexico City (Zona Metropolitana de la Ciudad de México, ZMCM),[3] has 8.8 million inhabitants, and its urban area has 8.5 million. Its growth is due to two factors: the natural growth of the city population—accounting for 56.8%—and the migration of people from the countryside to the city, making up 43.2%. It is estimated that approximately 75 families, with an average of 5.5 members per family, arrive daily to the "ZMCM" area, coming from various locations in the country.

Consequently, it can be ascertained that big cities in Latin America; certainly Mexico City among them, with their slums have created environmental conditions which are incompatible with the proper development of the human being, in both biological and social aspects.[4] By the year 1980, the Republic of Mexico is estimated to present this picture: it will have three cities with over one million people; Mexico City will have an urban population ranging from 12.5 to 13.8 million, Guadalajara will surpass the 2.5 million mark, and Monterrey will have over 2 million. There will be six cities with populations between a half a million and one million inhabitants; 31 to 36 cities with populations between fifty thousand and one hundred thousand; and approximately 185 to 192 with fifteen thousand to fifty thousand people. The total population of Mexico in 1974 stands around fifty-eight million and the estimate is that, by 1980 it will reach 71 million.[5]

If the two demographic variables—mortality and birth—are maintained at the present level, it is estimated that by the year 2 000 Mexico will have 135 million inhabitants.[6] Because, in addition to the previous factor, the Mexican State has, with its accomplishments in favor of social well-being and the utilization of new medical techniques, raised the life expectancy of its people from 45 years in 1940 to 62.1 in 1970.

New measures are begining to appear in Mexican regulations, that are directed against the birth-rate increase and the migration from the country-

[3] Unikel, Luis, *La Dinámica del Crecimiento de la Ciudad de México*, Fundación para Estudios de la Población, A. C., México, 1972, pp. 13-24.

[4] *Contaminación Ambiental, op. cit.*, p. 90.

[5] *Contaminación Ambiental, op. cit.*, pp. 255-256.

[6] It is sometimes estimated that with the new policy of Mexico, its population in the year 2000 will be just around 120 millions.

side to the city. Such is the case with the General Law of Population (*Ley General de Población*), December 11, 1973, which supports among others, the following objectives: family planning to decrease population growth, the struggle to preserve the environment, the incorporation of woman into the national life, the better regional distribution of population, respect for human rights and liberties, the improvement of life standards, and the diminution of the great differences among the social classes. This General Law of Population substituted that of 1947, which was aimed at the increase of population. The recent legislation has, of course created a new and different attitude which will result in a decrease of births, but its full impact cannot be estimated yet.

Some comments of the legal genre have to be made concerning birth-rate. Mexican legislation has not generally been favorable to the increase of births. For instance, there have been no tax-incentives to stimulate family growth; sterilization—both male and female—is legal, for it is not considered a felony as long as the concerned party gives full consent and, if married, his or her spouse is in accord and aware of their rights.[7] The sale, use, importation, and manufacture of contraceptives is legal.

On March 13, 1973, the Official Journal—*Diario Oficial*—published the new Sanitary Code of Mexico (*Código Sanitario de México*), which aims at promoting the physical and mental health of the people, the improvement of nutrition and public health, and environmental restoration. Federal, state, and municipal authorities cooperate in carrying out these sanitary measures—Coordinated Services of Public Health—and it is anticipated that, in the near future, all the various government agencies will supply the necessary medical services for the correct usage of contraceptives to nearly fifty per cent of the population.[8] Abortion is still a legal crime, except under some special cases strictly defined by the law.

The high birth rate is, without a doubt, influenced by ignorance of the laws and a general lack of culture on the part of many Mexicans. Notwithstanding the fact that elementary education is compulsory (Art. 3 of the Federal Constitution), 13 to 18% of the children do not go to school, and of the ones who do, only 44% ever finish. Functional illiteracy among the Mexican adult population is estimated at 40%.[9] This is one of the main reasons for the high demographic increase in Mexico.

