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From Development to Sustainable Development: Stakes and Issues Around the Sustainable City

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1.1. Introduction

The concept of development reflects a moment in the history of economic thought that itself reflects the designs of a historical period that seems not only to be finished, but an extension of which might be part of a vision of "the end of the world". Indeed, the reference period for economic growth and development is constituted by the so-called *Trente Glorieueses* ("thirty glorious years"), a period during which Western economies experienced a particularly sustained and constant average level of growth[1]. From the beginning of the 1980s, the outlook has changed considerably, both quantitatively and qualitatively, mainly with the liberalization of the world market and the liberalization of trade at the global level at the same time

1. For example, the French economy grew by 5.6% per year on average, meaning that growth rates might be around 3% during periods of recession, while more prosperous periods attained rates close to 8% per year. For the record, for the last several decades, these same economies have struggled to reach levels equal to those of the recession phases of this period.

On this subject, see Lorenzi, J.-H. et al. (1980). *La crise du 20ème siècle*. Oeconomica.

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as the massive financialization of what we may describe as a "world economy". As deregulation increases over time, and the process of liberalization and financialization of the economy accelerates, the number of financial, banking, stock market crises and even so-called "twin" crises, increases dangerously.

> Financial crises have shaken the world economy almost without interruption for 10 years. They have been especially frequent and profound for the economies most recently integrated into international financial flows, while economies with a long tradition of financial intermediation have been less severely affected.[2]

Given this, we may be surprised at the persistence of the search for endless growth and development whose costs, in the end, may outweigh the benefits they claim to bring. As some have stressed, the constant reference to development has thus become more of an ideological, even dogmatic reference aimed at masking the dangers of an immutable faith in this same development, even though we see its attendant risks and dangers on the horizon: namely climate change, loss of biodiversity, danger to fisheries' resources and oceans, depletion of fossil fuels, etc. In short, a set of environmental crises that by nature lead on to others and which seem, for some, increasingly serious[3].

Our presentation below aims to interrogate, not the crises in themselves, their origin, their course and their consequences, but development itself; from the birth of the concept to its mechanisms and the directions toward which it tends, despite itself. Furthermore, it is also worthwhile to question what it generates and what it leads to overall. We have also seen the emergence of a new, appropriate concept, that of sustainable development, which is consubstantial with it and intended to respond to the consequences of global economic development, which has led the planet to its present situation. Our focus here in this description remains critical insofar as, even if it aims to be sustainable, development breathes the polluted air of a system whose only evidence is manifest, today, in the bleak outlook that all environmental experts are predicting for us. Growth and development are two concepts whose significance is now felt in the very future of humanity, and which threatens humanity and our environment in its long-term survival on the planet. The

2. Boyer, R. et al. (2004). *Les crises financières*. La documentation française. From the viewpoint of 2020, crises have shaken developed and developing economies for more than 50 years if the point of reference remains the oil crisis of 1973. The rhythm and frequency of crises seems to have increased significantly from the 1990s, that is, with the liberalization of the globalized economy.

3. To realize this, it is enough to give a cursory reading of the reports of the Intergovernmental Panel on Climate Change (IPCC).

principle of denial that drives climate skeptics does not change the fate that awaits us if we continue on this path. In this context, can the sustainable city, heir to the ecological city, find its place and contribute to improving environmental living conditions? The demographic explosion, the pressure imposed by a new urbanism, the emergence of giant urban structures that bring together tens of millions of inhabitants in often deplorable conditions: can they reform themselves to the point of becoming exemplary in terms of respect for the environment; that is, respect for life? Because if the urban population, as expected, will represent between 70% and 80% of the world's population by 2050, we will have to find the means to make the necessary changes required by this situation. Especially since, as we shall see, one of the essential pillars of sustainable development lies in generous social policies, which respect and enable everyone to live decently in a world that respects nature.

Consequently, questions abound: how do we admit the possibility of infinite development (and/or growth) in a finite world? Why insist on policies of development and growth which remain very worrying in terms of their effects and consequences? Is it possible to organize an overburdened urban system with a growing population in the process of impoverishment? Ultimately, can the principle of sustainability promoted by some respond to a situation that is difficult to maintain over the long term? Throughout our presentation, we aim to put these issues into perspective with the sole purpose of inviting everyone to reflect on a state of affairs which results from history and which should guide us toward a better future.

1.2. Development: a concept, a history and its limits

The deliberate choice to use the term development as a concept capable of accounting for specific economic phenomena, particularly in terms of urbanism, results from a double stance. On the one hand, the concept itself of development (and therefore sustainable development) implies a singular reading of the evolution of the global economy in its relationship with the environment (natural and social), which we believe is necessary to account for in order to properly understand its workings, meaning and scope; on the other hand, and consequently, the question then becomes whether the answers thus provided (and in the process of being so) are likely to resolve the vital issues for the future that they claim to satisfy. Also, if the future of the planet, as well as that of cities, is indeed at stake here, we therefore understand the importance of the subject: understanding what is at stake at the planetary level in terms of perspective, bringing together in the present framework the elements of this understanding, and developing the arguments which lead us to this knowledge, as many factors as we wish to highlight. Therefore, for all practical purposes, we put into perspective the relative importance of the concept itself, its immersion in the real world, as well as its ability to answer (or not) the crucial

questions that we raise. Moreover, if we think that a single definition is not enough to shed light on the debate, we propose opening it to a broader theme which would tend to show the scope and meaning of the concept of development.

1.2.1. *The question of economic development*

In the context of this presentation, we cannot avoid the most classic definition of development, particularly starting with that which is most cited as well as the most shared: that of F. Perroux for whom "development is the combination of mental and social changes which enable cumulative and sustainable growth of its real and overall product"[4]. Or again, "the combination of mental and social changes in a population that makes it capable of cumulatively and sustainably growing its overall real product"[5]. In the same text referenced, the author hastens to distinguish, rightly, the development of growth which he defines as "the sustained increase of an indicator of dimension for the nation: the overall gross or net product, in real terms"[6].

The author takes care to distinguish the definition of development from that of economic growth, to which he gives a more quantitative content. That said and beyond this semantic aspect, the fact remains that the concept of development cannot be fundamentally separated from the concept of growth, with the second

4. Perroux, F. (1961). Qu'est ce que le développement ? *Revue " Etudes "*. January, p. 16.
This definition is taken up and argued in the journal "Tiers Monde" – 1966 – p. 239-250 – Les blocages de la croissance et du développement. La croissance, le développement, les progrès, le progrès (définitions). We will see the importance further on, that what might seem like a detail in this presentation in fact constitutes a moment of revelation for the origin of the concept itself, thus giving it a singular significance.

5. Perroux, F. (1964). *L'économie du XXème siècle*. PUF.

6. Perroux, F. (1961), op. cit., p. 16/17.
As an example, we present some definitions below: development constitutes "a process of transformation of a society's structures linked to growth. It indicates a long-term process and applies to all social and economic structures", while "growth is a long-term process which is manifested in an increase in the characteristic dimensions of the economy and by a transformation of society's structures".
Bernard, Y. and Colli, J.-C. (1976). *Vocabulaire économique et financier*. Le Seuil.
Gauchon, P. (1994). *Vocabulaire d'actualité économique*. Ellipses. The definition of development corresponds point by point to that cited from F. Perroux. As for growth, it is a "sustainable phenomenon of expansion of the economy as measured by several indices (GDP, GNP)" and therefore a "quantitative phenomenon, even if we admit qualitative transformations resulting from this phenomenon".

constituting a precondition for the first. Growth is in fact the result of a net increase in wealth produced, generally measured by gross domestic product (GDP), that is, by the sum of added values created during the reference period. It therefore involves a new creation in the form of new goods and services which circulate and are exchanged within the economy. Development involves a set of structures that integrate in time and space, a general progress of society within the framework of networks of societal relations, which associate complex sets involving both quantitative (disposable income, level of consumption, etc.) and qualitative aspects (modification of mental structures, cultural aspects, social habits, etc.). In addition, development introduces changes over time within the economic system as well as in its organization, which must adapt to new conditions that also result from the conditions of growth. In a certain way, we can see that development plays a role in framing growth, is distinct from it, and is based on a broader apprehension than the concept of growth which remains purely quantitative. However, it must be noted that the economic literature does not hesitate to reduce the concept of development to that of growth, often by assimilating the former to the latter to better emphasize the significance of the purely economic component over societal factors.

1.2.2. *A brief history of a concept*

As Paul Bairoch notes[7], in a chapter devoted to development, this concept is not short on ambiguities, especially since it appeared quite late in economic literature, toward the end of the 1940s. The author defines development as "the set of economic, social, technical and institutional changes linked to the increase in the standard of living resulting from technical and organizational changes"[8]. Therefore, in this case, the notion of development merges with the idea of structural changes which produce effects at both qualitative and quantitative levels. In this respect, development is quite clearly distinct from growth. In reality, the principle of growth is limited to quantitative increase in volume and therefore of "per capita" production, whereas development implies and integrates more qualitative, more "societal" changes, that is, in a certain way, outside the purely economic field. We can therefore speak of economic growth without implying the idea of development, while the opposite seems more delicate because of the broader references suggested by the latter concept.

If we return to the history of the concept of development, its emergence as such is first associated with that of "underdevelopment"; the two concepts will remain linked because they mutually imply each other. This is because, in English as in

7. Bairoch, P. (1990). Le développement. In *Encyclopédie économique*, Greffe, X., Mairesse, J., Reiffers, J.-L. (eds). Oeconomica, p. 133.

8. Bairoch, op. cit., p. 134.

French, the real meaning of the concept is above all associated with awareness of the problems posed by underdevelopment: the concept of development indeed proceeds from its "negative", namely underdevelopment. Indeed, during his inaugural address in 1949, President Truman posed, as a pillar of his economic policy, active support for Western economies that oscillated between three differentiated strands. On the one hand, support for the new organization of the world, notably within the framework of the United Nations; on the other hand, a large effort (albeit to the benefit of the American economy) in favor of the reconstruction of Western Europe (the Marshall Plan); finally, as part of a vast joint effort to defend the same geopolitical zone with the creation of NATO in the face of the Soviet threat. Faced with these first very precise points as to their objectives (history has clearly shown this), a fourth aspect emerges: to recognize the need for aid to the most disadvantaged nations, aid similar to that granted to Latin American countries. The additional point of Truman's speech (also called "point IV") was to mark what would be called the "age of development"[9]. This text appears to be the foundation, even the ordering, of a new world system organized around the American economy, which would spread its benefits. It thus comes to sanction a new vision of the world whose epicenter is constituted by the most powerful economy from a double point of view: on the one hand, by discrediting the old colonial system which only generated misery and poverty; and on the other hand, by positing development for all and for each as an essential paradigm, development adorned with all the "civilizational" virtues. In reality – and contemporary history has amply shown this to date – the objective sought lies mainly in the conditions thus defined for undivided domination of the economy, with all the environmental consequences that this has had for the planet[10].

9. See on this subject the developments of Rist, G. (2019). *Le développement – Histoire d'une croyance occidentale*. Sciences Po Les Presses, pp. 131–149.

The introduction to point 4 of Truman's speech is as follows: "Fourth, we must embark on a bold new program for making the benefits of our scientific advances and industrial progress available for the improvement and growth of underdeveloped areas. More than half the people of the world are living in conditions approaching misery. Their food is inadequate. They are victims of disease. Their economic life is primitive and stagnant. Their poverty is a handicap and a threat both to them and to more prosperous areas. For the first time in history, humanity possesses the knowledge and skill to relieve the suffering of these people." Rist, op. cit., p. 134.

10. Obviously, we cannot ignore the role played by the Soviet Union in this duality of opponents who, in their specific dynamic, contributed in the same way to the environmental destruction of the planet. Our approach here is the origin and meaning of development as a concept specific to Western economies. In any case, the end of the USSR in 1989 brought a definitive close to the debate.

In this perspective, namely the relativization of the concept of development, we cannot fail to refer to the perspective which has enriched this concept, to the extent that several "schools" of economic thought have attempted to appropriate its meaning, its content, perhaps even the ideological cover to which it ultimately belongs. We will distinguish three approaches closely related to the ideological environment of those who produced them.

– The "orthodox" or even neoliberal approach, according to which a state of underdevelopment would be associated with a previous situation of economic evolution, thus only implying a circumstantial delay. This view is based on a method of revisiting the history of Western economies as proposed by W.W. Rostow[11]. This delay is not explained but simply described, and could be quickly compensated for if the countries concerned accepted a strong integration of their economies into the global market. Indeed, by specializing in the production of goods in which they enjoy a comparative advantage[12], the countries concerned can then buy the cheap capital goods necessary to ensure what Rostow calls their "economic takeoff", that is, their development. With favorable terms of trade, it becomes possible to generate the profits necessary to finance growth and sustained internal accumulation. The market finds the qualities attributed to it by the neoclassicals, namely a strong capacity for achieving an optimal allocation of resources essential to strong growth.

– A so-called "developmentalist"[13] approach, for which development necessarily takes on a specific character, and which cannot constitute a simple stage but is the original product of a particular history characterized by dualism and dependence; dualism, because of the existence of a particular sectoral division, between a stagnant traditional sector and a more modern, "extroverted" fast-growing sector. Here, the terms of trade remain unfavorable and do not facilitate the integration of local economies into the global economy, with multinational firms further accentuating the dependence of these economies through untrammeled domination. Only structural changes in the economy can alter such a situation, with the national state aiming to establish "self-centered development".

– Finally, a so-called "third-worldist"[14] approach, for which it is an illusion to expect positive effects from the different strategies for developing international

11. See on this subject: Rostow, W.W. (1960). *Les étapes de la croissance*. Calmann-Lévy.

12. For example, a labor force whose cost would be lower than elsewhere...

13. Theses defended most often by authors such as Perroux, F., Myrdal, G. and Hirschman, A.O.

14. Theses defended by A.G. Frank, A. Emmanuel, S. Amin, etc. Authors belonging to this school of thought generally identify with "Marxist" thought.

economic relations. What is at issue is the internal and external logic of the dominant system, so that the precondition for any form of development lies in the breaking of the links connecting the economies of these countries with the dominant system by imposing "unequal exchange" upon them. This is because dependence on the global market that integrates these economies leads to, or even accentuates, chronic relative underdevelopment. The terms of trade which thus deteriorate due to integration into the world market cause transfers from the "periphery" to the center, that is, from developing countries to developed countries. Therefore, only rupture with the global market can be prerequisite for the establishment of an "internal dynamic" of development.

We can see that the idea of development, as different as its genesis may be, has remained at the center of concerns since the middle of the 20th century, and can only be really understood in the context of its consequences on the evolution of the relationship that we maintain with our environment.

1.2.3. *Return to a definition and its consequences*

As emphasized, for more than half a century, economic crises have followed one another at a high pace without, however, any questioning of economic development, the forms it takes and thus of the growth that supports it. Therefore, we are witnessing an escalation in wanting to unconditionally defend the idea of development without questioning its consequences, which are nevertheless widely observable and to which everyone admits. This is because it seems difficult (if not impossible) to objectively dissociate the process of development from its consequences, particularly with regard to the environment and therefore the evolution of the planet. All the more so since, although the problem of development and its consequences concern the developed countries themselves in particular, the fact remains that all developing countries are knocking on the door of development in order to finally benefit from it on an equal footing with developed countries. Therefore, the terms of the alternative are as follows: on the one hand, how to make those who have not benefited from the "benefits" of economic development understand that their future remains compromised due to the negative consequences for the environment caused by growth for its own sake. On the other hand, and conversely, how can we justify imposing on countries such as China, India, Brazil and the African countries, that they must now renounce the "positive" effects (for their people) of the "qualities" implied by economic development? Through this double question, we find ourselves face-to-face with the major problem, at the heart of the subject concerning development, its

meaning and scope, confronted with the future of the planet. However, a question then arises that we might describe as "subsidiary", but which remains, in our eyes, essential: should we not question the concept of development and its consequences more deeply? It should be noted here (and from the outset) that any questioning of development includes the question of sustainable development in its interrogative structure. We will definitely return to this.

That said, how can we properly ask and understand the question of development?

