

**URBANIZATION AND ENVIRONMENT:  
WHICH SUSTAINABLE HOUSING FOR THE POORS  
OF LATIN AMERICA?**

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**Summary**

Protection of the environment has become a fundamental challenge. Referring to research carried out in Latin America, I would like to support the thesis that a global protection of the natural environment must take into account the problems inherent to urbanization. This is particularly true for Latin America, where urbanization affects over 70% of the total population.

Urban growth in Latin America is characterized by an ever increasing demographic concentration in the metropolises and by a growing proportion of precarious housing. There is a penury of dwellings in Latin American cities. Low-income families are compelled to resort to autoconstruction, although their technical abilities are sometimes limited and credit schemes are not available to them.

Three processes connect environment and development: demographic growth, urbanization and industrialization. Environmental degradation essentially affects the following areas of urban life: water (access to drinking-water, disposal and management of waste water), air (pollution due to energy consumption, to exhaust gas and to industrial production), solid waste (collection and management of household and industrial waste). These types of degradation in natural resources mainly affect the poor who do not have the means to confront them individually.

In conclusion, environmental policies will have to include two essential aims: the improvement of the urban environment and a struggle against poverty. Adequate actions by the public authorities will have to be both global (at the national and the international level) and local. They will depend on participation from the sectors of the population that are directly concerned. In cities, these measures will tend to give priority to the implementation and the maintenance of basic infrastructures in precarious housing neighbourhoods, and also to the control of industrial pollution and the regulation of transportation.

## **1. Introduction**

Over the past few years, protection of the environment has become a fundamental challenge at the international level. The "Earth Summit" (environment and sustainable development) held in Rio de Janeiro in 1991 has provoked a whole series of comments and measures all over the world. This new concern reflects in every sector of human activity. It is directly relevant to the technical and social aspects influencing the way of life of the poorest populations. This is true for rural areas and it also applies to cities.

Urbanization has played a major role in Latin America. It is characterized, first, by the uninterrupted growth of metropolises, by the expansion of precarious housing neighbourhoods, by an increase in poverty and by a degradation of natural resources. Given the fact that over two thirds of this continent's population live and work in cities, it has become urgent that more effort be put into improving their living conditions. This necessarily implies that natural resources be exploited more rationally.

On the basis of research work done in South America, I would like to support the thesis that the demographic, economic and social evolution in the societies of Latin America (and the same would apply to every country in the Third World) will tend to see urban agglomerations playing an increasingly important role in the development of these countries. It is thus no longer possible to design programmes of environmental protection without including measures that aim to improve the use and management of natural

resources within cities. Excluding ecological problems from the reflection on the environment may sooner or later compromise the efforts towards sustainable development for all social strata.

I shall refer, among others, to the relevant data collected by IREC in Bolivia<sup>1</sup> (Bolay et al., 1992), in order to try to show as clearly as possible which paths must be followed towards above aim.

## **2. Latin America, an urban world**

Latin America is endowed with exceptional diversity; industrial countries such as Argentina and Chile have very little in common with poor rural regions such as Bolivia and Guatemala. Yet, this continent relentlessly is becoming an urban world. This is shown, first, by the fact that its urban population, i.e., 267 million inhabitants, amounts to 70% of the total population. Further, urbanization will become even more real in future since, according to the most serious evaluations, at the end of the 20th century city dwellers will make up 75% of the total population (IDB, 1988).

This urbanization phenomenon manifests in an increasingly marked demographic concentration in the metropolises, while regional centres and small cities loose part of their population. In 1990, 35% of the urban population lived in 14 agglomerations with

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<sup>1</sup> IREC (Research Institute on the Build Environment, Swiss Institute of Technology in Lausanne, Switzerland) has carried out research on urban environments in partnership with scientific institutions mainly in Argentina and Bolivia.

a population of over one million inhabitants each. In the year 2000, there will be 57 such metropolises, regrouping 48% of the urban population (UNCHS, 1987). Within less than 10 years, two Latin-Americans out of five will be living in a metropolis.

The same global tendency is found in every Latin American country, including in those where native traditions have survived and where rural economy remains strong. This is the case for Bolivia. This country is one of the poorest in America, with an annual income of 600 \$ per capita. Its urban growth is extremely high, the annual rate being at about 4%. At the end of the century, Bolivia's urban population will amount to 57% of the national population (Salas & Torres, 1990).

Latin American cities have tended to grow faster than those of Asia or Africa. On the other hand, the continent has a low demographic density (17 inhabitants per km<sup>2</sup> as opposed to 31 on average world-wide). Concentration phenomena thus have less to do with overpopulation than with unequal territorial distribution. This imbalance is caused mainly by the migration of rural populations to the cities. In rural regions families do not all own enough ground to survive, government policies have failed to support peasant populations and infrastructures as well as social, educational and sanitary services are lacking (Violich, 1987). Nowadays, the natural growth of new urban populations has become higher than the number of new arrivals. Yet, immigration continues to further the expansion of both small towns and large metropolises (UNCHS, 1987). This is most clear in countries where urbanization is a more

recent phenomenon. As a result of these movements, a relative weakening of the historical centres is found in most Latin American cities; these are losing many of their business and trade functions, without anything replacing them. Suburbs and peripheries are now the dynamic sectors in urban agglomerations, be it with regard to the implantation of industrial and commercial businesses or to the development of human dwellings. This centrifugal tendency in turn raises many important problems: role of public agencies and management of the global urban territory; laws and regulations promoting the development of metropolitan areas; use of the agricultural ground bordering on expansion zones; planification and distribution of urban equipments (Hardoy, 1984).