Perhaps, once the different federal, state, and municipal agencies start

[7] From the point of view of the Federal Civil Code, esterilization is legal in adult persons —18 years old— according to article 24 of that Code.

[8] *Ley y Población en México*, Fundación para Estudios de la Población, A. C. Con la colaboración de El Colegio de México y Facultad de Derecho de la UNAM., 1974, p. 23.

[9] *Ley y Población en México, op. cit.*, p. 84.

carrying out the demographic legislation, the birth-rate will finally diminish. On the other hand, migration from the countryside to the city —and the resulting urban pollution—is more difficult to halt. It is estimated that in Mexico there are four million farmers who only work a few months out of the year. Although the cities cannot accomodate all that labor force, [10] the mirage still lures these people to the big urban centers.

2. Recent political and legislative tendencies in Mexico against pollution. It has become clear, in the last three years, that the public awareness has finally awakened to the dangers caused by pollution. This, no doubt, is because of the particularly precarious condition of the Mexican Valley, where Mexico City is located. Besides the Sanitary Code of 1973, two regulations, several decrees, and government agreements, reflect this interest in fighting soil pollution.

Before 1971 there were but a few dispositions in the previous Sanitary Code (of December 29, 1954) and the Law for Sanitation of Plants and Livestock (*Ley de Sanidad Fitopecuaria*), published in the Official Journal of the Federation on September 26, 1940. This law already points out to the dangers of employing, haphazardly and without full knowledge, chemical plant and crop desinfectants. Thus, the recent publication of the Regulation for the Control and Use of Herb Desinfectants (*Reglamento para el control y uso de Herbicidas*), Official Journal, December 17, 1973, empowering the Department of Agriculture and Livestock General Board of Directors for Plant Sanitation (Dirección General de Sanidad Vegetal)—to enforce the registration of crop desinfectants as well as the aircraft used, to establish minimum requirements for its usage, to exactly determine ways of bottling and wasting, etc. The idea is to avoid damage to the crop areas adjacent to the ones being desinfected. This is a form of soil—contamination control.

The most important legislative measure is the Federal Law for the Prevention and Control of Environment Pollution (*Ley Federal para Prevenir y Controlar la Contaminación Ambiental*)—published in the Official Journal on March 23, 1971, passed by Federal Congress on the iniciative of the President of the Republic—which is the result of investigations initiated several years prior to 1971, at the National Polytechnical Institute and the National University of Mexico; this was mainly the work of graduates of the schools of Engineering of the Environment and Health Engineering who colaborated with the National Scientific and Technologic Council, a department which serves as consultant to the Federal Government. [11]

[10] *Ley y Población en México, op. cit.*, p. 92.
[11] *Contaminación Ambiental, op. cit.*, p. 187.

This law is federal and, therefore, applicable to the whole country. Its dispositions are considered of public interest, for they even override private interests. The executive office authorizes the prevention, regulation, and prohibition of pollutants and their causes, whatever their nature might be. We understand by pollutant any chemical or organic matter or compound which may mix with the air, water, or soil and alter their natural characteristics; also any kind of energy, heat, radioactivity, or noise which may modify the air, water or soil. The law states that contamination is the presence of any pollutant in the environment which might damage or disturb the health or welfare of persons, plants, or animals, or might lower the quality of the air, water, soil, or natural resources belonging either to private persons or to the nation (Art. 14).