The first principle when addressing the issue of economic development is to identify the concept without preconditions, that is, to eliminate false evidence (as far as possible); this amounts to "laying bare" a mechanism that allows us to distinguish, both quantitatively and qualitatively, the differences between developed and developing countries. This is because we cannot forget that the idea of development first appeared as part of the questioning of "underdevelopment". We propose taking as a starting point the definition proposed by G. Rist in his exemplary work on the subject:

> Development is made up of a set of sometimes seemingly contradictory practices which, to ensure social reproduction, require the generalized transformation and destruction of the natural environment and social relations with a view to increasing the production of commodities (goods and services) intended, through exchange, for solvent demand.[15]

This definition requires several comments:

– The definition of development above cannot deviate from an empirical, real and effective constant. This therefore excludes any normative approach that presupposes wishing, first of all, to show what we want rather than what is. It is well known that treatment of the problems associated with development is generally indicative of ideological choices that determine its content, especially since it is a question of reproducing these conditions in time and space on a global scale.

15. Rist, G. (2019). *Le développement – Histoire d'une croyance occidentale*. Les Presses de Sciences Po, p. 33.
The author's analysis and work on this theme remains unique and allows a better understanding than can be found elsewhere of the drivers of "Western-style" development. Obviously, we refer to this work without limitation of use.

– The major function of the economy is to transform in a generalized way what nature gives us into consumer goods, infinitely to the extent possible, and this is a major feature of development: on the one hand, we destroy raw materials, called "inputs" that we transform into products (or "outputs") that become consumables. Production and its development therefore constitute destruction[16] in several respects: on the one hand, of the materials initially supplied by nature; and, on the other hand, the resulting release of elements such as greenhouse gases, polluting waste and other negative factors. Moreover, the development and generalization of this production has led to secondary impacts on land ownership, the control of water, the living environment in general, etc.

– The impact of development is not limited to the constituent elements given by nature, and the social relations intertwined in the context of production do not avoid these consequences. Indeed, commodity production and its development are the expression and manifestation of the generalization of the production of goods which have a price on the market and which in turn require a solvent demand: only those who have the necessary means can consume the goods offered by the market. With the ultimate development of the market and monetary system, we have witnessed an explosion in the commodification of the world in recent decades, subjecting the whole of humanity to these constraints. For example, the commodification of the living world in all its forms is significant. Furthermore, the process of development is constantly oriented toward a maximum and the resulting growth may no longer appear as a choice but as a necessity. This explains (only in part) the existence of economic recovery plans within the framework of public policies aimed at maintaining growth rates, all of them generally dedicated to maintaining a level of employment deemed satisfactory.

– The economic system dominated by commodity exchange has been established and developed on the basis of a previous system and in rupture with it. Therefore, while the circulation of goods produced was long organized on the basis of relationships of kinship or hierarchical legal status, modern commodity production is in fact subordinated to social relations that dictate its organization and ordering. This is because human beings are considered free with respect to each other (contrary to the previous state of affairs) and the commodity then appears as a mediation between them in the context of a specific place where they meet each other, namely the market. Therefore, there is no direct, immediate encounter

16. Some authors (and not minor ones) have theorized this approach to the destructive aspect of production, mainly J.A. Schumpeter, who developed the concept of "creative destruction". Indeed, if the act of production is first and foremost a destruction of "raw" goods, it has the consequence of giving life to a new product whose objective is to satisfy a need that could not have been satisfied by its primitive form, and it is in this sense that destruction becomes a positive creation. Obviously, the author only highlights the positive aspect of the transformation here, without taking into account the negative externalities.

between the co-exchangers, but an encounter around an object that becomes an object of exchange, each actor regaining their original individual freedom after the exchange. "This autonomization of the object legitimizes that of the economy, which, therefore, strives to remove political, ethical and personal 'interferences' from its domain."[17] Also, although the reference model is always described in its "original purity", it is clear that, in reality, this is not always the case.

– There is a close relationship between the various movements of goods in society, which can be summarized as follows: first we produce, then we distribute and finally we consume. Therefore, from a systemic point of view, there must be a balance between what is produced upstream and what is consumed downstream, with the aim of distribution being to enable a balance between production and consumption. This presentation, somewhat too mechanical, forgets a decisive element in the logic governing the functioning of the whole, namely solvent demand. Indeed, our system functions based on money as a unit of account, a measure of value, and above all a store of value, and therefore as the only recognized means for allowing exchange. In other words, if we want to trade as a customer, we must hold the quantity of money necessary to ensure the exchange (directly or indirectly). Therefore, the solvency of the applicant becomes the distinguishing criterion of the possibility of exchange and the main characteristic of the commodity system[18]. As Adam Smith pointed out in the 18th century, commodity exchange is based on individual interest, which, in his view, constitutes the best possibility of ensuring social ties[19]. However, this constraint of solvency specific to the monetary and commodity system may run counter to the objectives of the logic of development; incomes may prove insufficient to guarantee the possibility of acquiring the goods necessary to maintain general equilibrium[20].

17. Rist, op.cit., p. 47.

18. Here, we find an old debate characteristic of economic thought initiated by the law of markets as formulated by J.-B. Say, which can be summarized as follows: commodities are exchanged for commodities because the production of these commodities generates sufficient income to absorb the whole of production, and money is only a "veil thrown over exchanges". Marx, initially, then Keynes showed the extent to which this law constitutes an illusion and that its sole function is to not understand the crises of overproduction which have characterized the capitalist system from its emergence. It is also no coincidence that liberal economists (whatever their "allegiance") are united under its banner, in the sole aim of showing that general equilibrium of the system constitutes the rule, crises being the result of the irrational behavior of economic agents.

19. "Man has almost constant occasion for the help of his brethren, and it is in vain for him to expect it from their benevolence only." Smith, A. (1976). *An Inquiry into the Nature and Causes of the Wealth of Nations*. Gallimard.

20. The reasoning here is obviously based on a macroeconomic approach, that is, one accounting for the general equilibrium of the nation, whatever it may be.

Therefore, development confronted with its own reality does not necessarily appear to us in its best light: the undeniable economic development of the global economy due to liberalization and globalization is not shared by all, the development of poverty appearing as the counterpart of an accumulation of wealth at the other pole of society.

As a provisional conclusion, the reality of development, although it undeniably appears at the macroeconomic level, seems to take shape as the planetary extension of the market system, that is, all its strengths and weaknesses. This is for several reasons: on the one hand, and despite the efforts of those who conceived them, the concept of development seems quite close to that of growth and therefore remains usually assimilated to the economic constraints which make it essential; on the other hand, its proven and declared goal lies in a certainly sincere desire to put an end to the poverty of a large proportion of humanity. In this regard, the concept of development stems from a humanist perspective, although the question of results is not currently working in its favor. In the end, despite its desire to define itself within a moral framework, one that dictates exemplary behavior in terms of solidarity and sharing, it does not seem to function as an absolute moral imperative. This is why some have concluded that it is a purely "Western belief", insofar as it is true that the concept has a negative connotation.

Development thus defined, particularly in all its concrete determinations and in a systemic manner, namely the relationship that we have established between the concept itself and its structural relationship with growth, therefore requires us to put its specific modalities and functionalities into perspective at the historical level. We propose to show by means of a historical example – the Fordist era of growth following the immediate post-war period – the internal logic of the strong growth that Western economies have experienced. This results from the temporal coincidence between the level of production and therefore factor productivity on the one hand, and the increase in income and sustained rate of consumption, on the other hand. It is through this cross-linking of the composite variables of this growth that we wish to put into perspective the conditions of this growth, as well as (and perhaps above all) its consequences.

1.2.4. *Development and growth: a functional approach*

The approach by definitions, as presented above, has the merit of simplifying the elements that we want to develop further. Indeed, we can deduce without risk of error that the relationships between growth and development remain close and that the former remains the condition of the latter. We want to highlight here the fact that economic growth is the foundation of the development of Western economies in the

immediate post-war period and that to understand its workings, and especially its consequences, it is necessary to show its content and effects. Within the limited framework of this contribution, we will limit our remarks and highlight the conditions of this unbridled growth and especially its consequences for the environment, whose debt toward nature we are partly repaying. Whether it is the productivist system of production, on the one hand, or the methods of consumption, on the other hand, these are clearly the two determining factors of this growth and of these consequences. This means that we begin from the hypothesis that all the damage to the environment and pollution thus created result almost exclusively from the anthropogenic activity that we usually call economic development and growth. It is therefore within the concrete formalities, the different modalities of this development, of this growth posed in terms of functionalities that we will put into relation all the factors that led us to it.

1.2.5. *Development, productivism and consumer society*

1.2.5.1. *Development and productivism*

The new determining element of post-war growth lies in the stability of progressive change throughout the reference period, more than in the values themselves: this growth lasted without interruption for more than 25 years, without any break in the trend. Growth rates were particularly high over a long period: in France, between 1949 and 1975, the average annual growth rate was 5.6% per year, which is remarkable, particularly compared to the growth rates of the economy subject to the neoliberal "credo", with less than 3% per year over the last 20 years[21]. OECD countries, that is, the most developed countries, experienced a growth rate of 4.9% per year over the entire period, which is exceptional. Finally, to complete the picture, a national economy like Japan saw a growth rate of more than 10% per year on average over the entire period. In other words, modern economies have never experienced such high growth rates over such a long period of time, and with such regularity.

Therefore, in the context of a previously unknown economic stability, with such significant and regular growth rates, it is possible to characterize the transformations of the French economy (even if an identical observation might be established for

21. It should be remembered that when the national economy saw its growth rate drop from 6% to 3%, there was talk of crisis and recession and of the need to intervene vigorously to revive growth. Thus, the economic stabilization plan of 1963 was a reaction to a growth rate of 3.2% over the same period, a rate that in the 2000s would have constituted a record for developed countries.

other countries) by the articulation between two driving forces: the very strong increase of productivity gains in industry and a structuring of consumption adapted to new conditions of production. It is this fundamental articulation as to the transition from extensive to intensive accumulation that has allowed mass production to be associated with mass consumption, the latter ensuring permanent outlets for mass-produced consumer goods.

Indeed, the dominant phenomenon of the period, and surely the most significant, is undoubtedly a very strong acceleration in productivity, resulting in much faster and stronger productivity growth than previously. While there are lively debates about the status of the concept of productivity, for once French economists from different backgrounds agree: whatever the indicator used, the improvement in the output/input ratio has been the symbol of French growth.

The role of productivity gains in the dynamics of growth and the transformation of the system of relative prices is decisive. Indeed, the growth of this indicator at the industry level induces a partial (or global) decline in the unit value of the goods produced. Two remarks are as follows:

– Productivity gains in an industry or sector may have two distinct origins: on the one hand, the diffusion of technological progress through use of more efficient capital goods, and on the other hand, the introduction of new forms of the organization of work, both factors being cumulative. In general, these two ways of increasing productivity are implemented simultaneously (since new, more efficient machines go hand in hand with a new organization of work); the link between machines, the organization of work, and material processes of production is certainly not unambiguous. For example, from 1957 to 1974, the relative share of shift workers increased from 10.3% to 22%, allowing improved productivity by saving capital. Conversely, for certain forms of mechanization (as in the case of automation), there is a substitution of capital for labor, thus leaving the organization of work unchanged.

– In the case of productivity, we cannot abstract from the problem of the devaluation of capital, as well as its role in growth. In the context of intensive accumulation, this devaluation becomes one of the possible permanent tools of regulation: in fact, the continual search for productivity gains, combined with fairly lively competition, leads to an accelerated diffusion of technological progress in the capital goods sector. However, these productivity gains reduce the relative value of capital goods while making those previously manufactured obsolete. It is thus

indeed a loss of value in the strict sense. This does not call the dynamics of the system into question: quite the contrary, because devaluation is not synonymous with economic loss. Indeed, the new machines generally introduce productivity gains which more than offset the cost of the devaluation. This devaluation of capital therefore plays a double role: it counters the trend toward increasing capital intensity, that is, an increase in costs and therefore a decrease in profits, while it also allows the autonomous development of industries producing capital goods by offering them markets that will be essential over time.

However, while the increase in productivity gains is essential, it is not sufficient in itself to generate a new mode of growth: intensification of industrial production requires the establishment of "industrial consumption". Without this condition, any gain in productivity can only lead to depressions and imbalances. The intensification of production processes, that is, the substitution of capital for labor, only leads to the self-development of the industries producing capital goods. Only the establishment of a standard of consumption provides a solution to the contradictions of extensive accumulation.

1.2.5.2. *Development and mass consumption*

The steady growth in real wages (4% per year from 1949 for workers on weekly wages) led to a rapid increase in the level of consumption: from 1955 to 1978, the purchasing power of employees more than doubled[22]. However, the evolution of the methods of remuneration of the labor force also led to a profound change in consumption practices. Therefore, the share of expenditure devoted to food consumption, which was above 60% in 1929, fell to 50% in 1956, reaching 40% in 1969. This decline continued until the share of income devoted to food in overall household consumption reached 25% in 1970 and 22% in 1978.

At the same time, the share of income allocated to spending on the purchase of durable goods (household appliances, television, automobiles, etc.) increased very quickly. This change is explained both by the fall in the relative price of these goods, driven by significant productivity gains, and by a steady increase in wage levels. Finally, we are seeing accelerated growth in the consumption of services, in which housing has played a driving role.

22. Apart from the minimum wage, which has continued to increase relatively more rapidly than other salaries since 1968, the increase in purchasing power slowed down significantly beginning from 1973. It should be noted that since the beginning of the 2010s, the opposite phenomenon (no "boost" to increases in the minimum wage) has occurred, despite a recent acceleration in inflation.

Beyond these transformations of the consumption structure, we have seen the emergence of a real norm of consumption that includes:

– widely harmonized individual consumption of mass-produced durable goods;

– consumption of socialized and collective services (social security, unemployment insurance, etc.).

More than any other element, the development of indirect wages and the socialization of certain social costs have led to this norm: while this cost represented nearly 20% of household disposable income in 1960, it represented nearly 34% in 1978. This new source of income, due to its permanence, plays an extremely important role because it makes the flow of production less sensitive to cyclical movements. At this level, monthly payment of salaries plays the same role and fulfills the same function, so that these two factors contribute to stabilizing the system. This stability of the system has furthermore favored credit by stabilizing debt and repayment conditions. The volume of loans to households increased 51-fold between 1954 and 1973, at which point it represented more than 15 weeks of disposable income, compared to two weeks in 1953. It is toward housing (which plays a driving role in structuring the norm of consumption) that this debt has been directed.

However, the establishment of this norm of consumption has another meaning: it implies, in fact, a homogenization of lifestyle or even behaviors further promoted by increasing salarization. Also, in this area we find a source of stability, an essential principle of regulation in the context of intensive accumulation.

The development of mass consumption and increasing productivity gains were the visible face of intensive accumulation: we therefore see how consumer society and productivist society are indispensable to each other, and structurally inseparable. Another indispensable condition for wage growth and wage increases is the sharing of productivity gains. Indeed, high productivity gains, of around 6–8% per year depending on the case, were redistributed in the form of wage increases, translating into a constant improvement in purchasing power. It is this continuous increase that made it possible to structurally modify consumption and thus constitute an insurmountable norm that characterizes this mode of accumulation and is consubstantial with it.

Finally, this growth came about in order to avoid the errors that led to the crisis of 1929, the importance of the state in such a process having then become the guarantee of stability over time. The only problem is that this growth was only possible thanks to raw materials procured at low prices and consumed without moderation and without limitation. Moreover, identifying growth with economic

success appeared during the period as a measure of achievement, and no one denied themselves.

In these conditions, awakening could only be painful.

1.2.6. *The environmental consequences of development*

The declared end of the Fordist period corresponds to an oil crisis that was in no way responsible for the failures of the system itself. At the most, the oil crisis of 1973 followed by that of 1979 accelerated the end of this form of accumulation. After addressing the question of the end of Fordism as a mode of accumulation, we will show the reasons for growth and the difficulties encountered in dissociating environmental damage from economic growth or development.

1.2.6.1. *Crisis of Fordism and neoliberal drift*

"Fordism", as analyzed above, appears as a system of support specific to a form of accumulation within the framework of a determined set of institutions. This mode of accumulation is characterized as follows:

– On the one hand, through a special wage ratio based on two major principles, namely a set of legal (labor law) and social (protective institutions) rules for all employees, as well as a sharing of productivity gains that are the source of a continuous increase in wages.

– On the other hand, Fordism establishes a compromise between business and the public authorities aimed at enabling economic policies described as "Keynesian", whose objective consists of regulating economic cycles in order to ensure full employment in the national context.

However, the Fordist accumulation regime entered a deep crisis in the mid-1970s for several reasons: an exhaustion of gains in productivity and consumption norms which led to a crisis of overproduction, and as a result, the development of unemployment and inflation, a relative decline in wages aggravating the decline in demand, not to mention the development of debt.