### **3. Urban economy as an economy of impoverishment**

According to the specialists, the expression that best symbolizes the eighties is that of "the lost decade". While the economic growth produced by industrialization had increased on average by 6% between 1965 and 1980 (Salama & Valier, 1991), the following decade was marked by four problems: international indebtedness, stagnation of production, inflation and loss of buying power. At the worse point in the crisis, in 1987, the debt contracted on external markets amounted to 472 billion dollars (Fottorino, 1992). Economic growth reached only 1%, resulting in a decrease in industrial production and in exports. In many countries (Argentina, Brazil, Bolivia, Peru), an inflation of over 1000% had provoked a

devaluation of national currencies (4 to 5 times in Mexico between 1992 and 1993), a flight of capitals and an increase in the number of destitute families.

Among city dwellers in Latin America, employment mirrored the degradation to which economy as a whole had been submitted during the eighties. The urban middle-class, grown from the development of public administrations and of the service sector, saw its share diminish. Existing inequalities in the distribution of income grew larger. This is an extremely serious evolution, considering that, in 1983, the poorest among the Peruvian population (20%) shared 1.9% of the national income. And it is far from being an exception with regard to the Latin American continent. Everywhere, the financial crisis and hyperinflation provoke a loss of buying power for salaried families. The index of consumption passed from 100 to 70 between 1984 and 1987, rendering numerous goods unaffordable (Violich, 1987).

Desindustrialization and the privatisation of State enterprises have provoked a revitalisation of the informal sector. According to V. Tockmann, the informal urban sector has grown by 6.8% a year between 1980 and 1985, while its share in employment had been relatively stable before this period (30.7% in 1950, 28.7% in 1980). The informal sector thus became the most dynamic one, whereas the private formal sector only grew by 1.2% during the same period of time (Tockman, 1990). This vitality is a result, first, of the fact that nothing hinders the soaring growth of the informal sector (no official registration, no limits to salaries, domestic economy,

relatively weak investments, etc.). Second, it is also a product of the permeability characteristic of the modern market, to which the informal sector is directly connected (underwriting, large numbers of individual activities running in parallel, etc.), and of the goodwill of States that consider the informal sector to be socially adequate with regard to deregulation and structural adjustment policies. Insofar as competition on the employment market continuously increases, the most direct consequence of the growth on the informal sector is a tendency for incomes to become lower. This is confirmed by B. Lautier in his analysis of the situation in Brazil and Colombia. Crisis gives rise to a "decodification" of employment, without any substitution of the jobs lost in industry since the informal sector tends to grow first in trade and services (Lautier, 1989).

#### **4. Precarious housing as the environment in which the majority of city dwellers live**

In Latin American cities, spatial planification follows the rules of social exclusion. This reflects first in the extent to which inhabitants may own (which) ground, since tendencies towards segregation compel poor families and rural immigrants to move to the peripheries and to sub-standard urban zones. Public authorities reinforce these tendencies by financing urban equipments selectively, dependant on the neighbourhood. They are finally aggravated by a system in which banks make the granting of housing credits depend on employment and credit

worthiness (Durand-Lasserve, 1988). According to M. Rochefort, inhabitants react to this discriminatory practice by attempting to solve the problem themselves (autoproduction of shanty towns, large growth of the informal sector, small promotion of construction). All these attempts are only marginally legal and they take no account of city planning regulations (Rochefort, 1988).

**The management of landed property located in the cities is a key area.** First, it defines the city's spatial organisation, with all the technical and infrastructural aspects involved. Second, the integration of the poor to the city, their security, their ability to invest in housing and to be granted credits, all depend on the allotment of landed property. Land policies play an essential role since at the level of urban planning, they combine the forces of the private market with public regulations. On the other hand, they have a decisive function at the social level, for a family's integration in the urban community depends on its access to property. The status now granted to landed property in the cities shows the extent of the problem to which inhabitants and public authorities are being confronted. A. Durand-Lasserve quotes some data relative to Latin American metropolises: in Mexico City, over 6 million individuals, i.e. 40% of the population, live in non-institutionalized environments; in Caracas, this proportion is 34%, in Bogota 59%, in Lima 33% and in Sao Paulo 32% (Durand-Lasserve, 1986).

Although the cities' historical centres play an important role in the integration of immigrants, they are older areas in which buildings

are mainly leased out. Properties are bought most often in the peripheral zones; quite frequently they are part of public zones that cannot be sub-divided without very long administrative procedures (Farvacque-Vitokovic & McAuslin, 1993). This is the case in Peru, where research work done by H. de Soto showed evidence of the slowness and complexity of the steps required. In one case, the adjudication of a piece of public land lasted 43 months and involved 48 official instances, over 207 stages (de Soto, 1986). The State is not always the main landowner. In Mexico, most of the illegally occupied suburban properties are owned by peasant collectivities (ejidos) that overwrite them privately to clandestine squatters (Bolay, 1986). This is why, in the Summer 1993, the government decided to accept reality and to allow the peasant families to sell their properties.