The application of this law falls on nearly all branch offices of the Executive, mainly on the Departments of Health, Water Resources, Agriculture and Livestock, Industry and Commerce; all aided by the State Governments, the territorial and municipal inclusive (Art. 5). The law prescribes the planification of urban development, the creation of national parks and industrial areas, fostering industrial decentralization in cooperation with private individuals. It also commands the creation of educational and informative programs about pollution, directed especially at youth and children, and forsees the expedition of diverse regulations for specialized subjects. It later refers, in particular, to the three types of contamination: air, water, and soil pollution, briefly stating the following:

a) All discharge of fume (gas, dust, smoke or vapor) that may alter the air, is subject to control. The law divides into two the sources of contamination: natural and artificial. The natural sources may originate in dried-up or eroded lands, volcanic activity, etc. The artificial sources originate from man-made technology: factories, refineries, automobiles, air-planes, ships, etc., as well as from the burning of trash and waste (Arts. 10 and 11).

It must be pointed out that air pollution is the better known of pollutants in the Valley of Mexico. where it has reached serious levels. 70% of such contamination is caused by motor-vehicles expelling carbon monoxide, sulphuric oxide, lead tetraethyline, etc. It is estimated that one million of vehicles are in circulation in the "ZMCM" area. Those utilizing diesel produce less carbon monoxide, but more smoke, and the adequate devices to eliminate it have not been invented yet. Industries like oil-refineries are also an important source of contamination, especially because of the sulphur-oxides which they expell. The factories producing cement, paper, steel, etc., soil the air with their fumes; and to fully understand the problem which this originates, it must be noted that 45% of the industry is located

within the "ZMCM" area, according to 1969 data.[12] That is why decentralization is one of the most urgent needs to reach an adequate solution.

Air contamination, being so high-leveled, has been the subject of a partial regulation, already promulgated, on fumes and dust-matter (Regulation for the Prevention and Control of Atmospheric Pollution Originated through the Emission of Smoke and Dust (*Reglamento para la Prevención y Control de la Contaminación Atmosférica Originada por la Emisión de Humos y Polvos*), Official Journal, Sept. 17, 1971). Its concern is pollution which emanates from large and small factories and exhaust pipes, and tries to stimulate through tax-incentives the displacement of industry to areas outside the "ZMCM" area. The Law also stipulates the use of antipollution equipment and provides several tax incentives for its manufacture and importation. Article 17 goes so far as to authorize federal and state institutions to stop circulation of all vehicles in poor condition which may cause serious contamination.

An interesting fact to point out is that there is a people's consciousness movement to report any source of contamination. Those responsible for such dangerous conditions are often subject to sanctioning, ranging from fines to temporary or definitive closure; but the charges against them have, of course, the guarantee of a hearing.

b) The abovementioned law also contains a specific chapter on prevention and control of water pollution. It prohibits the dumping of residual water containing pollutants into collector networks, rivers or any water deposit, or infiltrating such water into land property. Residual water must undergo treatment before being dumped, the enforcement of that obligation falling on the Department of Health and the Department of Water Resources.

This chapter of the law is the substance of a *regulation*, published by the Official Journal on March 29, 1973, containing numerous dispositions for the treatment and discharge of residual water. Every element which is a source of discharge —excepting those of purely domestic nature— must be registeret. Temporary analysis of water composition is forseen, and the Executive Office is empowered to carry out inspections. As in the case of air pollution, the contamination of water may originate sanctions ranging from fines to closure, if the injunction is not obeyed.

There is also the kind of responsibility for pollution fflhich is of a civil nature "out of contract", whenever illicit acts are committed against good

[12] *Contaminación Ambiental, op. cit.*, p. 256; Also, *La Contaminación Atmosférica y su Relación con el flujo de vehículos en la Ciudad de México*, Instituto de Ingeniería, UNAM. México, 1969; "La Contaminación Atmosférica", Academia Nacional de Medicina, *Gaceta Médica*, México, marzo 1970.

customs. For if it is true that both the forementioned law and its regulations mention a series of obligations, whenever private individuals do not comply with them —thus harming society, the nation, or other individuals— their reponsibility is not only of an administrative nature, derived from such laws, but also of the ordinary sort, based on statutory provisions of the Federal Civil Code.

c) Along with the aforesaid, the law contains a chapter on prevention and control of soil contamination. Thus, it prohibits, for instance, the discharge of soil pollutants without proper government authorization. The authorities regulate, and sometimes ban, the usage of certain fertilizers, desinfectants, and defoliants, and all trash and solid waste must avoid soil contamination. Industrial products which do not organically decompose —plastic, glass, aluminum, and such— will be subject to future regulation. The utilization of the soil is, because of its acquired importance and the problems which it presents, considered of public interest. This, regardless of whether or not it is used for urban purposes or any kind of urbanization, which was in the past a matter of state and municipal regulation and is now under federal jurisdiction.