Consequently, a number of economists developed an approach described as neoliberal, which defines certain constraints and certain rules to be respected in order to emerge from the crisis, namely: liberalization of market mechanisms which are the only ones capable, according to them, of regulating the economy and defining the correct modalities of optimal allocation of resources, and drastic control

of debt and inflation, particularly by rigorous management of the money supply, in short, a set of precepts constituting what should be called the "neoliberal doxa".

Without going into detail, its main features are as follows:

– An increased international division of labor, mainly in the process of production. This internationalization takes place in three distinct ways: at the level of capital, through increased financialization, at the level of production which endures the consequences, and at the level of consumption which becomes the adjustment variable. Indeed, the massive financialization of the world economy[23], in addition to its negative effects on global economic equilibrium, led to profound changes in the functioning of (very large) companies[24]: increased capacity to mobilize capital at the global level, the search for very high returns (return on investments), volatility of financial flows in search of strong returns on investments, all of which punishes the real economy in favor of international finance.

– Furthermore, while the changes in capital mobilization and thus in production conditions were significant, the effects of the changes were also felt in the sphere of consumption, which is also becoming internationalized. This is because we are no longer dealing with national markets but of subsets now distinguished at a continental level: Europe, North and South America, Asia, Russia, each of these subsets having its own characteristics both in terms of consumption and production[25].

In any case, the limits of the large conglomerates have been exceeded to such an extent that they have now surpassed the too narrow framework of the Nation-State within which the Fordist model had confined them: exercising their activity beyond any national control, we quickly understand the interest they will find in this internationalization, which puts them above national laws, especially in terms of environmental protection.

23. Note on the repetition of global financial crises referencing F. Morin.

24. We must avoid drawing a false equivalence, in the name of "universal management", between SMEs which, despite massive financialization of the economy, continue to encounter great difficulties in financing their growth, and large international groups which, due to their size and their economic weight, can effectively play on the level of major financiers.

25. Thus, we speak of China as being "the workshop of the world" and also, at the same time, as the largest consumer market for the coming period because of its population. This specificity is reflected in the relative weight in the global economy of the countries making up BRIC, that is, Brazil, Russia, India and China.

Finally, the post-Fordist system relies on what is called the "knowledge economy", with the aim of ensuring business competitiveness based on innovation and optimization of production costs (which itself is based on outsourcing its activities). This process of innovation desired by companies rests on their ability to develop and create new consumer needs and therefore new products. They thus induce captive consumption for which they become the almost exclusive supplier[26]. Furthermore, this positioning on the global market is based on the search for minimization of financial risks, which remains stronger than the desire to control all stages of the production process. The existence of financial holding companies with reciprocal shareholding with other competitors, or with other firms in different and complementary sectors, also ensures optimal control of the conditions of production and thus a strong position in the economy. Supply that is "locked in" in this way therefore constitutes the concrete and applied foundation of the "theory of supply" which has become the *deus ex machina* of neoliberal thought.

We have therefore aimed to show here that the post-Fordist regime of accumulation, following the liberalization of the global economy, produces a certain number of effects which may work against the environment, with large international conglomerates apparently committing to sustainable development, when in reality their practice has not changed in any way, and has even worsened. We might highlight the practices of large oil companies as well as companies engaged in deforestation, agro-industry, etc.

1.2.6.2. *Fordist growth and the environment: a destructive combination*

The essential characteristic of Fordism is found in the establishment of predominantly intensive conditions of production, whose consequences it is logical to analyze, particularly in terms of the environment. In other words, can Fordist accumulation be compatible with respect for the environment? A recent study found a close correlation between economic prosperity and carbon footprint, in other words, between economic growth and pollution. As far as the richest countries are concerned, they produce a very large amount of CO_2[27] and there is a close relationship between GDP growth and greenhouse gas (GHG) emissions[28]. The analysis covers 73 countries and, all other things being equal, we see some proportionality between these two values. Therefore, the argument for a link

26. The cases of Apple and Microsoft are very enlightening on this subject.

27. A 10% growth in GDP would invariably lead to an 8% increase in CO_2 emissions.

28. See on this subject: Hertwich, E.G. and Peters, G.P. (2009). Carbon footprint of nations: A global tradelinked analysis. *Environmental Science and Technology*. This is a cross-sectional study carried out at a given moment showing that countries that become "rich" have a high probability of increasing their GHG emissions.

between growth and reductions in GHG emissions through the effect of economies of scale seems false. This argument is most often based on the observation that the service sector is highly developed, mainly in countries with advanced economies and therefore low energy consumption. Furthermore, this hypothesis would allow us to accentuate the phenomenon of a reduction in GHG emissions in that the increasing importance of this sector to the economy is often accompanied by a decline in the productive sector, which is a heavy consumer of fossil fuels (e.g. construction or heavy industry). Therefore, a country whose expenditure is $4,000 per year per inhabitant produces at the same time less than a ton of CO_2, whereas, if we move to an expenditure of $50,000 under the same conditions, the CO_2 emissions into the atmosphere increase to four tons, or four times greater. Furthermore, emissions due to the production of manufactured products are nine times higher in rich countries and eight times higher in the case of the transport sector. A final aspect, one that is generally overlooked, shows the impact of imports. The figures given by rich countries are usually incomplete, for example, in the case of Great Britain, as the CO_2 production by Chinese factories which make imported products is not accounted for. This shows that imported goods, net of exports, account for 11% of this country's GHG emissions. This clearly shows a close correlation between the level of economic production and pollution. Conversely, during the Covid-19 pandemic, the decrease in economic activity clearly showed a decline in emissions: for a 4% drop in global GDP, we witnessed a 5.3% drop in these same emissions.

The question that arises is this: is continued growth in GDP accompanied by a significant reduction in GHG emissions possible in order to meet climate requirements? From this perspective, some economists have promoted the concept of "decoupling", that is, a form of disjunction between the evolution of GDP and the GHG emissions resulting from economic activity. However, based on ideological presuppositions, certain nuances have been introduced. Therefore, on the one hand, we must distinguish a so-called relative decoupling, according to which any increase in GDP is accompanied by a less than proportionate increase in emissions[29]. This means a gain in carbon efficiency, meaning that one unit of carbon emitted results in a proportionally higher level of GDP. That said, there is no (or little) long-term impact on climate change. On the other hand, there is absolute decoupling, which translates into an absolute decrease in GHG emissions for any increase in GDP. Therefore, decoupling occurs if, and only if, the rate of decline in GHG emissions is greater than the rate of GDP growth: for a growth rate of 2% of GDP, absolute decoupling appears only for a rate of decline of more than 2% of emissions. In this

29. In mathematical language, this means that all through the increase in the emission function, the first derivative is positive, while the second derivative is negative.

case, this would mean that the very nature of economic growth has changed considerably.

Without going into further detail, the real challenge of the energy transition, that is, the decoupling of economic growth (and therefore development) from GHG emissions, actually amounts to "decarbonizing" a specific energy mix for a particular form of development (e.g. the Fordist type), while trying to limit its consequences both qualitatively and quantitatively.

1.3. Economic development and collateral damage

Les Trente Glorieuses (thirty glorious years) are still characterized on the one hand by "productivism" (in all sectors of the economy, including agriculture), and on the other hand, by the "consumer society"; the first refers to the mode of production, the second the mode of consumption. Therefore, this intensive mode of production could only develop thanks to and with a corresponding mode of consumption. There can only be sustained production over such a long period if all the conditions are met. What is produced within the framework of the productive system as a whole at one pole assumes that the other pole features identical conditions allowing the absorption of all that has been produced. Without this condition, there will necessarily be a crisis of overproduction.

However, the relative equilibrium within this mode has particular consequences: destructive growth, that is, destructive consumption, which ultimately reveals its capacity to degrade the environment and, above all, if it were to continue, would result in disaster. Here, we will highlight a few factors which are a consequence of economic development and whose effects on the environment are particularly harmful, thus calling into question the relationships between the environment and the economy. We will take the respective examples in each of these domains, namely non-renewable energies for production[30], as well as the loss of biodiversity which has already reached a high level of species destruction, the problems resulting from deforestation[31] and from the depletion of natural resources.

30. We will not deal here with the problems linked to intensive use of this non-renewable energy. The objective is simply to show that intensive accumulation, a great devourer of energy in general and oil in particular, poses a problem for ensuring its continuity over time (in particular, in relation to extensive accumulation): the very strong economic growth which lasted almost 30 years has a cost that the system will pay "in cash" one day or another.

31. This is obviously the destruction of the "primary forest" but also the conditions in which some clear their consciences by claiming to practice a form of reforestation which has

1.3.1. *Production, consumption and fossil fuels*

1.3.1.1. *Fossil fuels, development and environmental damage*

In reality, the success of *Les Trente Glorieuses* proceeds (among other things) from an economy based on the consumption of non-renewable fossil fuels and oil becoming the dominant energy. Not that the nature of growth depends on the specific energies used that support it. This means that there is no causal relationship between a specific (or dominant) energy and forms of accumulation: the specific qualities and range of opportunities offered by oil[32] (combined with a clear political will to keep the price as low as possible) have been a set of converging reasons that have favored this, but not fully accounted for it. Therefore, while growth does not depend on oil for its essential causes, the pace of its deployment in space and time[33] has been made easier by oil. In return, this has led to a strong dependence on oil without the various actors being fully aware of it, at least initially.

In order to correlate these two elements, oil and growth, we present below a few examples in graphic form, which highlight the importance of the differences between what happened before and after 1945. These graphs compare situations from one historical period to another and do not claim to be sufficient in themselves: they simply corroborate factors which then take on a new meaning.

– Evolution over time of the concentration of CO_2 in the atmosphere[34].

We will distinguish two distinct periods of history: a first stage of slow growth between 1850 and 1940 and the period after World War II. With one obvious observation: the first was much more "economical" in the use of fossil energy (coal[35] and to a lesser extent oil) and therefore with a slower and especially less

absolutely nothing to do with the initial conditions, thus preventing any possibility that the previously destroyed biodiversity might reappear.

32. Oil is indeed used as a primary energy in transport, industrial production, electricity, etc., but it is also used in the processing industry and the durable goods production industry: plastics, derived components used in the manufacture of durable goods such as household appliances, various composite components, etc. From this point of view, the role that oil has played in everyday life is particularly significant, although not absolutely essential.

33. In this regard, the crises (oil, among others) of 1973 and 1975 are clear proof of the importance assumed by oil in the development of those economies which were very dependent on it, namely, the so-called developed economies.

34. The diagram shown in Figure 1.1 is based on figures taken from: Rotillon, G. (2008). *Faut-il croire au développement durable*. L'harmattan, p. 37.

35. In this regard, it is interesting to note that the initial demands of what we can call "ecologists" during the 1930s concerned the replacement of coal by nuclear energy!

significant increase of CO_2 concentration in the atmosphere. With strong growth and equally strong development, coupled with strong energy-intensive industrialization, things changed radically and became more problematic. If the level of CO_2 concentration in the atmosphere characteristic of extensive accumulation had continued, this concentration would not exceed 310 million tons, whereas it is greater than 380 million tons today.

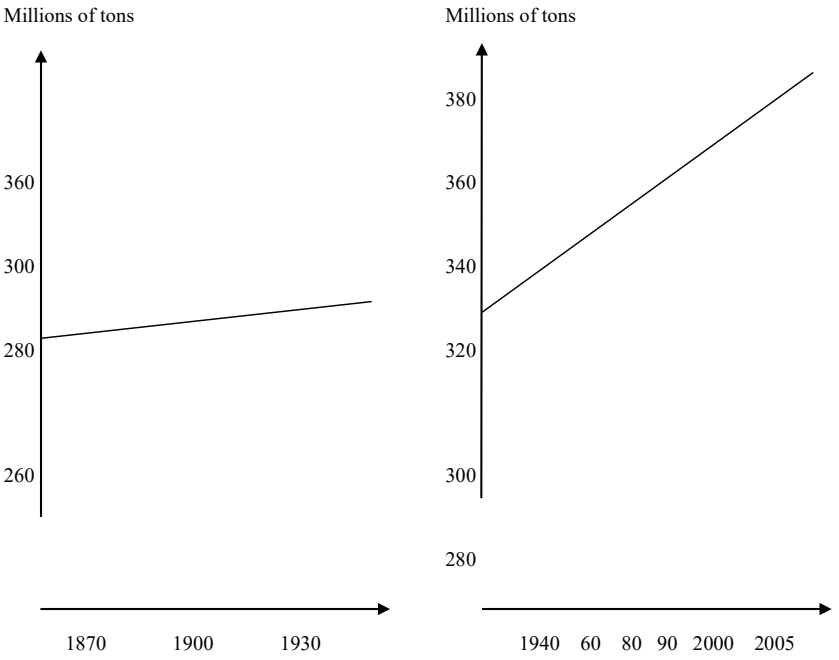

Figure 1.1. *Greenhouse gas trends over two major periods*

– Acceleration of exceptional events and natural disasters[36].

This second series of graphs highlights a similar reality: the consequences of the concentration of CO_2 in the atmosphere and its corollary, global warming and the associated intense climatic events. In the first phase, progression remains slow (even

36. Source: notre-planete-info based on EM-DAT: the OFDA/CRED International Disaster Database, 2005.
The graph is based on the figures quoted by Rotillon, Op. cit., p. 40.

if there will necessarily be a problem in the long term), while this kind of event explodes in frequency with intensive growth. Intensive use of fossil energy is the cause of a high concentration of CO_2 which in turn accelerates global warming, itself the cause of numerous "natural" disasters.

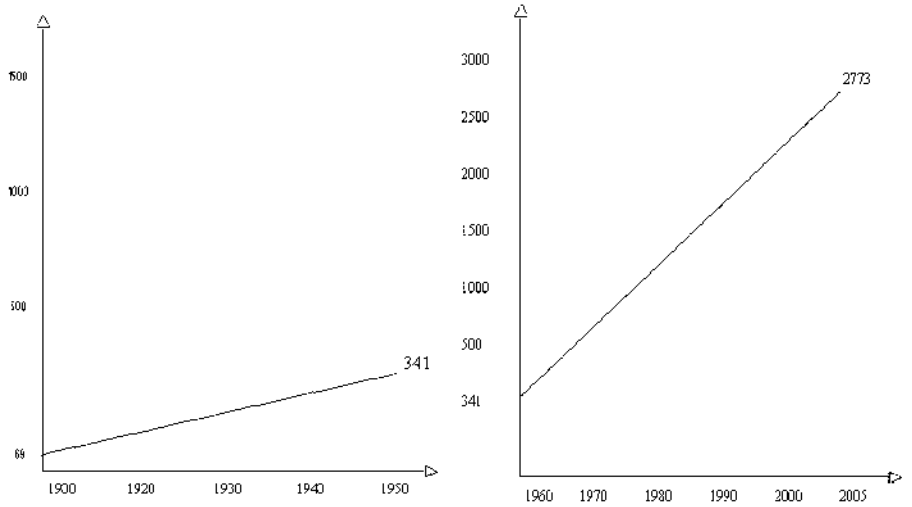

Figure 1.2. *Trends of exceptional events and natural disasters*

– Intensive use of oil and the rate of discoveries of new deposits.

Finally, this last series of graphs shows the interest of research in new oil fields to meet an ever-increasing demand (both from manufacturers and consumers). The problem, which is becoming unavoidable, arises because (global) demand continues to increase, while the number of discoveries of new deposits decreases sharply (and will continue to decrease since, by definition, oil reserves are finite reserves).

Some argue that with the increase in the price of this energy, deposits currently unexploited because they are not profitable will become so in the long term. This, although correct for the time being, does not change the substance of the argument: oil reserves will be exhausted by 2050.

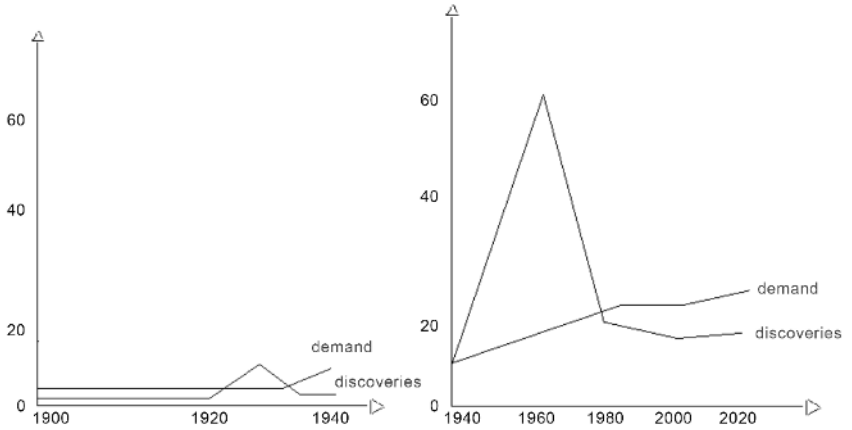

Figure 1.3. *Trends in oil use and pace of new discoveries*

1.3.1.2. *Consumption and the environment*

The food crisis and the "hunger riots" that took place in 2008 brought the specter of world hunger to the forefront of global attention in a particularly acute way. Another question arises here: to what extent might the question of widespread sustainable development contribute to definitively moving away from this idea?