The question of land ownership is, and will remain a tricky problem in Latin America; it will need to be solved within the framework of global urbanization policies. A number of actors will be involved: the State, indirectly through the promulgation of property laws and sometimes more directly, as the owner of much sought after landed property; the local collectivities since they are responsible for the administration of communal land and for the implementation of urban planning projects; big landowners whose properties may be squatted if they are not used or subdivided into allotments.

**Latin America lacks in dwellings for its urban families.** This scarcity obviously has grave consequences at the social level. It

is all the more alarming in view of the fact that even the poorest people declare themselves determined to invest an important part of their financial means in securing shelter for their family (about 8% of the family's budget for the 40% who form the poorest sector of the population in Lima) (Linn, 1983). This apparent contradiction between the housing penury and the individual's search for decent dwellings clearly shows that the mechanisms governing building promotion are not adequate with regard to those urban dwellers who most need housing.

According to the Inter-American Development Bank (1988), between 1985 and the year 2000 127 million persons will try to settle in the cities of Latin America. The formal system will be unable to satisfy an ever increasing need for housing. This is why 50% of the new dwellings are produced via the informal sector (as opposed to 25% in the formal private sector and 25% in the public sector).

One may easily understand that, starting from the sixties, housing has been one of the main focus of urban research in Latin America. At the beginning, the studies aimed at defining the extent and the consequences of urban marginality with regard to the location and precariousness of housing. Later, they focussed on analyzing public policies with a view to showing that their social aims did not reach the people concerned. In the eighties, research concentrated on the social, technical and economical aspects of housing production (autoconstruction, technical assistance, rehabilitation, regulations). More recently, the research has

focussed on the relationship between urban poverty and precarious housing (Valladares & Prates, 1993).

Similar conclusions have been reached for the different countries, although statistical methods varied. According to official sources, almost 270'000 dwellings (corresponding to 23% of the population's needs) are missing in Bolivia, not counting the fact that 560'000 of the existing dwellings do not satisfy minimum sanitary standards (Bolay and al., 1991). In Brazil, with its 154 million inhabitants, the deficit amounts to 7.3 million dwellings and about 60 million Brazilians live in unsatisfactory housing (Meira, 1991). The list could be expanded: one third of the inhabitants of metropolitan Lima live in shanty towns (Vega-Centeno, 1990), 43% of the dwellings in Great Buenos Aires (city and periphery) are build by their users (Leibrandt, 1990), etc. Similar findings apply to Venezuela, Mexico, and elsewhere.

The obstacles slowing down the construction of housing for the most destitute sectors of urban societies are well known. They are extremely difficult to overcome, even though they have consequences for a majority of the urban population (in Bolivia, for instance, 49% of urban families have a monthly income under 75 \$ US): administrative and legal procedures are badly adapted; the poor have no access to public and private schemes of housing credits; income is low; building materials are expensive; basic public infrastructures (drinking water, waste water management, electricity) are far away. Since social demand cannot be satisfied through the formal channels, it generates - so to speak - its own

offer, adapting traditional forms of domestic production to contemporary urban modernity. In the building sector, this process results in autoconstruction.

This reaction of the poor to the lack of housing bears witness to their social dynamism. Yet, one should not forget that it is basically a crisis solution to a situation of social emergency. Either the family and the group decide to take into their own hands their future in the city, or they lose part of their chances for integration. It is thus rational behaviour that moves the poor to adopt what G. Massiah and H.-F. Tribillon call the "filière populaire de production" (the low-income approach to production), as opposed to a modernist approach in which specialists build according to European models (Massiah & Tribillon, 1987).

The problems are rather large. Given the inhabitants' limited financial resources the building process is very slow. In a first step, a rudimentary shelter (often lacking sanitary installations) is erected; it will be progressively consolidated, depending on the means available. The high cost of materials also contributes to slowing down construction. Studies made in Brazil, Colombia and Mexico on the price of cement, bricks, windows and metallic components show that it increases much faster than the income level of workers in the low-income sector (Gilbert & Gugler, 1992).

Low-income housing is characterized above all by a low standard of equipments. A few figures included in the most recent statistics presented by the United Nations Centre for Human Settlements may help compare (UNCHS, 1990). Data concerning, for example,

drinking water supply to the dwellings, sanitary equipments and electricity supply show the most obvious shortcomings. The most recent data on Peru dates from 1981. It shows that, within an urban environment, only 46.3% of dwellings are equipped with sanitary installations and only 17.5% have access to electricity (one may think that this figure does not include the large number of clandestine users). Here is another relatively recent example: in Brazil, 75.8% of urban dwellings have running water, 91.8% have sanitary equipments and 88.5% have electricity. Although very unequal, this global data suggests that the lack of equipments directly depends on the existing infrastructure and that it clearly will be greater in urban zones of recent implantation.