All the above legislation has, as suppletory, the Sanitary Code and its regulations, the Federal Law of Sanitary Planification, (*Ley Federal de Ingeniería Sanitaria*) and the other laws which direct all matters concerning air, land, water, fauna and flora, and their corresponding regulations (Art. 34).

Shortly after the above mentioned law was put into effect, a Presidential Decree was issued —published by the Official Journal on January 29, 1972— by which the Undersecretariat of Environmental Improvement (Subsecretaría del Mejoramiento del Ambiente) was created within the Health Department. This new office, along with the Navy, approach the problem concerning beaches, interior marine waters, the territorial sea and its adjacent zones. Articles 64 & 65 of the Code authorize the federal government to prevent any vessel from throwing out any kind of substances or waste which might contaminate the sea water.

The Sanitary Code also has a special chapter on the possession, commerce, transportation, and use of radioactive isotopes, radiation sources like nuclear reactors, neutron sources, micro-wave devices, radar and x-ray devices, etc., and the vigilance over such which corresponds to the Government (Articles 66 through 72).

3. Legislation for Decentralization. The Federal Law against pollution and the Sanitary Code make up the two most important pieces of legislation on this subject. This regulation was prompted, above all, because

of the pollutants created by different sources in the Valley of México and the "ZMCM" area. But the problem cannot be solved until a better territorial distribution of industry and population is accomplished, and the Mexican central region be no longer the one with a greater proportional amount of both in a relatively small area. There are, along with these two laws, other scattered resolutions on the same subject, mostly administrative agreements and decrees. This has caused a certain lack of unity and legislative disorder, as this field is yet in its experimental stage.

The Presidential Decree of July 1972,[13] divides the national territory into *three zones*, according to their degree of industrial concentration, and grants to each, different kinds of tax and credit incentives, as well as technical advice.[14] The first zone embraces many of the metropolitan municipalities of the three most important cities in the country: México, Guadalajara, and Monterrey. Number two zone includes some municipalities surrounding Guadalajara and other important cities like Querétaro, Puebla, Cuernavaca, and Toluca. Number three zone encompasses the rest of the country. It has been said that the present division will not accomplish its purpose of developing new regions, as number two zone is too close to the big cities and will encourage the creation of new cities during the present decade, which is precisely what must be avoided.[15] It is pertinent to mention that the interest on loans to finance new industries, varies according to the particular zone: 11% per year for the first, 10% for the second and 9% for the third. These loans can be obtained from either private or public banking institutions, plus various funds designated for this purpose.

It is important to make reference to the Trust for the Promotion of Developments, Parks, and Industrial Cities (*Fideicomiso para la Promoción de Conjuntos, Parques y Ciudades Industriales*) of 1970, extended to include commercial centers in 1972. Its goal is to favor decentralization, making it easier for the small and medium industrialists to acquire land and even buildings, with public utilities. Up until April 1973, there were fifty-two projects and, between 1971 and 1973, thirteen parks and industrial cities began operations, plus seven more which were about to get started. However, and due to many factors, private investors generally prefer the more populated areas to set up factories and, therefore, do little to cooperate with the decentralization plans.[16]

[13] As it is not a complete codification in this matter, there are several administrative decrees and resolutions.

[14] Unikel, Luis, book in process to be published, which chapter XI is denominated *Politics related with urbanization.*

[15] Unikel, Luis, obra en proyecto, cap. XI.