After a relatively swift decline in the space of a generation, the number of people suffering from hunger began to increase again from the 2000s[37]. The hunger riots which broke out in 37 (relatively) poor countries in 2008 were the result of a massive increase in the prices of cereals, wheat and rice first of all, then corn and other essential agricultural products afterward. This situation is all the more troubling as some predict a lasting increase in food prices, which will immediately hit the poorest who spend almost all of their income on food. Therefore, despite an impressive economic "takeoff" (10% GDP growth per year), India still has more than 250 million people suffering from malnourishment. Generally speaking, those who suffer from hunger are those who do not matter to the market system, as they have no purchasing power.

37. From nearly 1 billion malnourished people in 1970, or one-third of the population of the developing countries, this figure had fallen to less than 500 million by the end of the 1990s, or less than one-fifth of the growing population of the countries of the south. Less than a decade later, the figure of 1 billion malnourished people has once again been attained, while another billion are overweight, including 800 million obese.

This food tension against a background of scarcity (even if nothing is certain) revives the great fears mentioned above: are there too many of us on Earth? Will we run out of food? Sustainable development has brought new relevance to these questions by challenging productivist agriculture, accused of polluting groundwater, depleting soils, etc., and by introducing the idea already discussed of a finite world whose capacity to support strong growth in the birth rate is challenged in view of our available resources: "There is no Planet B", say environmentalists who list the disasters that await us.

In reality, there is a growing divide at global level between modern agriculture linked to world markets, financed by public authorities, with wide use of intensive techniques and using very little labor, and peasant family agriculture working on very small farms, without access to growing markets. Also, this cleavage is not just a North/South divide, but exists almost everywhere in the world. In fact, a key question arises: if the food crisis is global, solutions must first be found at the local level. Since, in the field of agriculture more than elsewhere, harvests arrive simultaneously on the market, leading to a collapse in prices, followed by a shortage which is responsible for an inflation in prices; all states since the 17th century have first begun by relying on rural areas through investing in a dynamic and sustained agriculture, thus implementing real agricultural and, thereby, food policies.

To get out of such a situation, it is therefore necessary to make agriculture a strong point for development, to the point that some have spoken of the "revenge of the peasants". Without going that far, three important factors may lead in this direction.

– Firstly, certain southern countries (China, India, African countries, etc.) take their peasantry into consideration; this is the case for India and China, which have implemented campaigns aimed at "giving more and taking less" from their farmers who had become the poor relations of development over the last 30 years.

– Secondly, a number of countries, especially African countries, must regain the possibility of protecting their borders from foreign competition in order to enhance local production, long disregarded by urban dwellers subjected to the advertising of large Western agro-food groups. Therefore, in Mauritania, UHT milk comes from Germany and fresh cream is imported from Saudi Arabia, to the detriment of a particularly large local cattle population that is largely capable of meeting the needs of the population on its own. In this regard, Korea or Japan has created a real "food nationalism" by protecting their agriculture against unrestrained imports. We will come back to this point, which poses quite a few problems.

– Finally, significant sums must be allocated through international aid to family and subsistence agriculture, including against the advice of NGOs which advocate an unrestrained liberalism that leads to these growing asymmetries. Since the 1980s, the World Bank, the OECD and the regional development banks have forced the countries of the South to submit to structural adjustment plans, that is, subjected them to the inverse logic of a massive sectoral action, subject to the "rules" of the markets, to help them manage. We will also come back to this problem.

Today, the big difference between farmers in the North, who represent 2% of the working population, and those in the South, who represent 60% of the working population, lies in the fact that the former are protected, assisted, have access to credit and various aid mechanisms, while the latter are exposed to fluctuations in international markets, both upward and downward.

In this context, the question of how the food supply will develop requires taking into account a certain number of uncertainties which interact and which pose heavy implications for the future. Several reasons are known as of now:

– On the one hand, the "carrying capacity" of the different "agricultural areas" involved, to the extent that this depends just as much on the technologies that will be used – more or less intensive, productive, economical in their capacity to pollute, etc. – than climatic conditions (e.g. to what extent will climate change affect tropical environments?). In this regard, the extent of climate change, not yet known, may lead to a regional redistribution of large production areas: an extension of regions marked by desertification on one side, but a release of frozen peatlands in the regions of the far north (for example, Siberia). It is thus likely that the map of major agricultural production will not be the same in half a century as it is today. Added to this problem is the problem of GMOs (genetically modified organisms), currently negatively viewed, which does not mean that this will always be the same. As things stand today, it seems difficult to conclude on this subject and to jeopardize the future, even if the big NGOs[38], such as Greenpeace, have a rather alarmist, even doomsday discourse.

– On the other hand, agricultural and trade policies will be decisive because agricultural production is not distributed according to the possible agronomic advantages of the different regions but according to the sums that states invest in their agriculture. In addition, in all cases and everywhere, governments will have to consider trade-offs and a number of priorities: feeding people and urban sites, biofuels, seeking energy independence, preserving the environment, etc. In many

38. NGOs: Non-Governmental Organizations.

ways, however, some trade-offs are likely to be difficult to accept because they will also profoundly alter our daily behaviors.

– Finally, the role of technological progress may be decisive in many areas, but it must not prove to be a greater evil. It may indeed help remove certain constraints in terms of soil and climate: recourse to new, more resistant varieties or species, whether genetically modified or hybrids. In addition, as regards biofuels, so-called "second generation" plants should be able to use cellulosic raw materials (such as by-products of timber or the agri-food industry) instead of the present use of plants that compete strongly with feeding both humans and animals (corn, rape seed, sugar cane, oil palm, etc.). Also in this area, uncertainty lies in the acceptability of GMOs, these being accepted in America (North and South), while this is much more difficult in Europe.

However, this optimistic perception does not find echoes everywhere, to say the least. Far from it: erratic price movements on the world market, the constraints of destructive neoliberalism by the leaders of the WTO (World Trade Organization, formerly GATT), changes in behavior, particularly in relation to raw materials, lack of control over the financial system which speculates on "everything that moves", all these constitute elements of uncertainty which do not necessarily disprove the most pessimistic predictions.

1.3.2. *From economic development to endangering the planet*

As we have said again and again throughout our presentation, development is intrinsically linked to the numerous attacks on the environment that result from its progression. All sectors of the economy play a role in this process; all elements of life in society are touched by its effects. Whether it is climate change, biodiversity, problems resulting from damage to nature (water, waste, etc.), it is clear that society as a whole is suffering from the consequences of a development which at the moment, despite lip service, continues to be evoked as a response to the problems to which they largely contribute. Here, we will discuss some of these issues.

1.3.2.1. *Biodiversity losses*

In our contemporary societies, the development of agriculture is based on specific forms of capital and knowledge. With the standardization of cultivated species, capital becomes more and more efficient, and this standardization of cultivation methods becomes dominant and spreads to all areas. Therefore, the accumulated knowledge about natural species that has made it possible to select the most productive, and the non-rival dissemination of this information which has made it accessible to all without restriction, have led to an impressive decrease in

the number of species used, that is, to an enormous loss of diversity. A few examples are sufficient to illustrate this situation.

In India, regarding rice, we have gone from more than 30,000 different varieties to less than 10 for 75% of total production; in Indonesia, 75% of varieties descend from a single strain. In the United States, 80% of potatoes harvested are based on four varieties; for cotton and soybeans, 50% of crops are grown from three varieties and six varieties respectively.

It is therefore this capacity of humanity to transform nature by substituting produced capital for assets given by nature that leads to the decrease of diversity in the biosphere and thus to an inexorable loss of biodiversity. Admittedly, this substitution allows tremendous productivity gains, but leads to an irreparable loss of biological wealth. As such, we consider that over the last 50 years, "progress" in terms of productivity in agriculture is equivalent to that achieved during the last nine millennia which separate us from the beginning of agriculture. However, this has a consequence which may prove particularly serious: by making food dependent on fewer and fewer varieties, humanity risks a food catastrophe in the long term, if those varieties we cultivate become unusable (due to a genetic mutation, or due to a virus, pandemic, etc.). Furthermore, this importance given to the search at all costs for efficiency in agricultural production and to the cultivation of new lands leads to the degradation (or destruction) of habitats and results in a sharp decline in species at such a rapid rate that the report on global biodiversity of the United Nations Conference for the year 2006 speaks of a "sixth extinction", the fifth being 65 million years ago with the disappearance of the dinosaurs. Every year, between 17,000 and 100,000 species and varieties disappear from the Earth. Therefore, the assessment of ecosystems in relation to the changes that have occurred to date considers that "human actions contribute to irreversible losses in terms of diversity of life on the planet". These changes have been more rapid during the last 50 years than in any other period in human history.

However, species protection is not the only problem as such. Indeed, biodiversity is not only defined in relation to species but also in relation to the ecosystems that shelter them; so, the protection of some also involves the protection of others, and each of these levels guarantees the existence of the other. Furthermore, at the genetic level, it is often the latter aspect that determines the ability to adapt to a changing environment. This genetic variability is essential data for explaining and deducing the consequences in terms of evolution. There are two key reasons why the genetic level is particularly interesting:

– on the one hand, there is a use of existing genes to improve plants, either to protect them[39], make them more resistant, or to improve their quality; and this all leads to the debate on the problem of GMOs;

– on the other hand, there is a great potential for the development of drugs of all kinds and for all diseases, which requires the protection of species and varieties and therefore of the genes and molecules they contain, that is, a real "treasury". This constitutes a considerable major economic issue whose primary objective is to provide solutions to public health problems.

In both cases, the issues are blurred by powerful seed companies (for example, Monsanto) and/or pharmaceuticals whose sole aim is to profit from these situations, which poses serious problems, not only ethical but also in economic logic: should we accept that private interest comes before the interest of all?

1.3.2.2. *The water crisis*

The case of the water problem that we currently face in the context of the growth/environment coupling might just as well have been dealt with in the context of a relationship between growth and the social pillar of sustainable development. The so-called water crisis is not due only to a simple problem of availability, although water scarcity might very quickly become a problem.

Indeed, if water, in principle an infinitely renewable resource, sometimes has a finite character in terms of availability, this is due mainly to the fragility of its natural reproduction process. This results from two main factors:

– on the one hand, as a consequence of conflicts of appropriation by some users and/or uses to the detriment of others (upstream/downstream relationship) generated by its unequal natural distribution on our planet;

– on the other hand, also due to the consequences of the multiple forms of pollution to which it is subject, resulting from human activity.

The global volume of usable fresh water represents less than 0.01% of the water present on the surface of the globe, or 12,500 km^3 of water. This quantity would be sufficient overall for current uses (production and consumption) if it were equitably

39. This is the case, for example, of Asian rice in the early 1970s, which was attacked by a virus which threatened its very existence. It has been eradicated due to the transfer of a protective gene from wild rice plants. Without this biological and biogenetic diversity, this species of rice would have disappeared. We therefore see the point of preserving for ourselves this exceptional, abundant wealth of elements of all kinds.

distributed, which is not the case, either in time or in space. Therefore, Europe has 8% of the available water for a population that represents 13% of the world population. These figures are respectively 15% and 8% for North and Central America, 11% and 13% for Africa, and 31% and 60% for Asia.

However, the major problem at the root of the water crisis lies in unequal access to the resource. If domestic water consumption is on average 40 liters (L) per day per inhabitant, there are also deep disparities: 10 L per day for a farmer residing in Madagascar, but 240 L per day for a Parisian resident who is moreover not a farmer. Therefore, with a world population expected to exceed 8 billion individuals in 2025, the average amount of freshwater available per person per year would increase from 660 m^3 to 4,800 m^3, which would imply a situation of "hydraulic stress" (which is reached with less than 1,700 m^3 of water per person per year) for more than half of the world's population. The problem would be aggravated by an increase in the use of irrigation, which already accounts for more than 70% of water use worldwide.

Finally, at present, 1.1 billion people do not have access to running water and 2.4 billion people do not have access to sanitation. Under these conditions, 60% of childhood diseases in the world result from infectious and parasitic diseases carried by water. One of the UN goals was to halve the number of those without direct access to water and those lacking sanitation by 2015. It was a wasted effort, and the objective is far from having been achieved; this would have required connecting more than 370,000 people to water and more than 820,000 to sanitation per day. In other words, this is impossible. More generally, by 2025, if we want to solve the water problem (all uses combined), we will need a yearly investment of 180 billion dollars. In any case, it is a bet lost in advance. Therefore, a real risk of physical water scarcity is far from excluded if our patterns of consumption and treatment of the water problem do not change quickly.

Paradoxically, at a time when fears are focused on water problems, another threat linked to climate change appears as a direct consequence: namely, since 1950, there has been a steady rise in sea levels, which itself results from an increase in worldwide surface temperatures. This has in fact increased by 0.6°C over 100 years and, according to projections made based on the stabilized concentration of carbon dioxide in the atmosphere, the temperature could increase by 2.7°C (plus or minus 1°C) in the most optimistic hypothesis (where CO_2 emissions are halved by 2050), but by 6°C (plus or minus 3° C) under the most pessimistic hypothesis.

Therefore, for some countries such as Bangladesh, this means the loss of millions of hectares of cultivable land submerged by the oceans and the migration of several million people with the tensions accompanying these migratory flows, for

one of the poorest countries in the world. As of today, a significant number of inhabitants of Pacific islands, for example, in the Tuvalu archipelago, are beginning to leave their islands to live elsewhere due to rising waters and the resulting salinization of soils, resulting in their land becoming unusable.

This is because one of the induced effects of climate change is expressed in an increase in what we now call "climate hazards" such as floods or droughts. Within the restricted framework of this presentation, we envisage the answer to these questions in a twofold way: at the global level and in the general framework of the problems associated with it, as well as within a more limited, more selective framework, the whole intended to highlight the size of the problem.

1.3.2.2.1. At the global level

On the Asian continent as a whole (from Pakistan to Japan via India and Indonesia), the level of rainfall has become such that massive floods have caused the displacement of millions of people, while several hundred lost their lives at the same time. The damage caused was considerable and contributed to the impoverishment of populations already in a state of destitution. However, this is not restricted to the countries mentioned, and also concerns European countries and those of the American continent. Generally speaking, the increase of precipitation to unprecedented levels at particular geographical locations is the origin of what is known as "water stress". Paradoxically, in other very specific geographical areas (Antarctica, Greenland, Africa, etc.), we have witnessed a massive loss of water during the same period, particularly in the most extreme areas (Sahel, Antarctica). According to figures published in 2018 by the WMO[40], 3.6 billion people had insufficient access to water for at least one month and, by 2050, this figure is expected to exceed five billion, including in more populated areas. Therefore, from a hydrological point of view, the planet finds itself in a completely paradoxical situation: on the one hand, certain geographical areas are victims of catastrophic floods, and, on the other hand, other areas are subject to increasing periods of drought.

Under these conditions, the question that arises is as follows: how to manage water resources to ensure the supply necessary for life to everyone. However, from the outset, one observation is clear: according to the WMO, 107 countries are not able to ensure satisfactory access to water for their populations from now until 2030,

40. World Meteorological Organization – for more details, see: www.wmo.int.

and a significant delay has occurred in this area[41]. For example, in 2020, more than 3.5 billion people lacked sanitation services worthy of the name and 2.3 billion people had no access to these services in any way. Among the recommendations in response to this threatening manifest crisis and to the looming hydrological emergency due to climate change and its consequences, to develop the management of water resources as much as possible, the institution suggests tackling the problem upstream, particularly by establishing climatological services intended for the water sector as well as an early warning system, at the same time as sustainable investments. Not to mention that the first area to invest in is the fight against climate change, which is the cause of most of today's ills[42].

1.3.2.2.2. At the national level

Although located in a so-called "temperate" geographical and climatic zone, France, as well as a large part of Western Europe, cannot escape the hydrological problems which concern the entire planet[43]. We propose to make some remarks and indications about the real risks that concern France as much as Spain or Italy, Germany, etc., as well as the countries around the Mediterranean.