**The financing of housing** is split dependant on the task: public collectivities finance infrastructures and community services; individuals finance the dwellings and their equipments.

Local fiscal revenues remain low, even in countries with an advanced decentralization. In other words, this means that, in their present administrative situation, local collectivities do not have the financial means required to develop and maintain primary infrastructures (garbage collection, sewage system), networks (water and electricity) and public services (administration, security, social, health, education<sup>2</sup>). The solutions that are normally adopted tend to favour residential neighbourhoods and industrial or commercial zones in which the most rewarding tax-

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<sup>2</sup> The last three items frequently depend on regional or national agencies and are part of different budgets.

payers live and work, and to neglect the zones of precarious housing, since their inhabitants do not play a really important role as tax-payers. In the last decade a reassuring evolution has taken place, in which urban planning projects have been implemented that require their users to pay for part of their cost. This "consumption tax" depends on legal ownership, on the utilisation of water or electricity, etc. It is less social than direct taxes, since it depends on the use of the available public services rather than on declared income.

The World Bank has shown that a lack of infrastructures carries a high price, both for collectivities and for individuals (for instance, in Mexico traffic jams slow down the transportation of goods and thus reduces the possible savings brought by mass production; in Sao Paolo, there are twice as many cars as telephones and this obviously affects the speed and the cost of communication, as well as the amount of pollution engendered) (Cohen, 1991). These constraints may be seen as local problems, but they nevertheless have macro-economic consequences. In the long run, the improvement of infrastructures and the reorganization of their management are productive.

On the other hand, the financing of housing for the poor is made more difficult by the fact that it involves actors who are not equal, both in terms of their nature and of their power: central State, public banks, private credit institutes, and individuals. It also involves a process of institutionalization adapted to the needs and the financial means of the populations concerned (this is the aim

of the implementation of a National Plan for Low-Income Housing in Bolivia (PNVP)<sup>3</sup>). Experiences of this type have remained rare in Latin America, or very limited in their scope.<sup>4</sup> This does not mean that there have been no large national programmes. On the contrary, as J. Hardoy and D. Satterthwaite write (1989), starting in the sixties numerous governments (Argentina, Brazil, Mexico, Venezuela, Chile, Panama, etc.) launched vast programmes for social housing; but the results have been very disappointing: limited number of units built, dissatisfaction of beneficiaries, exclusion of truly needy populations, decapitalization of funds.

Nevertheless, a few positive examples can be found. We may consider particularly noteworthy the programme developed by FONHAPO (National Fund for Low-Income Housing) in Mexico; for more than ten years it has focused on financing housing for low-income families (Garcia & Raeber, 1993). However, this type of policy requires public subsidies (for the bank loan and the property, and also for tax exemption) that are not easily available at times of low conjuncture (Renaud, 1984). This is exactly what happened to the credits granted by the World Bank in Bolivia: they are no longer used for financing low-income housing, because this sector is considered to be too "political". The Inter-American

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<sup>3</sup> See in particular chapters 4 and 5 in: Bolay Jean-Claude, Cunha Antonio, Waas Eveline, Cruz Mabel et al. (1992) "Habitat populaire et pauvreté urbaine en Amérique latine, vers une nouvelle politique du logement en Bolivie", published by IREC/EPFL, Lausanne.

<sup>4</sup> This is shown by the case studies from different countries presented in: REALTORS (1990) "The Key to Housing for All: Public/Private Partnerships", Third International Shelter Conference, Washington DC, April 24-30, 1990.

Development Bank has also modified its strategy. It has gradually given up the projects designed to finance housing and moved to the sanitation of allotments (ground and services) and of primitive shelters, as well as to the development of infrastructures, neighbourhoods and community services. Thus, financing of housing remains for the most part in the hands of the private sector (the banks, but also insurance societies and credit cooperatives, and even usury<sup>5</sup>).

Experience may lead one to say that public bureaucracy is not sufficiently flexible and efficient to manage housing for the poor. Nevertheless, an adequate legal and financial frame must be provided by the State. This is shown by experiences made in Bolivia, where an inadequate system showed its weak points: since the State did not guarantee financing in the informal sector, commercial banks and the National Fund for Social Housing (FONVIS, a public institution) limited access to their loans to the employed; insurance companies and credit cooperatives opened towards people working in the informal sector, but granted only limited funds to be invested in productive projects with direct returns; a few NGOs tried out housing aid on a very limited scale. All these restrictions have direct consequences for low-income housing: construction is slow, the techniques used are primitive,

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<sup>5</sup> Usury being the solution used by numerous inhabitants in the low-income neighbourhoods of Bolivia when they need a loan. Although usurers ("prestamistas") ask for very high interest rates (5 to 10% per month as opposed to 15% per year for the banks), they have the advantage that they are satisfied with a personal guarantee and that they provide the funds immediately.

there is a lack of equipments, and credits are very expensive for those who need them most.

In future, there will be a need for non-conventional instruments to be used for housing financing and implementing for low-income groups in each country (UNCHS, 1984). Failing that, the precariousness now more than ever typical of the way of life of low-income groups in the urban societies of Latin America will tend to become worse and more widespread.