[16] It is necessary to admit that some entrepreneurs have indeed collaborated.

One must also mention the proposed law which aims at the territorial classification of urban development areas. This is an attempt to apply the theory of "development poles", as with the reform carried out in France where

> "... what is sought is the strengthening of several poles which have been classified as 'deconcentrating metropolis' of the three main cities, fourteen regional or balancing cities, thirty intermediate metropolis, twelve urban centers and seventy urban sub-centers ..." [17]

It is still too early to appraise the accomplishments of this government project-charged to the *Nacional Financiera, S. A.* and the Department of Public Works.

Conclusions:

1. Population wise, México presents two characteristics which influence, directly or indirectly, the pollution of air, water, and soil. They are: a high birth-rate and a tendency for urban growth, especially within the metropolitan zone of Mexico City (ZMCM). The new Population Law and other legislative decrees aim, in recent years, at the solution, or at least the mitigation, of these two problems.

2. The high level of air pollution in the "ZMCM" area is the main reason for the creation of the Federal Law for the Prevention and Control of Environmental Contamination. With this law, a new policy is under way which tries, by different means, to fight the contamination of air, water, and soil throughout the country. It has also been the basis of two regulations on air and water pollution, and sets forth the creation of a new agency within the Executive Branch; this agency is called the Undersecretariat for Environmental Improvement and is controlled by the Health Department.

3. Ample legislation has come out in the last few years, concerning decentralization of industrial and population areas, which is contained in laws, regulations, resolutions and decrees, and will soon be codified.

4. The practical results of the new Mexican legislation are begining to be felt. The Undersecretariat of Water Resources, on July 30, 1974, announced that 45,000 factories had fulfilled their obligation of registering and informing on the contents of their residual waters, and that

[17] *Revista de la Secretaría de Obras Públicas*, México, mayo, 1973, p. 4.

it anticipated the application of sanctions to 25,000 more for not complying with such injuction.

5. The new Mexican legislation has strengthened the basic human right to live in a clean environment, free of contamination. This right must coexist along with all other traditional liberties of man.

Principal legal resolutions on pollution.

Sanitary Code of the United States of Mexico, O. J.: Official Journal (Diario Oficial). March 13, 1973. Federal Law for the Prevention and Control of Environment Pollution, O. J., March 23, 1971.

Regulation for the Prevention and Control of Atmospheric Pollution Originated through the Emission of Smoke and Dust, O. J., September 17, 1971.

Regulation for the Prevention and Control of Water Pollution, O. J., March 29, 1973.

Resolution by which the Undersecretariat of Environmental Improvement is created within the Health Department, O. J., January 29, 1972.

Instruction manual describing the characteristics, use, and interpretation of the "Ringelmann smoke chart", O. J., January 25, 1972.

Resolution by the Industrial Board of Directors of the Department of Industry and Commerce, setting the basis to observe in the manufacture of pollution-control equipment and devices, O. J., July 14, 1972.

Resolution by the Undersecretariat of Planification, of the Department of Water Resources, on the discharge of residual water, O. J., November 19, 1973.

Law for Sanitation of Plants and Livestock, O. J., September 26, 1940.

Regulation for the Control and Use of Herb Desinfectants, O. J., December 17, 1973.

General Law of Population, O. J., January 7, 1974.

Presidential Decree which marks three zones in the national territory for the purpose of industrial development, 1972.

Resolution for the creation of the Trust for the Promotion of Developments, Parks, and Industrial Cities, 1970.

Resolution for the creation of the Fund for the Security and Development of Medium and Small Industries, 1953. Amended in 1972.

Resolution for the creation of the National Fund for Industrial Development, 1972.

Presidential Decree granting national industrialists all lawful subsidies on the importation of equipment and devices for the prevention, control, and reduction of pollution caused by fumes, O. J., August 14, 1972.

Federal Law of Sanitary Planification.