– For several years, we have witnessed an increase in episodes of drought leading to a scarcity of water reserves. At the same time, despite more than 400 billion m^3 of precipitation, more than 60% of this manna falling from the sky disappears through evaporation. With climate change, we can expect hotter and drier summers which will lead to greater "water stress", so that regional (and national) water management will involve changes in individual and collective behavior as well as water protection at all levels.

– The question then arising for the geographical areas involved in water management refers to the problems of today's and tomorrow's water stocks. Consequently, what needs to be done to maintain a situation of relative comfort for users, as well as to preserve biodiversity as well as the forest which might be endangered, to treat dependence on parasites and diseases – all factors which constitute a serious threat to the environment, that is, to the fauna and flora?

41. In this case, it is as much about the distribution of water to the entire population as about sanitation and the hygiene services attached to it. Indeed, more than two billion people live in "high water stress" countries without access to drinking water.

42. We will return to this crucial question later; investments, however well oriented they may be, nonetheless remain within a logic of development. However, all forms of development (i.e. of economic growth) are generally based on an attack on "nature".

43. For more information and details on issues around water and its management as resources, we refer the reader to the following website: nationalgeographic.fr/crise-de-leau-en-france.

– Finally, the intensive use of water by agricultural production of the "productivist" type contributes more than necessary to a hydrological imbalance already compromised by conditions in general. This problem should lead us to reflect on our methods of cultivating soil and on practices that are too often implemented in our countryside. In the same way that we speak of a carbon footprint, it would be welcome to introduce the idea of a "water footprint", and to consequently consider better use of this resource which is becoming relatively scarce. One meaningful example illustrates this situation in the productive system: in Spain, a significant part of the water which supplies the flow of the Tagus (which crosses the country from East to West) is diverted in favor of vegetable producers from the region of Andalusia (particularly Almeria), whose crops are widely treated with pesticides and flood northern European markets, thus drying up the entire downstream part of the river. Here, we are faced with a double problem: a negative water footprint which widely impacts the river itself, its flow and its associated downstream activities, as well as a carbon footprint problem caused by the wave of road haulers making incessant back and forth trips across Europe between places of production and places of consumption.

As we can see, here as elsewhere, the problem remains systemic in nature, both in terms of the fight against climate change and in terms of reorganization not only of the management of resources but also of the conditions of production, which itself, through its mere implementation, entails dramatic consequences for the planet in the long term. The water problem can therefore be considered particularly important, and the question of the sustainability of human activity arises with particular urgency.

1.3.2.3. *Depletion of scarce resources*

We will distinguish here, purposefully, between two kinds of resources that are generally distinguished according to their availability a priori: on the one hand, renewable resources with fisheries resources as a significant example; on the other hand, a resource limited in time and space, not renewable and whose availability is finite, namely oil, gas, uranium, "rare earths", etc.

– Fisheries resources are entirely devoted to food, so that 75% of global production is destined for human consumption and the remaining 25% for the manufacture of feed for pig farms and aquaculture. Globally, the sector employs 35 million people directly, but this figure increases to 200 million when family ties, induced employment and other related activities are considered. However, this sector is entering a period of serious crisis, with many species of fish already threatened with extinction due to overexploitation of existing stocks. The problem here is, therefore, in terms of sustainability of the scarce resource, to return to a level

of exploitation that does not threaten their renewable nature. In this area, the FAO has compiled a statistical inventory of types of fish stocks out of 590 to date. While these statistics should be taken with caution[44], they are largely confirmed (or even exceeded) by finer surveys, and thus provide a good approximation of the global trend. Therefore, among the most exploited species, 70% are threatened with depletion in the coming years if nothing is done, while for other species, the state of stocks remains satisfactory or even in slight recovery. As a result, the state of commonly consumed fish stocks, such as cod, hake, tuna[45], sea bream, sole and other sea bass, will become particularly worrying if nothing changes very quickly.

– One non-reproducible resource: oil.

Table 1.1 gives a fairly accurate idea of the evolution of the problem posed by oil.

Year	1970	2000
Oil extracted and consumed	35 million barrels	128 million barrels
Proven reserves	72 million barrels	140 million barrels
Additional reserves	250 million barrels	89 million barrels
Total extractable	357 million barrels	357 million barrels

Table 1.1. *Evolution of oil resource data*

In the case of renewable resources, the problems are certainly worrying, but there are conceivable solutions: forests replant, water is renewable and fish or crustaceans reproduce. This implies that, if properly managed, these resources may be conserved over time.

Regarding oil (but this is also true for natural gas and coal or any other fossil fuel), it is an exhaustible resource whose stocks are evaluated based on two main concepts:

44. This is for two essential reasons: firstly, because they do not cover all existing statistics; secondly, because they involve conglomerates of stocks and therefore species, which is imprecise from a quantitative point of view.

45. For example, in the case of bluefin tuna, the size of the fish caught has decreased by more than half, meaning that this species is no longer able to reproduce under normal conditions. Japanese overfishing in general and European overfishing in the Mediterranean in particular has led to this situation, which threatens the very existence of the species.

– On the one hand, proven reserves: these are resources that can be exploited at any given time with the available technology and at market prices. They therefore depend on technology and on the economy, that is, on market prices. These reserves are announced by oil companies who say how much they have in available stock. In reality, these reserves are based solely on these companies' statements, with all the possible strategic behaviors that this implies[46].

– On the other hand, additional reserves: these are reserves that are barely or not at all exploitable, either because the necessary technology is not available, or because the operating costs are too high (or the price too low). Here we find the tar sands of Canada or the heavy oils of Venezuela, from which we know how to extract petroleum but at too high a cost. With the scarcity of resources and the inevitable increase in the price of the product (especially since everyone knows that the stock is available in finite quantities), these additional reserves will one day be exploited but they are not counted among the proven reserves.

To estimate the number of years of oil remaining to be used in the future, a ratio was developed that correlates proven reserves to quantities consumed over the year. Therefore, in 1936, proven reserves were able to operate for 16 years, whereas today the result of this ratio is 30 years. Under these conditions, these data appear as a (relative) illusion to the extent that technology improves and that market prices and thus the profitability of the wells increase at the same time[47].

Therefore, the same oil may change "status" from one period to another depending on its market price. However, the overall quantities available, whether proven and/or additional, are still finite, beyond which it is impossible to go. So, the possible substitution of one type of reserve for another fundamentally changes nothing: there will come a day, not very far away, when there will be no more oil. Because if demand continues to increase regularly at constant prices, overall reserves are limited and the number of discoveries decreases regularly, we will have increasingly smaller quantities of oil. Under these conditions, the increase in the price of the resource will have a double consequence: on the one hand, it will lead to a significant drop in demand (at worst, a drop in its rate of growth); on the other hand, it will make deposits profitable which are currently known to be

46. Thus, in 1982, without new discoveries, Iraq declared an increase in its reserves of 84%, while in 1986, the United Emirates increased their declarations by 194%!

47. Thus, with regard to the United States, the second oil shock of 1979 and the increase in the price of a barrel of oil made it possible to put oil fields into service which would not have happened without this increase in prices. Thus, reserves which were additional until 1979 then became proven due to this "simple" increase.

unexploitable, mitigating the effects of scarcity while allowing others to be discovered.

However, whatever the scenario, the dilemma remains the same: faced with an inevitable shortage of oil, it is perhaps time to consider alternative forms of energy and avoid the dramatic consequences of such a situation, even if it had no solution before this catastrophic outcome. The terms of the choice are clear: either we prepare for the post-oil era in the best conditions by agreeing to change our behavior, or these conditions will impose themselves later, in much more difficult conditions.

1.3.2.4. *The consequences of deforestation*

At the time of the agricultural revolution, forests extended over more than six billion hectares worldwide. Today, they cover less than four billion, and more than half of this area has disappeared in the last 50 years.

This recent deforestation is due:

– on the one hand, to the need to cultivate new arable land[48];

– on the other hand, to the growing demand for firewood, which remains the main source of energy for half of humanity;

– finally, to an intensive use of quality wood consumed by northern countries.

According to the FAO, 13 million hectares of forest have been destroyed and transformed into agricultural land. Despite new plantations and natural forest growth, the net loss is 7.3 million hectares per year and, unfortunately, this mainly involves primary forest. Therefore, between 1980 and 1995, the percentage of forests continued to decline overall. Although the increase for developed countries (Europe, Japan, North America, etc.) is 2.6% on average per year, for developing or emerging countries (Africa, Latin America, Southeast Asia), there is a net decrease of almost 9% per year. The consequences of this phenomenon are multiple: loss of biodiversity, mineralization and soil erosion, climatic changes, decrease in water resources, reduction in forestry activities, etc.

48. Indeed, due to rampant urbanization, it is necessary to compensate for the loss of UAA (Useful Agricultural Area) to continue to feed a population which furthermore never ceases to grow. It is therefore by falling back onto the forest that we attempt to maintain a precarious balance. Furthermore, in Brazil, for example, the destruction of the Amazon rainforest results from the cultivation of sugar cane which allows production of ethanol, a plant substitute for petrol: we no longer release CO_2 into the atmosphere, but we are destroying the lungs of the planet, all for the benefit of the largest “landlords” in Latin America.

Furthermore, the figures themselves should not be misunderstood; in fact, we have also noted a sharp increase in the number of eucalyptus plantations, which tends to reduce the figures concerning losses. However, this is a tree that grows very quickly and can therefore be used quickly (growth of six meters in three years) but has the disadvantage of drying out the soil and prohibits all life under its canopies, which prohibits any biodiversity. In the case of Brazil, while the primary forest is in the process of being almost completely destroyed, the maintenance of a "good" amount of forest cover is due to the size of eucalyptus plantations which are also used industrially; in the meantime, the Amazon rainforest is being destroyed.

Our above approach remains, of course, merely indicative and does not pretend to address head-on all the problems linked to the depletion of natural resources, the impoverishment of the environment and its endangerment. It simply gives an idea of the consequences that the growth and development of world economies, in all its forms, imply in the very near future (in terms of the age of humanity). This is because what is called the Anthropocene[49], that is, the effects of human activity on nature can be assessed in the light of the very consequences of this activity. It now constitutes a very tangible reality, one that is more and more present in daily life for each and every one of us. This long and varied list is not encouraging, and we are aware that the division that we propose between social, environmental and economic dimensions certainly remains arbitrary due to the overlapping of these three strands which are difficult to isolate from one other. Its immediate objective is to set out future problems before those consciences that may still doubt them.

1.4. The neoliberal city and the environment

The strong development experienced by the countries of the "North" as well as, to a certain extent, the countries of the "South"[50] during the second half of the

49. This term designates "the era when human powers have overtaken natural forces and pushed the earth system off its rails, placing it on a slippery terrain where it experiences upheavals in unpredictable and ever more violent ways". Thus, "the industrial revolution marks the beginning of a large-scale human disruption of the earth system, the most visible manifestation of which is climate change". Malm, A. (2017). *L'anthropocène contre l'histoire – Le réchauffement climatique à l'ère du capital*. La fabrique.

See also Bonneuil, C. and Fressoz, J.-B. (2013). *L'événement anthropocène – La terre, l'histoire et nous*. Le Seuil.

50. We include in this expression both the so-called "emerging" countries, that is, those which have experienced a certain level of growth and development (the BRICs, namely Brazil, Russia, India and China) as well as developing countries whose growth has long been more sluggish, mainly African countries and a few Latin American countries.

20th century is characterized especially by a demographic explosion at the same time as a strong urban development. While in 1950 slightly less than 30% of the world's population lived in cities, this figure exceeds 50% today and is expected to reach more than 70% around 2050. With seven billion inhabitants in 2011, almost 10 billion in 2050, global population growth[51] has mainly benefited cities on all continents. However, this massive and uncontrolled urbanization does not proceed without serious problems. Urban infrastructure is struggling to keep pace with population growth in cities whose economic base cannot keep up. This rate of population growth leads to situations as dramatic as they are explosive: crowding of populations in deplorable hygienic conditions, waste treatment, water supply, air pollution, serious attacks on the environment; in short, all the problems that many megacities face. At a time of globalization and the generalization of trade under the rule of neoliberalism, the emergence of the neoliberal city has come to pose more problems than it solves.

1.4.1. *A redefinition of the neoliberal city*

From the city to the urban, or even, according to the expression of F. Choay, "the reign of the urban at the death of the city"[52]: so many terms which seem to designate the same object while differentiating it. As for F. Choay, it is clear that this semantic shift in fact traces the transformation of the city, which expresses a transition from a way of locally living together to a specific approach which refers to a state of society, which itself corresponds to a phase of development of the city, and more particularly of its extension. In this way, we establish, if not a causal relationship in this evolution from the city to the urban, at least a particular meaning in the history of both, the main shaping force of which would be the economic and social development of our societies. Therefore, the global phenomenon of urbanization on the planet, transcending morphological, cultural, geographical and other differences, affects all countries in multiple aspects but in identical ways. This is because the set of megacities, that is, the concrete manifestation of the phenomenon of total

51. These figures are based on projections of current trends and are reported by all the largest institutions. However, for some and based on other studies, the trend could well be reversed from the 2050s: "Fertility rates are collapsing, both in developed nations and in developing and least developed countries. In this scenario, the population would peak at 8.5 billion by 2050, and then begin to decline rapidly. So rapidly that by the end of the century, it would return to its current level of 7 billion. Instead of increasing, it would decrease". Bricker, D. and Ibbitson, J. (2020). *Planète vide – Le choc de la décroissance démographique mondiale*. Les Arènes.

52. Choay, F. (1999). De la ville à l'urbain. *Revue Urbanisme*, 309.

urbanization, of the shift from the city to the urban, now extends from Shanghai to São Paulo, from Mexico City to Lagos. Therefore, it seems difficult not to see in the major phenomenon of economic development, which concerns us here and as defined previously, the reasons for this change of direction, of the passage from one state to another, from the city to "an urban civilization"[53].

This is why we will attempt to describe this evolution both from a quantitative point of view (mainly with the emergence of a large number of megacities over the last 40 years) and from a qualitative point of view, in order to attempt to appreciate (or not) the capacities of urban systems to adapt to the standards and conditions of sustainable development.

We have thus established a formal relationship between the city and economic development, mainly within the broader framework of urbanization, which thus brings us back to life and what it fundamentally is.

– First of all, the city is a product, that is, the result of a production that is above all social. This is an introductory remark which has the advantage of bringing into play two (but not only two) determining factors which it seems to us essential to pose as a priori. On the one hand, the city arises from an act of production and because it is produced, as such, the city remains an artifact. It may therefore appear, as such, only as the synthesis of the technical system to which it belongs, including when it integrates within itself the elements of its history and the history of its construction. As such, the different sediments that characterize its construction throughout its history summarize in a certain fashion the history of technologies and their evolution. Therefore, on the other hand, because it is a technical construction, the city is a very precise reflection of what the history of technology has bequeathed us.

– It is also well known that the simple technical vision of the city (and its most recent extensions under the term urbanization) is not enough to answer the question of what the city is, particularly in social, cultural and economic terms, as well as in the relationship that it tries to re-establish with its natural environment and therefore its preservation. Also, though the social question remains essential, inextricably linked to understanding what the city is, not only as a built environment but a living environment, the relationship it weaves (or does not) with its environment proves to be decisive in many respects.

53. Paquot, T. (2000). Etudes urbaines ou " sciences " de la ville et des territoires. In *La ville et l'urbain l'Etat des savoirs*. La Découverte, p. 7.

1.4.2. *From the Fordist city to the neoliberal city*

We will distinguish two phases of the development of the city which emerged in the immediate post-war period, which continues today and which is clearly identifiable in terms of its consequences for the environment.

1.4.2.1. *The Fordist city*

The end of the 1970s also saw the end of a cycle that can be described as prosperous for the city, particularly due to significant changes in the social and spatial morphology of cities. Indeed, this period witnessed the birth of urban policies whose objective was to regulate population, inducing a significant and definitive development of cities. Furthermore, these urban policies also aimed to provide the city with transport networks, to facilitate all the flows across it that allow it to live: namely water, gas, electricity, waste collection, roads, etc., as well as their circulation, whether material and physical flows or people, which it previously lacked. Obviously, in this context and under these conditions, the state would play a major role, especially since conditions of post-war reconstruction required resources that the private system was not able to invest. Infrastructure policies, post-war nationalizations and, more generally, redistribution mechanisms constituted a particularly favorable package for a renaissance and urban development. In addition, we witnessed a form of "decommodification", thus of socialization of the collective functions of life in the city[54], that is, "living together", resulting mainly from the assumption by the state and local authorities of its functionalities, allowing everyone to enjoy a never-equaled purchasing power.