## **5. Environment and natural resources — relevance for urban life?**

The paradigm of growth, as found in Western industrialized societies, was used as a basis for elaborating models of development for the Third World countries (Waaub, 1991). This paradigm rests on a number of beliefs that have now been abandoned: unlimited availability of natural resources, continuous progress, ability of science and technology to solve every problem, individual freedom and sacred right to private ownership. The permanency of poverty and the increasing gaps between social groups have put in question a development model centring only on economic growth.<sup>6</sup> The ecological problems that have

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<sup>6</sup> UNDP suggests a different classification based on a new indicator serving to evaluate human development and combining life expectancy, level of education and level of income. See:

PNUD (1992) "Rapport mondial sur le développement humain 1992", published by Economica, Paris.

appeared at the level of the biosphere have induced a conscious realization of the fact that economic development depends on natural resources, renewable or not.

In a definition of ecological development dating back to 1980, I. Sachs (1980) presented a clear synthesis of the relationship that must link development and environment: "Ecodevelopment is self-development by the populations concerned, using the natural resources as best as possible and adapting to an environment which they transform without destroying". This is very different from world economy and delocalization! All the same, Sachs' principles greatly influenced international organizations in defining what is now called "sustainable development". Sustainable development may be seen as a process in which a new position is attributed to man and his (economic, social and biological) activities within the biosphere's self-regulating system. At a more pragmatic level, the Bruntland Report presented by the World Commission on Environment (1987) mentions that development must satisfy our present needs without jeopardizing the possibility that future generations will have of satisfying theirs. The various dimensions must thus be seen as interdependent and in continuous evolution, together with their environment. According to J.-F. Waab, this means that economic aspects no longer prevail. On the basis of this vision, the ecosystem is approached differently: it becomes a capital that should not be used on short term (over-exploitation of resources). The preservation of the environment implies that a price must be paid not only for production, but also for maintaining the factors that serve to

reproduce resources (the costs being paid by those responsible for them).

A. Benachenhou considers that three main processes link environment and development: the population, urbanization and industrialization (Benachenhou, 1992). The acceleration of the demographic growth world-wide is expected to continue (from 7.6 to 8.6 billion people in 2025), but will greatly vary depending on the region. In 2025, 61% of the world population will have been urbanized; this may be accompanied by a degradation of the environment, a growth in water and air pollution, and by negative effects on adjacent rural regions. The industrialization of developing countries raises their energy consumption and this has direct effects on chemical pollution. What is more, the rapid speed at which world economy has transformed and the apparition of new industrial poles will contribute to further endanger an environment whose situation is already worrying (pollution of rivers and lakes, degradation of flora and fauna, deforestation and desertification, etc.).

There the question of the urban environment is of immediate interest, considering that, in developing countries, the three processes mentioned by the above author combine the following: the effects of demographic growth are strongest in the cities; it is also in the cities that industry concentrates; and finally, being the places where power and decisions are grouped, the cities often decide on the future of rural zones (Rossel & Bolay).

The United Nations Centre for Human Settlements supports this approach when it stresses the importance of urban problems and of the struggle against poverty, within a strategic approach to sustainable development (UNCHS, 1991). I quote the passage concerning the role of cities: "The largest, most varied and most innovative settlements, i.e. the cities and megapoles, clearly will have to play the most important role; they must be the source of new governmental policies and programmes aiming to fight poverty and to improve life and work conditions". The next quote concerns the strategies to be followed: "There is no instrument that more adequately redistributes income within a democratic society than the supply of efficient services to the poorest sectors of the population... Any improvement brought to zones of low-income housing will bring better quality of life to a very large sector of the population".

Such a global conception of environment involves the risk that anyone may refer to it without explicating it; this would make impossible any debate and any criticism. It is thus necessary to define the ecological areas which must be protected in priority in order to improve the quality of life in the urban context in general and more specifically the housing conditions of resident populations.

We must thus precisely define the fields of intervention and the mechanisms involved. In a report on the question of development and environment (Steer and al., 1992), the World Bank enumerates the main areas in which a degradation in the quality

of the environment has been registered. These are: drinking water and sanitation; air pollution; solid and dangerous waste; soils; deforestation; loss of biodiversity; changes in the atmosphere. All these areas are connected to human activity. The first three, i.e., water, air and waste, directly affect life in the cities. The resulting environmental disfunctions have negative effects on health and on economic productivity.

The built environment typical of industrialization transforms space into large, increasingly permeable zones, making water management by means of infiltration almost impossible (White, 1989). Technical replacement solutions are thus required. The same applies to urban green spaces (parks, fields and forests) where natural recycling of atmospheric pollution becomes slower as they become spatially smaller.

The access to **drinking water** remains extremely problematic, due to contamination of this natural resource. The most usual type of contamination is due to human excrements and becomes especially critical in cities that have not been able to invest in filtering systems. We should also note that some contamination is due to pollutants such as used waters and industrial waste (toxic chemical substances and heavy metals).

As the pollution of surface water was getting worse and the filtering costs increased, public services and users have turned to

exploiting ground-water reserves<sup>7</sup>. Ground-water may be better protected but it is not immune to infiltration by noxious substances; recycling is much slower. In agricultural regions and industrial urban zones, chemical pollutants infiltrate ground-water through a process of alluvial formation. In Latin America, the quantity of pollutants penetrating ground-water reserves doubles every 15 years.

Filtering systems for used waters is an essential part of urban infrastructures and of disease prevention. It is in the large cities that health risks are greatest; thus, in urban centres the drainage of waste water is indispensable. Yet, its management has not been improved much. Where they exist, sewers empty into the rivers, lakes or seas, depending on the location of the city, and they pollute surface water. In peripheral zones of precarious housing, septic tanks are still frequently used and contaminate the ground-water. Only 2% of the water used in Latin America is actually processed. In Argentina, one of the richest countries on the continent, only 67% of the urban population have drinking water at home, and only 37% of these homes are connected to a sewer (Di Pace and al., 1992).

Water transmitted diseases have an extremely serious impact on children and on the poor, who are most directly exposed to them.

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<sup>7</sup> Metropolitan Mexico expands over a dried-out lake; after the ground-water reserve under the city had been overexploited, the ground receded. This had disastrous consequences for the sewage system and the architectonic patrimony (the most spectacular case being that of the Basilica of Our Lady of Guadalupe, which had to be closed).

Unclean water that is drunk or used to wash up causes diarrhoeic diseases that sometimes bring death.

**Air pollution** is due to three main causes: the utilisation of energy, exhaust gas produced by motor vehicles and industrial production. All three will tend to increase parallel to economic growth unless corrective measures are implemented.

Air pollution is directly related to urbanization because urbanization brings an increase in energy consumption. It is known that most industrial enterprises, and especially those in the poorest urban regions, do not process "dirty smokes" to reduce pollution. There, the concentration of particules in the air is often higher than the norms considered acceptable by WHO. It can provoke permanent lesions of the respiratory system (in metropolitan Mexico, 90% of the respiratory infections and diseases registered between 1972 and 1983 were due to air pollution)(UNCHS, 1897).

In agglomerations where the number of cars rapidly increases, the lead contained in exhaust fumes is extremely noxious (in Mexico, where 95% of the petrol used still contains lead, 29% of children suffer from an excessive concentration of lead in their blood; this lead excess may be responsible for 20% of cases of hypertension). Fuels with a high content of sulphur also pollute the air, by producing concentrations of sulphur dioxide.

The **use of biomass** (wood, straw, dried dung) for heating and cooking is a basically rural phenomenon. However, it may be

practiced in the poorest urban zones where this is the only combustible that people can afford. It also produces an alarming concentration of noxious particles that remain suspended in the air.

Many cities produce more **solid waste** than they can eliminate or manage. It is estimated that 30 to 50% of the solid waste produced by urban centres are not collected and pile up on abandoned lots or in the streets. The lack of passable roads in the most underprivileged urban zones, together with bad maintenance, makes it impossible for garbage collection services to function regularly (one third of Sao Paolo's population lives in zones without garbage collection; in Bogota, 2500 tons of waste remain uncollected every day).

The problems deriving from garbage heaps are obvious. They stink throughout the neighbourhood, but they also attract animals (rats, mosquitoes, flies, etc.) that may carry endemic diseases. They frequently clog up sewage and drainage systems and sometimes even the streets.

Apart from waste collection, the problem of waste management is acute. Great masses of waste are generally deposited on open dumps where control is scanty and the refuse remains unsorted. Many risks exist: infiltration of ground water, combustion, emission of gas, and even explosion. As we see, solid waste plays an important role in polluting the soil, the water and the air.

Apart from household waste, the industry and hospitals produce other types of solid waste (heavy metal, chemicals, etc.). These can be dangerous and very toxic; to avoid any grave repercussions, they must be specifically treated, so that neither humans nor nature comes into contact with them. They must be stored at adequate locations and under control. This is rarely the case in Latin America. On the West Coast, heavy metals have been found on practically every municipal dump, together with strong concentrations of mercury, copper and cadmium in some species of fish. In recent years, highly toxic waste has also been transferred from industrialized countries to regions with less strict laws, e.g., the region situated on Mexico's Northern border receives toxic waste coming from the United States.

There is an enormous risk that the incompatibilities between urbanization and environment will increase, unless measures are taken very soon to implement urban planning projects focussing on preserving natural resources within the most affected housing zones. There also is a risk that projects designed to protect the ecosystem and implemented in rural regions will have little impact, unless they are coordinated with adequate urban policies.

## **6. What environment for urban Bolivia?**

Bolivia is one of the poorest countries in Latin America. After a period of political trouble and instability, it found its way to democracy after 1982; its economy, then very unstable, has been totally reorganized. This restructuration was led by the Bolivian government with the support of the International Monetary Fund and of the World Bank; it has helped stabilize the country's monetary situation. Numerous industrial enterprises (amongst which the mines) were closed down because they didn't earn enough profit; many workers lost their job. Thus, although its economy is stagnating, Bolivia is going through a process of reorganization of its State institutions and of administrative decentralization. And it is within this difficult context that its cities are growing more and more rapidly (4.4% annual rate).