The public policies thus implemented have been described as "spatial Keynesianism" to the extent that their goal was better distribution of the effects of development, at a time when good will was essential to the reconstruction effort at the level of the city and of national territories[55]. Ambitious housing policies were then implemented in most of the countries concerned through reconstruction and social housing, which expressed in its development "the housing of the future".

54. As a significant example in our view, the very liberal United Kingdom under the Transport Act of 1947 would nearly nationalize a large part of the country's urban transport network; the other part, not controlled by the British Transport Commission, would be controlled by local communities. In France, with the creation of the Société Nationale des Chemins de Fer, the state assumed responsibility for the national rail transport network.

55. It should be noted here that the establishment of "Fordism" had different characteristics depending on the country and local socio-political realities. Thus, in the USA, it took the form of what we can call "market Fordism", whereas, in the countries of continental Europe, it took on a more statist character, particularly in France.

This was characterized by health, educational, leisure and sports facilities, no longer the prerogative of the wealthy classes and the best-resourced urban centers. This planning effort combined with a political will to act upon this new urbanization movement resulted in a clear improvement in housing conditions in Western Europe. Therefore, in Great Britain, the share of tenants in public housing exceeded 30% in 1971, more than 40% in the Netherlands (with peaks of more than 50% in Amsterdam), while in France, this housing was strongly concentrated in the suburbs which then constituted an extension to or continuity of existing cities. Furthermore, and in all cases, we witnessed a strong growth in home ownership thanks to significant support from the "welfare state". At the same time, we saw the explosion in the use of private cars and therefore the first effects of the pollution that its intensive use would generate. Finally, with the liberalization of trade, the redefinition of the new international division of labor and globalization, the city itself took on the appearance of the new liberalized world that became available to it.

1.4.2.2. *The neoliberal city*

The saturation of markets, particularly for durable goods, the end of significant productivity gains, the (relative) increase in labor costs and decline in business profitability, the emergence on the economic scene of new producers such as Japan, Taiwan, China or even South Korea, that is, the majority of South East Asian countries: all these reasons and others led to a movement of industrial centers from the "North" toward the "South". Therefore, countries with "low labor costs" attracted most of the so-called "labor intensive" industrial activities, that is, those with high (relatively speaking, of course) use of labor. As urban planning policies had consisted of monitoring and supporting industrial establishments (quite logically, for that matter), the entire urban fabric was therefore impacted by the consequences of this new global organization of labor. The most affected cities, the regions and territories most marked by the crumbling of the industrial system, suffered the full brunt of such a downturn. Only regions of diffuse and light industry, territories marked by a strong innovative technological potential[56] came off better, but in an environment that had become uncertain. The end of Fordism thus gradually gave way to an increasingly uninhibited liberalism with all the economic and social consequences that we know: with the 1980s (which brought to power the ultra-liberals such as Reagan in the USA and Thatcher in Great Britain) neoliberalism took hold and, with it, a new conception of the city. For example, the Thatcher government dealt a definitive blow to the autonomy of cities by taking two

56. What some have called "technopolitan territories", generally organized around university towns with high potential for research and therefore high innovative capacity. See Pinson, G. (2020). *La ville néolibérale*. PUF, p. 41.

specific measures: on the one hand, a drastic reduction in transfers from the central state to the municipalities; on the other hand, limiting the capacity of these same municipalities to change their revenues to compensate for the losses of state subsidies[57].

The neoliberal choice was in reality made against the initial principle of urban planning and in the name of development: urban planning must not be an obstacle to the full functioning of the market, but must allow better returns from the territory. This means that all procedures must be simplified and left in the hands of private agencies, which thus replaced local administrations to the best advantage of their private interests. We witnessed a deregulation consisting of handing over all the logics of land and building allocation to market mechanisms. This new expression of urban planning resulted in social polarization; on the one hand by expelling toward the periphery(s) those populations most affected by the succession of economic crises; and on the other hand, by a gentrification of urban centers accentuating the division of populations. The commodification of housing associated with a relative scarcity of urban land caused a profound deregulation of the real estate market and an explosion in prices so that the relative share of income allocated to housing (rent and induced charges) increased from 15% on average at the beginning of the 1970s to more than 30% (or even exceeding 40% in certain urban areas) in 2018. While the canons of liberalism proclaim to anyone who will listen that market competition works in favor of the consumer, experience shows on the contrary that prices soar and turn against them. This situation accentuated the social divide that manifests itself in several ways. We will only highlight a few aspects of it here.

On the one hand, urban segregation has strong economic and social connotations which are rooted both in the consequences of deindustrialization and in chronic unemployment that has hit the working populations of the periphery. In addition, the development of a service economy has promoted the development of

57. In Great Britain, the Thatcher government created the UDCs (Urban Development Corporations) during the 1980s, placed under the direct authority of the government, replacing local authorities in matters of urban planning. These were agencies headed by a "manager" appointed by the government and in direct contact with the business community in charge of urban development problems. See on this subject: Imrie, R. and Huw, T. (1999). *British Urban Policy: an Evaluation of the Urban Development Corporation*. Sage Publications.

Regarding the USA in the same area: Harvey, D. (2005). *A Brief History of Neoliberalism*. Oxford University Press.

For France, we refer to Jobert, B. and Théret, B. (1994). La consécration républicaine du néolibéralisme : l'ultime étape d'une reconquête. In *Le tournant néolibéral en Europe*, Jobert, B. (ed.). L'Harmattan, p. 21/85.

precarity for a segment of the population that is already the victim of successive crises; on the other hand, an ethno-social segregation which has been established by a certain number of studies, particularly in the United States (but which also involves France to varying degrees). The populations concerned are generally discriminated against because of their belonging to a community that is distinguished at an ethnic level. This problem concerns both France and the United States in many respects and constitutes an important concern in the "management" of cities which suffer the effects of this discrimination. For although the history is not the same and does not cover the same realities, the effects and consequences remain very significant, and we are slow to find solutions. The suburbs in France and the ghettos in the United States certainly represent a serious and recurring societal problem[58].

1.4.3. *Population growth, economic development and urbanization*

The urban phenomenon arises from the development of cities on all continents and appears to be relatively recent. Moreover, it seems to be linked to another aspect that is as recent as it is significant, namely world population growth. We offer here a review of headcounts concerning these developments without going into the detail of an exhaustive analysis of this phenomenon. The figures[59] speak for themselves: between 1950 and 2020, the population increased by more than 300%. Indeed, the world population grew from nearly 2.5 billion in 1950 to nearly 7.8 billion in 2020 and is set to reach 9 billion in 2050[60]. In 1950, the urban population represented 30% of the world population, while in 2008, this rate rose to 50%. Today, almost 75% of the world's population is considered to live in "urban areas". This last figure is only an indicator of major trends, even if it remains relatively imprecise, particularly concerning a possible confusion between "city and urban", on the one hand, and "urban zone", on the other hand. Indeed, we might include in the concept of city,

58. Due to lack of space here, we refer on these topics to:
Oberti, M. and Prétecielle, E. (2016). *La ségrégation urbaine*. La Découverte.
Wacquant, L. (2006). *Parais urbains – Ghetto, banlieues, Etat*. La Découverte/Poche – more generally, the work of this author on these themes is considerable and particularly important for understanding the phenomenon.
59. The figures we present above are from the following sources:
United Nations – World Population Prospects – Departments of Economic and Social Affairs.
World Bank. World Bank/Indicators/Population/Income.
60. This is a projection provided by the UN and on which there is consensus, apart from some who question the assumptions on which this projection is based. We will return to this later.

as F. Choay rightly points out[61], those endless Indian villages which reflect more a form of belonging to rurality than a true identification with the city proper, as we may find in megacities such as New Delhi or Bombay. It is generally considered, and forecasts are based on this figure, that by 2050, 70% of the world's population will live in cities (against 55% presently) with a significant increase in the size of cities: while during the 1970s only the world's top eight metropolises exceeded 10 million inhabitants, in 2019, the top eight exceeded or equaled 25 million inhabitants, Hong Kong and Tokyo reaching the figures of 65.7 and 42.7 million inhabitants respectively[62]. However, it should be noted that these populations are very unevenly distributed: while the urban population increases on average by nearly 1.4% in developed countries, urban growth exceeds 3.5% on average in developing countries (including emerging countries).

This reminder of the demographic conditions in which the contemporary world has transformed must not ignore the deep-rooted reasons that may account for it. Indeed, the exponential curve of population growth has as a corollary the same trajectory for development closely associated with economic growth. This is because, however uneven the distribution of ever-increasing wealth may have been, the fact is that the effects of this growth are clearly identifiable and can be summarized as follows:

– Economic development, even if poorly distributed, has "trickled down" negligibly in terms of contraception, thus favoring a sharply increasing birth rate in developing countries as well as in emerging countries whose vitality in terms of births is remarkable.

– Commercial development and the globalization of trade have also enabled the development of centers of redistribution and significantly improved the living conditions of populations through a significant (although very insufficient) increase in purchasing power. Let us also not forget the masses of the "left behind" who have not seen significant change in their situation.

– Urbanization has had several consequences whose long-term effects are quite contradictory. On the one hand, it allows cultural development that is not necessarily facilitated by the relative isolation of rurality. Therefore, changes in individual and collective behavior will not fail to have consequences on possible developments: development of education, cultural opportunities, (relative!) improvement in women's rights, in short, a set of factors of a socio-cultural nature which have

61. Choay, F. (1979). *L'urbanisme, utopies et réalités – Une anthologie*. Le Seuil.

62. For more details on these urban demographic developments, see Mignot, J.-P. (2020). *Document de travail interne – Axe Développement Soutenable*. LERASS.

changed living conditions on most continents. On the other hand, the acceleration of urbanization has the indirect effect of facilitating access to employment, with an increase in opportunities which itself results in a change in social relations to the point of changing their meaning and scope. This translates into easier access to divorce, to a challenge to the model of the family inherited from the 19th century and a decline in fertility rates observed in all developed countries, to the point that this phenomenon has come to worry decision-makers.

As we can see, the impact of economic growth and the resulting economic and social development does not fail to leave important traces concerning the evolution of our societies. This is because the existence of the so-called "modern" city, if it a priori integrates these two dimensions, also responds to a set of questions posed by the movements that have agitated this century: migratory movements[63], forms of urban concentration, overpopulation, intra- and inter-urban mobility, the relationship to work and also the problems linked to housing and hygiene, as well as the relationship to the environment and all the damage it suffers. It will be easily understood that we cannot deal with all these questions here, and we will address the problem of the relationship between the city and the development (and therefore the growth) of the economies which enable it in a twofold way: from a quantitative point of view, by trying to highlight the effects of this development, especially on the city and its extension; and from a qualitative point of view, by showing that development as a manifestation of the structural transformation of economies and society in general leads to a transformation of the city at the same time. Obviously, the modalities of change implied by development and growth in a globalized economy are reflected, even in differentiated ways, in current and/or future transformations of the city (and the urban) and of the role that they play in society.

1.4.4. *Urbanization and environment*

Demographic growth and its corollary, urban growth, as we have known it since the end of the war, continued for a very long time without concern for the consequences that all this might have on the environment. As much as the issue of environmental preservation was ignored during this period, now the pressure is stronger and more pressing: environmental damage cannot wait, and we are the only ones responsible for it. Also, the contemporary city must play its part in accepting something that may become overwhelming, both in terms of human health and the

63. This involves intra-national migrations (from cities to cities, from cities to the countryside and vice versa) as much as international migratory flows, voluntary or involuntary. Also, we can clearly see the importance that these movements have assumed in recent times.

future of the planet. Here we offer a quick breakdown of the damage caused, for lack of being able (or knowing how) to remedy it.

1.4.4.1. *The release of greenhouse gases*

The problem of GHG emissions is the environmental pillar of sustainable development, at least symbolically as it is one of the most visible (and talked about) and iconic signs of environmental damage, involving the most visible human action on the planet and directly impacting on human lives through the resulting climate change. Greenhouse gases are defined as gaseous components which absorb infrared radiation emitted from the Earth's surface. An increase in their concentration in the planet's atmosphere is a major reason for climate change.

While the IPCC[64] in its first report in 1988 was still hesitant about human responsibility for global warming, the fourth report published in 2007 leaves no doubt about this responsibility, while the most recent report of 2022 points to the absolute urgency of taking the necessary measures under threat of irreversible damage. In this context, we have previously shown the evolution of the concentration of CO_2 over almost a century, carbon dioxide being considered the gas responsible for the greenhouse effect which leads to inexorable climate change. Also, even if the consequences of this accumulation are uncertain (as with all environmental problems), they are serious and threatening enough to warrant immediate action.

Indeed, our current modes of production and consumption suggest that this situation will continue for several decades. Furthermore, it is a problem of stocks and no longer a simple problem of flows, that is, new emissions: because even if we reduced our CO_2 emissions to zero today, the greenhouse effect would persist until 2100. However, we must reduce CO_2 emissions now: in this regard, the National Academy of Sciences of the United States states that the increase in the concentration of carbon dioxide emissions in the atmosphere was 35% in 2006. However, the current situation of emerging countries such as China or India, which are also major polluters, does not help because these countries do not intend to sacrifice their development in the name of the greenhouse effect. They therefore refuse to sign the Kyoto Protocol, which suggests reducing GHG emissions by 5% for the countries involved and signatories. Furthermore, as they do not feel responsible for the current situation (due to their relative underdevelopment during

64. This working group was created at the initiative of the WMO and officials from the United Nations Environment Program. The IPCC's work is recognized as being of high quality by all specialists.

Les Trente Glorieuses), they ask the developed and rich countries to make the necessary efforts first.

In the light of these positions, we may judge that the problems of GHG emissions are not ready to be resolved and that matters are urgent.

1.4.4.2. *Waste treatment*

The so-called consumer society has an inescapable counterpart, namely "the disposable society". The problem of waste does not appear to everyone to be as immediate and obvious as it is in reality: every morning, or regularly at least, all our waste is collected and we are rid of it. All it takes is a somewhat prolonged strike by sanitation services to realize to what extent this is a real problem linked to our system of consumption. The reason for such a situation is simple: 80% of consumable goods sold and consumed worldwide are discarded after a single use. In addition, 99% of the resources contained in products become waste six weeks after the sale of the products. We therefore have every reason to connect our mode of consumption to a "disposable society": the productivist and consumerist society creates products whose origin is found in nature (e.g. in oil for plastics) and according to the same logic, our "natural" behavior aims to throw back into nature what it has given us (even if its transformed by human industry). However, in the long term, this proves to be impossible for nature itself and therefore for us.

This increase in waste constitutes the counterpoint to the growth in consumption which, itself, results from industrial productive growth: the mode of production of wealth determines the mode of consumption of an industrial society, a consumer society, or whatever it might be called. Therefore, while the average amount of waste per capita was slightly over 220 kg in 1965, it rose to nearly 350 kg in 1995, then to over 380 kg in 2005. In 2021, Europeans generated 481 kg of waste on average. Despite the implementation of waste sorting, we individually produce more and more waste.

In addition, 88% of the total weight of waste produced that we discard is not recycled. We can imagine the increasing level of nuisances, of all kinds, linked to storage of this waste, nuisances associated with much greater and potentially much more dangerous pollution. Therefore, for example, a mercury watch battery pollutes 1 m^3 of land for 50 years; it takes 10 years for a plastic cup to biodegrade and ... 4,000 years for a glass bottle! Furthermore, whether it involves nuisance or collection, the treatment of this waste (and the pollution it causes) has a significant social and economic cost. Therefore, the "waste" bill has more than doubled in

France since 1992, and, for some municipalities, the contribution to the SIVOM[65] to which they belong represents more than half of their operating expenses. We suspect that the organization of society around a mode of consumption (and therefore of production) indicates societal foundations which pose problems, particularly regarding waste. Two aspects in particular are as follows:

a) A quantitative approach.

The problem of waste is generated at all stages of the production cycles and therefore of the life of a product, namely in the extraction of raw materials during manufacture, in its development, and in its use until its end of life. Under these conditions, all actors in the value chain participate in and share in the production of the amount of waste thus produced. In 2018, France produced nearly 343 million tons (Mts) of waste, or just over 5.1 tons of waste per capita. Waste is divided into three categories: firstly, so-called mineral waste, almost all of which results from construction activity and which represents 236 Mts; secondly, hazardous waste which necessarily involves specific facilities because it presents a public health danger, 12 Mts; finally, non-mineral and not very dangerous waste of 95 Mts. This represents the waste produced by all sectors of the economy, namely agriculture, industry, households[66], the service sector, etc. To give an order of magnitude of the size of the waste problem, for the year 2018, the total production of waste for the 27 countries of the European Union is 2,600,000,000 tons, including 107,000 of hazardous waste. By extension, it is good to remember that there is an enormous mass of floating waste (plastics in various forms, wood, various waste), concentrated by marine currents northeast of Alaska, sometimes called the “sixth continent”. Not to mention the global consequences for biodiversity and the endangering of species, whether marine or terrestrial. Finally, there is a major trend of pointing the finger at consumers who dump too much waste. However, what we call municipal waste only represents 10% of total waste! Duly noted, and what about the waste of the productive system which pervades the planet?

b) A qualitative approach.