Many indices clearly show the deterioration of living conditions in urban environments, even though it is difficult to get systematic information on the topic. To this day, no study has focussed on the urban environment as such.

A number of indicators may help define the problem of urban pollution, using the relationship between causative factors and their effects on the main areas of pollution, i.e., on water, air and waste (Paterson and al., 1988).

Economically speaking, Bolivian industry is not very powerful. Basically, it still produces on a small scale, with the exception of a few large firms. Industry is based mainly on the exploitation of local

raw materials (foodstuffs, chemicals and gas) and orientated towards the domestic market. Only 4.1% of Bolivian industrial enterprises have more than 100 employees. The secondary sector is thus weak, but it is interesting to know that 70% of the national production is concentrated in the three main urban agglomerations (La Paz, Cochabamba, Santa Cruz).

On the other hand, the productivity and the efficiency of the economic system are being slowed down by the state of the transportation infrastructure. Only 5% of the roads are tarred. Transportation by rail is very expensive (twice as expensive as in Argentina or in Brazil) and rarely used, although it would be more adequate from the point of view of ecology.

The brief informations given above confirm that, in Bolivia, the most considerable damage to the natural resources, resulting from man's activities within urban surroundings, concentrates in the three main agglomerations mentioned before. Migratory fluxes from rural regions flow toward these three cities. In the eighties, they have shown an annual rate of demographic growth reaching 3.4% in La Paz (1 million inhabitants, including El Alto, a poor periphery), 5.8% in Cochabamba (400'000 inhabitants) and 6.2% in Santa Cruz (530'000 inhabitants) (INE, 1989). 30% of the national population live in these cities alone.

As far as urban infrastructures are concerned, the researchers employed by the Urban Institute consider the main problem to be connected with water. Because the drinking water supply and the elimination of waste water are not sufficient, the whole country

suffers from a high rate of mortality in children (142 per thousand on average, and in some regions there are twice as many).

In La Paz and Santa Cruz, the question of waste water elimination is particularly dramatic: in La Paz, an extremely mountainous topography makes the installation of equipments extremely difficult and technically expensive; as a city built on a plateau that is often inundated, Santa Cruz suffers from the reverse problem.

In the historical centres of the three cities, up to 75% of the inhabitants benefit from drinking water supply; but in their peripheral zones, where low-income families live, this proportion is only 50 to 60%. As for the elimination of waste water, it doesn't reach more than 50% of any urban zone.

Cochabamba and Santa Cruz recently have inaugurated their first filtering plants. These remain rare at the national level, since up to this day no other Bolivian city has built a system of water recycling.

The environment is also put at a particularly high risk by the low number of waste collection systems. Only 30 to 40% of solid waste is collected, this figure applying to all Bolivian cities. Household garbage, waste from industry and from the hospitals are never separated. And when they are collected, they are stored in open dumps lacking any technical control.

Finally, we must add that the lack of infrastructures and public services reflects on the degree to which housing has sanitary equipments. A large proportion of dwellings does not satisfy basic hygienic criteria: 74.1% of urban dwellings have no running water,

while 73.1% have no sanitary installations and 22.8% no electricity. Although we have used data dating from 1976, we believe that, in view of the low level of investment since then, the situation cannot have improved. On top of this, the housing penury now probably has reached about 300'000 units (in the cities mainly). 75% of the Bolivian population lives in dwellings where more than 5 people share a room. This obviously has important repercussions on the physical and psychic health of the population concerned.

The few informations that we have mentioned clearly show the extent of the ecological problem in Bolivian cities, and more specifically in the largest ones and in the most underprivileged neighbourhoods of their peripheries. We could have quoted more data to complete our overview. Control of atmospheric pollution is nil and to this day no measure has been taken to try and limit the effects of traffic on air quality. Leadless petrol is not sold in Bolivia and motor vehicles do not have to pass a technical test. We could also have mentioned the systematic deforestation of new urban zones and the lack of green spaces in existing precarious housing zones. This "ecological desertification" of urban zones is particularly obvious in El Alto, a suburb of La Paz situated at an altitude of over 4000 meters. According to the book written by G. Sandoval, El Alto is certainly the most abandoned urban zone in the country: "In El Alto, public services are allotted according to the logics of a selective and marginalizing process of urbanization." (Sandoval, 1989).

Local and national public authorities must make a very serious effort to stop these destructive tendencies. During the past few years, no single department of the Ministry of Urban Affairs<sup>8</sup> has succeeded in adopting and implementing measures protecting the cities' natural resources.<sup>9</sup>

Local administrations are the first to be confronted with the problems; but they lack the means, the strategies and the competencies required to start reacting. The decentralization efforts made by the Government at the political and administrative level will probably bring some improvements, so that environment is given greater priority when technical and financial means are being invested.

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<sup>8</sup> This Ministry existed as an independent entity up to August 1993; the new Government has now integrated it in a super-ministry of Human Development.

<sup>9</sup> We should add that a National Office of the Environment had been created within the Ministry of Urban Affairs; it had an extremely limited number of personnel.