As we can see, the quantitative significance of waste generation at both national and global levels now poses the urgent problem of recycling, or better still, elimination, as well as recovery to the extent possible. The principle of recovery is in fact part of a policy of defense (admittedly a posteriori) of the environment,

65. SIVOM: Syndicat Intercommunal de Traitement des Ordures Ménagères (Intermunicipal Union for the Treatment of Household Waste).

66. Regarding households, the overall value of waste discarded for the same period represents almost 30 Mts, that is, a little less than 9% of the total waste produced in France.

particularly by establishing funding for the treatment of waste and certain raw materials. Therefore, against funding of €8 billion at current prices in 2000, the sum allocated to this same funding in 2018 exceeds €16 billion, or double in constant prices, while over the same period, the sums allocated to recycling have remained almost constant: €1.9 billion in 2000 against €1.8 billion in 2018. Several factors have facilitated the decision to support waste recovery more actively with a view towards better environmental protection. On the one hand, strong incentives by the public authorities for companies (especially those in the construction sector) to reuse part of the waste they produce, that is, rubble and other debris. On the other hand, we are seeing an increasingly emphatic commitment from local authorities, mainly in the selective collection of household waste. In particular, the increasingly important role of recycling centers (from "everything accepted" to "green waste") which represent 31% of household waste collected by these local institutions. Finally, around 20 specialized functions characterized as "producer responsibility" are organized to ensure the management of certain specific waste streams based on their quality (dangerousness) or their quality (packaging). Therefore, in 2018, 8.3 Mts of recyclable waste were collected under the responsibility of specialized organizations.

Ultimately, the expenditure incurred in managing waste of all kinds, in other words, the investments made, combined with the costs of operation, treatment and recovery of raw materials reached a total of €25.6 billion in 2018 for France. This is an opportunity cost that our economies could perhaps do without. In this context, one last remark: we have focused in this presentation on the "downstream" aspect of waste production and treatment from the perspective of environmental protection. However, a fundamental question arises concerning the "upstream" problem, that is, the responsibility of the producers of this same waste, which concerns us in terms of treatment. Therefore, despite widespread protests regarding packaging waste and the damage it causes, no progress (or very little in comparison to the urgency of the problem) has been made in this area. However, it seems that the cost of this same waste is attributed to the "downstream" phase of its treatment, even though it is the responsibility of the companies "upstream". Obviously, this situation also very strongly engages the responsibility of manufacturers who use and abuse packaging of all kinds to increase sales, without worrying about the impact on the environment. In this regard, European regulations have made progress in this area, by imposing stricter packaging standards on manufacturers: thus, the European Commission set new recycling targets for 2008 by increasing from 25% to 55% the proportion of packaging waste which must be recycled. Some manufacturers even produce goods that are completely recyclable at end of life. In general, manufacturers are more or less forced to contain their production of waste as part of what is called "eco-design" which consists of integrating a product's life cycle from its very first conception

until its destruction. Eco-design therefore corresponds to the integration of environmental aspects into the commodity from its initial design. This involves considering environmental requirements (the regulations in force, use of brands, product content, etc.) as well as the environmental consequences of products, namely resources consumed by its manufacture, atmospheric emissions, production of waste and recovery of products reaching the end of their life.

1.4.4.3. *A possible major food crisis*

A recurring question regularly disturbs economic thinking and keeps our decision-makers awake: whether we will be able to feed the planet in the years or decades to come. Since Malthus and the thinly veiled specter of the impossibility of supporting the continued growth of the world's population in terms of quantity of food, this problem has systematically resurfaced. In these troubled times, where uncertainty reigns, it is obvious that a question on this theme will come to the fore. However, the reasons for this question seem more pressing than ever since the damage caused by humanity on this planet that must feed it is more and more significant, at risk of becoming irreversible. We return to the same question here: will a world population of 9 billion people by 2050 find enough to eat? Also, if so, under what conditions? It is this crucial issue for the future of humanity that we address here. Here, the effects of the economic crisis were for once beneficial, in that this crisis, by stopping speculation on agricultural raw materials, allowed prices to return to an acceptable level. However, for some, the worst is yet to come, for both structural and conjunctural reasons.

1.4.4.3.1. Conjunctural reasons

First of all, we might logically think that the economic crisis will encourage developed states to focus on what appears essential in their eyes (and in good political logic): the needs of their own populations. This implies that development aid might suffer a potentially fatal halt. As an aggravating circumstance, the reduction in international trade due to the crisis would not facilitate agricultural exports from emerging countries, just as investments abroad risk declining for the same reasons. Overall, it seems that investments in agriculture are decreasing, which can only have a negative impact on production: remember that it is precisely the decline in investment in agriculture over the last 20 years that led to the food crisis[67]

67. Obviously, everyone knows that the outbreak of the crisis, that is, from a conjunctural point of view, was due to speculation, among other things, on raw materials on the futures market. However, it should not be forgotten that had production levels been sufficient, that is, had sufficient upstream investments been made by the responsible states, speculators would not have been given ammunition; the quantities in circulation of raw materials would have

of 2008. A second conjunctural reason is not favorable to positive change, namely the evolution of the price of raw materials. Certainly, an increase in the price of wheat would not be favorable to the consumer but would have the advantage of increasing the producer's income, which, ultimately, would allow the farmer to invest. However, this scenario is unlikely to happen because current and future prices are characterized more by their long-term volatility than by their level, whether high or low. Prices on the world market behave more like yo-yos than in a regular fashion. This is because they are based very little on the law of supply and demand on the world market, but increasingly on the logic defined in the financial markets. However, there is nothing more delicate for a farmer, from the point of view of their economic future, than a situation where insight into their revenues is difficult, if not impossible.

1.4.4.3.2. Structural reasons

An initial reason lies in the evolution of demand, both quantitatively and qualitatively. We know that the world population is expected to increase from 6 billion currently to 9 billion in 2050, a jump of 50% which should translate into an equivalent increase in food needs. This is a challenge that was already encountered in the 20th century. Unfortunately, the situation has become more complex due, on the one hand, to increased life expectancy and, on the other hand, to the shift of many emerging countries (in general, the most populated ones, such as India or China) from a diet more oriented toward plants to a more meat-based diet. Under these conditions, we need an increase in agricultural production over the next 50 years, not of 50% but of 100%, which poses numerous problems, not only for agriculture but also for existing ecosystems. While emerging countries produced 27 million tons of meat in 1970, they now produce 150 million tons. Knowing that it takes nearly 15,000 liters of water to obtain a kilo of meat (because of the cereals used to feed it, for example, corn silage), a widespread global meat diet is unsustainable: the Earth is capable of feeding 9 billion people, but probably not if they model their diet on that of Americans, which is furthermore an undesirable one.

In addition, animals are not humans' only competitors for access to plant resources: so are cars, especially with the development of agrofuels. While the rate of substitution for oil is marginal (around 2%), agrofuels already absorb a significant portion of cereal production: 5% of wheat, 10% of corn and 20% of food crops. In the United States, ethanol provided 4% of fuel in 2007, while 20% of cereals produced were devoted to its production, or a third of corn production. Also, farmers are all the more motivated to contribute to this because they are heavily subsidized

been sufficient to avoid any form of speculation. We therefore see that these two aspects are not competing but complementary: the one makes the other possible.

(both in the US and Europe, for that matter). In fact, the choices of agrofuels, in the current situation, do not seem particularly ecological. They not only compete with human needs for food, but are also very expensive: refueling a 4x4 requires as much grain, 240 kg, as feeding a person grain for a year. What goes into vehicles' tanks does not go into people's bellies, and pushes the price of agricultural raw materials upward. However, as we pointed out, this problem could be on the way to being solved by second-generation agro-fuels made from cellulosic plants, which would mean moving the problem from the field to the forest[68].

The question then arises as to how to deal with such a situation. We have mentioned two solutions above: increasing the cultivable area (the UAA) and/or increasing yields. However, these two suggestions seem unrealistic. In the previous paragraph, we mentioned the hypothesis of an increase in arable land due to global warming, suggesting that this might be a possible solution. From an accounting point of view, it indeed seems possible to envisage geographical compensation: land gained there would replace the land lost elsewhere. However, the problem is not only an area of land but also the people who live there. With climate change, it is the most populated lands which would become desert (e.g. central Africa) and the least populated lands (e.g. Siberia) which would become productive! All that remains is to transplant the populations of central Africa to Siberia! Stalin's dream realized at last!

Regarding the increase in yields, is it possible to rely on such a hypothesis? Nothing is less certain. While yields have followed a constant curve of increase until recent years, the situation is different today because the major phenomenon is soil degradation: according to the World Bank and the United Nations, in a 2008 report, 1.9 billion hectares (twice the surface area of China) and 2.6 billion people are now affected by significant rates of soil degradation. Of course, we can point the finger at productivist agriculture, particularly regarding its harmful effects on the environment. Seventy percent of freshwater withdrawals are affected by irrigated agriculture, which in certain cases leads to land salinization. In addition, agriculture is responsible for 60% of anthropogenic methane emissions and 50% of emissions of nitrous oxide, a powerful greenhouse gas. These examples could be multiplied, and we must simply remember that agriculture as we have known it for 50 years in Western countries is coming up against unsurpassable limits, and that it is urgent to question it.

68. It seems not to the extent that there are species of wood whose annual growth is very rapid; we have seen this previously for the eucalyptus whose growth is particularly lively, without forgetting the negative effects on the environment of the tree (see Brazil).

Does this mean that everything is definitively grim? It is necessary to add nuance, and it is perhaps one of the major challenges of sustainable development to propose solutions which preserve the future of all and for all. In any case, all specialists agree that the solutions are multiple and local and not unique, as is the case for reorganization by the "market"; as such, the damage caused by the market is already too great and too substantial to make it a solution for the future. The problem of sustainable development must be addressed here in its entirety, that is, by considering the solutions it advocates as well as by measuring the limits and contradictions that this concept imposes in practice.

1.5. From sustainable development to sustainable cities: issues and limits

In the first part, we presented the modalities of functioning of the economic system and its impact, both on the conditions for strong economic growth and on the environment. A provisional conclusion must be drawn: such functioning is not possible over time and cannot be sustained. The idea of sustainable development proceeds from this reasoning and develops the principle of intergenerational continuity as well as the maintenance of major natural spatio-temporal balances. We might also believe that such an idea is new and a consequence of the abuses of intensive growth and unbridled neoliberalism. In fact, this is not the case and this idea of tempering the power of humanity over nature is in no way new: whether it is a question of the "welfare state" or the protection of nature as a place of identification of divine power, there are numerous approaches which aim toward a different relationship between humanity and nature, the immediate environment. We will therefore define, first of all, the content of this notion which appears, more than others, to be multiple, complex and controversial.

Moreover, defining new modalities of this humanity/nature relationship in a purely formal and theoretical way is not enough to resolve the problems: if there is a practical-sensitive domain whose content must be supported and its functioning clarified, it is this one.

The requirements, in terms of results, are primary and go beyond controversies over definitions: why talk about sustainable development if not to consider in a practical way the modalities of application of such a concept? In the second part, we will address these practical modalities through examples that illustrate their content and function.

1.5.1. *Origins, foundations and evolution of the concept of sustainable development*

It seems that something is wrong in the conception of nature that Western humanity has formed, and the consequences of strong growth bear witness to this: if all humans consumed on average like a European, an area equivalent to twice that of our planet would be necessary to satisfy the needs of all; if everyone consumed like an American, it would take five. No other culture has, to this extent, adopted toward both natural resources and animals – in short, toward Nature in general – such an attitude of conquest, of control and operation. Furthermore, the idea of economic growth is exclusively Western, more particularly, English-speaking, and has been dominant for only three centuries. As long as we do not break with this vision of nature inherited from Descartes[69] that is linked to the very history of Western thought, any remedy for the consequences of this idea of domination of nature through economic growth seems compromised.

1.5.1.1. *Evolution of the concept in all its forms*

One of the first to make this diagnosis is the contemporary philosopher Edmund Husserl in his work "The Crisis of European Sciences and Transcendental Phenomenology" published in 1936[70]. According to him, the founding act of the European vision of the world is situated in Greek antiquity with the appearance of a singular teleology: understanding the world and developing a science of "everything in the world". This means creating a synthesis between metaphysics and physics, linking ideas with sensory realities, and this science is philosophy. With the Renaissance and the Classical Age (17th century), a radical change occurs and the natural sciences separate from the sciences of the mind. From then on, physics, biology, chemistry – all the natural sciences – continue their research on matter and the living world and, associated in their understanding of the natural world, they ensure progressive mastery through technology which becomes the tool of a new power for domination of nature. At the same time, these advances are made outside of any moral and political consideration and nature thus falls under the control of scientific and technical reason, while the "sciences of the mind" remain anthropocentric. Also, this is where the problem arises: this technical mastery is increasing without anyone worrying about its progress and its consequences for the

69. It must be remembered here that Cartesian precepts are identified with a singular idea of the relationship between humanity and nature: that humanity must become "the master and possessor".

70. Husserl, E. (1989). *La crise des sciences européennes et la phénoménologie transcendantale*. Gallimard.

world around it. This mastery extends to a space of lawlessness and amorality and may serve the very worst causes[71].

Heidegger would take up, although in another mode and based on a different content, the critique of science and modern technology in a conference entitled "The Question Concerning Technology"[72]. For the author, technology in the modern sense is characterized by "revealing that challenges": nature is called forth, that is challenged by humans to deliver energy capable of being extracted and accumulated. The essence of modern technology is "enframing", that is, subjecting this nature to the domination of reason. Nature then becomes a source of exploitation from which humanity benefits through science and updated technologies. Furthermore, the danger of technology for Heidegger comes from the fact that humanity does not master technology to the extent that technology subjugates and challenges humanity itself. The exploitation of humans by humans would only be the extension of the exploitation of natural resources, of nature therefore for the sole benefit of humanity: technology therefore endangers both the ecosystem and humanity itself. The analysis that Heidegger produces concerning the "scientific and technical complex" belongs, in fact, to a historical period during which the confusion of "minds" leads to unique situations on the ideological level[73].

In the field of economics, the idea of sustainable development appears at certain periods in the history of economic thought in the form of what economists call the "stationary state"[74]. It was with Adam Smith, the founding father of classical political economy, that the idea appeared in the following form. For Smith (as well as for Ricardo and Marx), the accumulation of capital depends on savings which are

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71. Husserl wrote his last book while helplessly witnessing the rise of Nazism in Germany, which he fled in 1933.

72. Martin, H. (1980). *Essais et conférences – la question de la technique*. Gallimard, pp. 9–48.

73. Let us recall here that in 1934, Martin Heidegger accepted his appointment to the highly coveted position of Rector of the University of Berlin by…Hitler! This part of the philosopher's life is of course very controversial and has given rise to abundant literature. In any case, as Victor Farias points out, the role of nature and the direct relations of respect, even submission, that humans must maintain with it, characterize a time when the nascent idea of "ecology" derived directly from the extreme-right movements which demanded, at the time, the replacement of coal by... nuclear energy.

See on this Farias, V. (1987). *Heidegger et le nazisme*. Verdier.