## 7. **Conclusions: an environment for the urban poor, how?**

In Latin American cities, **the poor live precisely where all the ecological problems are concentrated**. On the one hand, the "misplanning" of the context in which they live makes them the main victims of urban pollution. The United Nations Centre for Human Settlements calls this context "the environment of poverty". The low economic resources of the inhabitants make it impossible for them, as individuals, to avoid the noxious effects of contamination. On the other hand, the living conditions in these sectors of society inevitably produce pollution.

**Preservation of the environment is fundamental to a sustainable development.** The measures taken to fight the degradation of natural resources must take into account the pair urbanization/industrialization. This is what will define the economic and social development of Third World countries in general, and even more so of the countries in Latin America.

To be efficient, the policies aimed at improving the urban environment must be **global and local, direct and indirect**, all at the same time. The few recommendations that we present in conclusion mainly concern the improvement of the precarious housing in which the urban poor live.

The inhabitants of precarious housing neighbourhoods are acutely aware of the negative consequences brought by the degradation of natural resources. One needs only to think of water pollution, of

the garbage dumps that cover public spaces and of the chronic diseases caused by polluted air. These people are thus willing to participate, to collaborate in such a way that their life environment may improve. **Any incentive policy must be participative** and must integrate the proposals made by the groups that are directly affected.

**Local public collectivities** play a key role in the implementation of measures concerning the urban environment in underprivileged neighbourhoods. They must install basic drinking water infrastructures (sewers, dispensers, etc.) and equipments for the management of used water (sewage, drainable tanks). They must also see to it that streets are built within the neighbourhoods, making it possible to collect garbage and to evacuate waste. The location of ground-water reserves and the porosity of the soils must be studied, so that measures may be taken that will guarantee water quality (mainly with regard to the elimination of excrements and to the utilisation of wells). These initiatives must be accompanied by a (public and private) transportation policy that will aim at lowering the impact of this sector on air quality. Similarly, local and regional authorities must coordinate their efforts and promulgate industrial laws and regulations that include the recycling of waste (gas, liquids and solids).

**The cost of the installation and maintenance of water and waste elimination networks must be shared by the whole population of the city.** The cost of these installations for low-income groups can be lowered if community associations do a

share of the public works (maintenance of streets and drainage systems; centralization, sorting and recycling of garbage; installation of equipments in the dwellings, etc.). This cost can also be lowered through an efficient administration of this sector (in particular through the use of a business type of management: monopoly, privatisation, etc., within a legal framework imposing an ecological approach).

**These actions must be taken in priority in precarious housing zones. They must be accompanied by measures affecting the whole agglomeration.** Transportation systems<sup>10</sup> and industry are the main sources of water and air degradation. Incentive and coercive measures must be implemented, lowering the degree of toxicity of carburants, guaranteeing that motor vehicles are being serviced, promoting "clean" public transportation systems. Industrial enterprises must be encouraged to better manage pollution (filtering of gas, recycling of water, tax on pollution).<sup>11</sup>

**The efficiency of such measures depends on their administrative and legal framework, and on the manner in which they are applied.** Local measures implemented in neighbourhoods must be grounded on a **decentralization of public services in each urban zone** (district or other), and mainly

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<sup>10</sup> In Mexico, transportation systems are responsible for 48% of the air pollution, in Steer Andrew et al. (1992), p. 78.

<sup>11</sup> I shall not insist on the positive consequences for the cities of ecological measures taken at the international, national and rural level. These may obviously be considered to indirectly contribute to the preservation of the urban environment.

in underprivileged neighbourhoods. The proximity of public services stimulates the participation of community groups. **Whenever possible, public collectivities should delegate the execution of the work to specialized local businesses**, while they constantly re-orientate their policies by adapting rules to the local situation and supervise the operations. Organisation should be such that it is efficient with regard to strategy, planification, programming, monitoring, evaluation, and participation of the people concerned.

A policy aimed at restricting the utilisation of natural resources may create in each city a legal and administrative system that will dissuade rather than encourage. It may also provoke the departure of businesses and thus the loss of jobs, or eliminate clandestine activities. In order for this to be avoided, **four postulates** must be respected: **the promulgation of local laws and regulations is indispensable but not sufficient; it must be integrated in a coherent whole at the regional and national level**; a local policy preserving the urban environment is costly and implies that the **tax system be fair to the population as a whole**<sup>12</sup>, providing the authorities with the funds that will allow them to act; in order to be able to **participate** in the local struggle against the degradation of natural resources, the poorest sector of the urban population, i.e. the people in the informal sector, must have access to public and private credit schemes; users must be

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<sup>12</sup> Meaning both direct taxes (on revenue and wealth) and indirect ones (value-added taxes, taxes on pollution).

**informed on a permanent basis**, so as they are aware of the (economic and human) costs and benefits involved in the preservation of the environment.

In conclusion, we must remember that the preservation of the environment cannot be dissociated from the demographic, social and economic policies aimed at fighting poverty. It also goes hand in hand with urbanization policies aiming to promote sanitary housing for the majority of the population. **By their nature, impacts on the ecology concern whole regions, thus directly interconnecting urban agglomerations and rural areas. Environment, poverty and urbanization must be considered as interdependent; programmes of sustainable development must be grounded on their relationship** if we are not just to cure a few symptoms without eliminating their deeper causes.

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