74. Obviously, the very term development is not used, or in certain cases, does not exist. The fact remains that the principle of a situation of non-growth, or even "degrowth" is very real and corresponds to the principle of sustainable development, the environmental variant not having the significance that it (unfortunately) has today.

made to be reinvested (implicitly meaning that there is no hoarding) and that investment must provide profits which must be reinvested to ensure the continuity of accumulation. Such is the organic and structural logic of capitalism. In this context, Smith defines a "natural rate of profit" below which we cannot go because it would be just sufficient to cover the "risk" of the investment. If the real rate of profit is higher than this rate of "natural profit", there will be net investment and thus net accumulation, that is, growth. Conversely, if it is equal to it (or even lower, which would be worse), there will be a stationary state without net accumulation of capital: gross investment will be equal to the replacement of existing capital. If the real rate is lower than the natural rate, there will be a decrease in the capital stock, in other words, degrowth. For Smith, however, the growth rate of the capital stock is a factor that explains the decline in the rate of profit for several reasons. On the one hand, opportunities to invest profitably are increasingly scarce and there will be an increase in costs, especially wage costs; on the other hand, competition between firms in both the market for goods and services and the labor market leads to a decline in the rate of profit. Therefore, the system leads inexorably toward a "stationary state" situation and it seems that this idea of stagnation, sooner or later, is inevitable in the context of the evolution of the system. This logic of the evolution of the system is found in part in Ricardo. However, the analogy with Marx remains difficult to the extent that the schema of simple reproduction does not aim to describe a real situation corresponding to a "stationary state", but to put into focus and perspective the conditions and mechanisms of reproduction of the capitalist system. The schema of simple reproduction cannot be conceived without the schema of extended reproduction which describes a situation of growth.

Another economist, Alfred Marshall, dealt with the problem of the stationary state, but in a somewhat particular way: namely by considering it as a particular hypothesis which he compares to a "famous fiction", in reference to Adam Smith. In reality, it is only a hypothesis used to test the consequences of the long period analysis. For Marshall, the long period is a period long enough for all adaptations to have time to take place, and this period is so long that nothing can be considered fixed, except those elements which are irreducibly fixed (for example, the factor of land). Therefore, all asymmetries should disappear over time due to competition and market values, and then correspond to normal values: quasi-rents would have vanished and only rents linked to land would remain, since the fixity of this factor cannot be altered. Under these conditions, resorting to this "famous fiction" which economists use, the stationary state is defined as follows:

This state obtains its name from the fact that in it, the general conditions of production and consumption, of distribution and exchange remain motionless; but

yet it is full of movement, for it is a mode of life. There would be no distinction between long-period and short-period normal value, at all events, if we supposed that in that monotonous world the harvests themselves were uniform and normal price would never vary. However, nothing of this is true in the world in which we live[75].

Marshal's thinking in this area is therefore as follows: for any particular problem, it is necessary to examine the trends which will trigger this or that type of adjustment in the long term. If, however, we want to think about the long period as a whole, such research can only occur in the hypothesis of a long period which, furthermore, does not exist in real economic life. It is therefore an economy characterized by a series of partial imbalances which reflect surpluses and rents and trigger corrective actions, which are themselves partial: a correction in one market leads to an imbalance in another market, so that at no time is it possible to see a balance in all markets, which makes general (Walrasian) equilibrium impossible. The interconnection of markets, combined with the different speed of reactions to partial imbalances, will allow this general equilibrium, and therefore the stationary state. We are therefore dealing with what we will call balanced and regular growth, of the liberal type, which then becomes a generalization of the stationary state and static circuits. This is therefore one of the most "orthodox" approaches, which poses general equilibrium as a horizon of thought, the stationary state then becoming a pretext for justifications of a purely ideological nature.

This very "economistic" approach does not correspond to that which characterizes sustainable development, which implies ipso facto that we cannot find satisfactory answers to the planet's environmental problems in the liberal theoretical corpus, which mixes genres at will in order to maintain its role as "privileged manager". However, here too, history serves as a reference and shows that liberal ideologues cannot mystify reality and their history, which is now catching up with them, with impunity: the only possible answers they put forward are technical and solve nothing. This assertion is not gratuitous and finds its conclusion in the years which followed the Great Depression of 1929: the events which characterized this period had the consequence of developing a pessimistic vision of the future of capitalism, a vision which was also supported by liberal economists, particularly in the United States where the economic situation following the Great Depression remained worrying until 1940. Harvard economist A. H. Hansen argues that advanced capitalist economies have entered a period of a very clear tendency to a

75. Marshall, A. (1961). *Principles of Economics*, 8th edition. Macmillan, p. 386.

halt in the development (growth) of production. The rhythm of investment, which causes accumulation and therefore growth, is becoming increasingly infrequent for three reasons: firstly, there are no more rich lands to conquer in the world, which implies that the extension of the capitalist world in its imperialist, dominating form no longer finds means and objectives to be made profitable, or possibilities to expand. On the contrary, the population of industrialized countries is tending to become stationary, thus leading to an aging of the population and therefore economic apathy. Finally, technological progress no longer requires as much additional capital for its implementation as before the crisis.

This analysis results in a certain distrust on the part of the author as to the possibility of returning to "capitalist fundamentals" which he would otherwise desire: in disagreement with Keynes regarding the presence of the national state as a substitute for private failure in terms of investment, he thinks that such a solution leads to "complete socialism" because it is close to the principles of a planned economy. Also in this case, solutions that do not refer to the market are doomed to failure and resemble something altogether different from "pure and hard" capitalism. Sustainable development, in the form of a so-called "stationary state" economy, that is, an economy without growth (or, in any case, whose objective is not growth) is incompatible with the liberal solution. It can be seen, even in brief, that economic thinking takes little or no account of problems related to the environmental destruction caused by the operation of the system. It therefore appears logical that, if only for reasons of survival, we should begin to take an interest in a phenomenon which is taking on proportions that could become dramatic for humanity. The birth of sustainable development as a coordinating concept thus becomes a unifying concept whose progress we will follow.

1.5.1.2. *Sustainable development: a recent requirement*

In the space of around 30 years, the concept of sustainable development has become "sustainably" established in thought and reality. Here, we will quickly review the main stages of its progression to show its development in terms of arguments, of course, but especially with regard to the meaning, the scope and the role it claims to play in the survival of humanity. In the space of 30 years, in fact, from the Stockholm conference to Johannesburg via Rio, the concerns of states have gradually extended from environmental protection to an integrated approach to sustainable development, which must involve all the actors and individuals living on our planet.

We will therefore describe here the different stages marking this "obstacle course".

– ***1968***: creation of the Club of Rome, bringing together political figures from different countries who want research to focus more systematically on the problems posed by economic growth, particularly regarding its impact on the environment.

– ***1972***: two major events: on the one hand, the publication by the Club of Rome of a report on economic growth and its effects looking forward to 2100. This study, relatively controversial as to the methods used, is based on simulations concerning changes in population, depending on the exploitation of natural resources. This work shows that continued growth at an equivalent rate throughout the period concerned would lead to a net decrease in the world population, very high pollution, the exhaustion of arable land and the scarcity of fossil fuels. The authors of this report would update it 30 years later by publishing a comparison between the 1972 forecasts and what had happened by 2002. On the other hand, the United Nations Stockholm Conference on the human environment is the first meeting on the issue of protecting the environment. In terms of results, there are two major aspects: for the first time, a link is established between development and environmental conditions, especially for developing countries, while establishing an integrated vision; the conference led to the establishment of the United Nations Development Program (UNDP). This conference would later be referred to as "the first Earth Summit". The issue has already been raised: the environment appears as an essential global heritage to be passed on to future generations, and this responsibility belongs to the present generation.

– ***1980***: the International Union for Conservation of Nature publishes a report entitled "World Conservation Strategy" in which the term "sustainable development" appears for the first time[76]. This point will be remembered as a perfect, albeit symbolic, illustration of a certain evolution that manifested itself in the last quarter of the 20th century; from the 1970s, NGOs brought a new vigor to reflections on these problems.

– ***1987***: within the framework of the "World Commission on Environment and Development", the Brundtland report, which is still authoritative today, offers a precise definition of sustainable development (see the following section). This report marks the true birth of the concept of sustainable development as it is understood and accepted today. The great novelty is conceptual: although previous discussions focused mainly on the link between economic and environmental questions, this report definitively establishes the link with the social conditions of this development. As such, it really accounts for the extent of the problem facing all of humanity in every part of the planet. An agreement in principle is signed on

76. We will return later to the problems posed by the translation of the English term "sustainable" into French, by the expression *durable*. In this area, translation may be the source of an interpretation which impoverishes the word itself and its scope.

September 16 in Montreal concerning substances affecting the ozone layer, proving that a collective commitment to the protection of Nature is possible.

– ***1992***: the second "Earth Summit" is held in Rio de Janeiro (Brazil) from June 3 to 14 and enshrines the concept of sustainable development which is beginning to receive wide media coverage. This summit resulted in the adoption of the "Rio Convention" and the birth of "Agenda 21": this is a technical document which describes all the principles of action, objectives and the means that must be implemented to achieve a program of sustainable development. The definition of sustainable development will also be supplemented by the definition of the "three pillars" which must be reconciled in the perspective of sustainable development, namely economic progress, social justice and environmental preservation. Agenda 21 was adopted by all the states participating in the Rio conference. The Rio Summit can be considered a major step forward in affirming the need for sustainable development.

– ***1994***: publication, at European level, of the "Aalborg Charter" on "sustainable cities".

– ***1997***: third United Nations conference, from December 1 to 12 in Kyoto, during which the so-called "Kyoto Protocol" is established and signed by some of the participating countries (the United States will refuse to sign this agreement).

– ***2002***: "Johannesburg Summit" from August 26 to September 4, during which around a hundred heads of state, government representatives and NGOs ratify a treaty on the conservation of natural resources and biodiversity. In substance, this treaty offers less innovation than "Agenda 21" signed in Rio. It allows us to take stock of sustainable development, to reaffirm the principles that had been stated previously, while specifying them and making them more explicit: for example, particular attention is paid to the elimination of poverty. It is in the spirit that change appears, to the extent that the commitments made by the participants take on a legal aspect, that is, they take on some of the nature of a law that implicates the states with regard to their commitments[77]. Furthermore, some large companies participate in this summit, thus contributing to the establishment of the notion of "corporate social responsibility". The main contribution of the summit lies more in harsh criticism of the state of the planet than in the measures taken.

77. We were able to judge the "significance" of the commitments made in terms of development aid in the first part. It is worth remembering that the number of malnourished people in the world increased from some 500 million people in 1990/1998 to nearly a billion ten years later, even though growth rates in developed economies were relatively sustained. This says a lot about the "promises made" by states regarding their commitments and equally minimizes the texts signed in the euphoria of the moment, which were forgotten as quickly as they were signed.

– ***2005***: entry into force of the "Kyoto Protocol", particularly on the reduction of GHG emissions in the European Union.

– ***2009***: meeting of the G20 (i.e. the 20 richest countries in the world) who define the conditions of application of existing agreements in terms of respect for nature, preservation of ecosystems and biodiversity.

– The organization of "Conferences of the Parties" (COP) extends the Copenhagen conference by setting the objective of learning lessons from its failure. COP 21, organized in Paris in 2015, appears historic because it sets the objective of restricting the increase in temperature to 2 degrees and at the same time increasing efforts to limit it to 1.5 degrees. Ratified by 196 "parties", this agreement recognizes the existence of global warming due to human activity and gives industrialized countries the responsibility and the need to act effectively against this phenomenon. The "COP" meets every year to make decisions that should allow attainment of such an objective.

As we can see, the concept of sustainable development, timid in its origins, has received the support of all governments on the planet: whether it is a diagnosis or a need for action. In favor of the environment and balanced development, everyone agrees that it is urgent to act. The only problem is that in an emergency we note that for many, it is better…to wait! However, as the emergence of the concept has definitively been achieved, it is now necessary to consider this new concept and to assess its content.

1.5.1.3. *Sustainable development: a normative concept*

Growth and development, as they have been conceived since the 19th and 20th centuries, are based on criteria that are exclusively economic and that are also measurable. Therefore, GDP becomes the major criterion for assessing the development of the economy to the exclusion of any other factor. The abundance of fossil-based (and thus non-renewable) raw materials combined with, on the one hand, a cleverly orchestrated ignorance of environmental problems in general and, on the other hand, prices for these raw materials not acting as a deterrent, set the rhythm for economic growth until the oil shocks of 1973 and 1979. The emergence of the concept of sustainable development restores the problems to their real place by insisting on the balance of the elements comprising it. We will begin with the following definition: "Sustainable development is development that meets the needs of the present without compromising the capacity of future generations to meet their

own needs[78].” Two essential elements are constitutive of this concept. On the one hand, there is the concept of needs and, more particularly, that of essential needs for the poorest, to whom must be given the highest priority. However, it must be remembered that within the framework of capitalism as a system of generalized monetary exchange, every need is a solvent need and to satisfy it we must have enough money to purchase goods capable of satisfying it. An economy whose foundations are linked to money and whose functioning depends on it can only refer to solvent needs. On the other hand, the idea of sustainable development is based on a principle of limitation that the state of our technology and our social organization imposes on the capacity of the environment to meet current and, above all, future needs. Therefore, the objectives of sustainable development are the same for everyone, whatever the political regime, economic system (market economy or planned economy), internal conditions, etc., and if interpretations may vary from one country to another, everyone must agree on this notion and on the strategies flowing from it, which must apply to everyone. Sustainable development involves a progressive transformation of the economy and society; this means that it can only be ensured if economic development policies account for considerations such as access to all resources (and for all, regardless of race or social class) or equal distribution of costs/benefits for all. Even in its narrowest sense, sustainable development presupposes a concern for social equity both within and between generations.

The need for food, shelter, clothing and work constitutes aspirations for all people on all continents, while, at the moment, this objective is far from being achieved. A world where poverty and injustice are endemic will always be subject to all forms of crisis, including ecological crisis. Sustainable development means that the basic needs of all people are met, including their aspirations for a better life. However, a level above the subsistence minimum would only be possible on condition that the consumption patterns of a few account for long-term possibilities. To meet these essential needs, the full potential for growth must be realized; sustainable development clearly requires economic growth, principally where needs are not met. This implies that sustainable development and growth can be compatible provided that the content of one respects the principles of the other: growth alone cannot be enough, as recent history bears witness.

78. See: Bruntland, G.H. (1987). Report of the WCED (World Commission on Environment and Environment and Development - United Nations). Report, du Fleuve.

Several determining factors emerge:

– Sustainable development is possible only if demographic change is in line with the productive potential of the existing ecosystem and an uncontrolled demographic development may effectively compromise its ability to meet the needs of all its members.

– At the bare minimum, it means not endangering the natural systems that allow us to live, namely the atmosphere, water, soil and living beings. Human intervention in ecosystems in the form of agriculture, mining, gas emissions, forestry, etc., must not be a threat to the future of humanity, which is not the case at present.

– Limits to either resource exploitation or demography do exist, although they may be pushed back to different levels, depending on the nature of each. This is why, well before these limits are reached, we must ensure equity in access to this limited data and redirect technological efforts in order to alleviate the pressures as quickly as possible.

– For non-renewable resources (such as fossil fuels and minerals), consideration should be given to the critical importance of the resource, the availability of technology to minimize depletion and finding replacement products, the ideal being that the resources do not disappear before finding substitute products. Therefore, in its very spirit, sustainable development is a process of transformation in which the exploitation of resources, the direction of investments, the orientation of technology and institutional changes take place in a harmonious manner and reinforce present and future potential, enabling us to better respond to the needs and aspirations of humanity.

1.5.1.4. *Equity and common interest*

Therefore, these questions arise: how to concretely persuade (or force) people to protect the forests and how to improve the prospects for long-term agricultural development. Also, it must be understood that this synergy is very far from being shared. In these conditions, since the institutional function is failing, how can we promote the principles of sustainable development?

An equivalent question then emerges in the following form: how can we get individuals to act for the good of all? In other words, individuals are tasked with responding to the negligence of the institutional function. In this regard, Brundtland's response takes a rather particular turn: "the answer lies partly in education, institutional development, and law enforcement"; and immediately adds, as if to temper the point: "But many problems of resource depletion and environmental stress arise from disparities in economic and political power. An industry may get away with unacceptable levels of air and water pollution because the people who bear the brunt of it are poor and unable to complain effectively."

Therefore, we must start from the principle that ecological interactions respect neither private property nor political divisions. Endless examples can be cited: a farmer who works the land upstream and creates runoff on land downstream; irrigation practices and pesticides which may have an impact on a neighbor's farm; rates of chemical emissions from an industry that affect the entire region; thermal hot water discharged into the sea which has effects on local fisheries. In short, there are so many examples which contravene the principle of the common interest, allowing us to see that if the latter were more often respected, our problems would perhaps be less crucial. In fact, local interdependence has only increased due to the technology used in modern agriculture and production. However, in parallel with these technological advances, reduced access to collective land, loss of traditional rights to forests and other resources, and pressure from commercial production for profit, have wrested decision-making power from individuals, and this is still true for developing countries. Governments and/or communities may then compensate for this trend through laws, education, taxation, subsidies or any other incentive or coercive means to reduce and control the most harmful effects. Interdependence is not just a local phenomenon, and rapid growth has made it a global phenomenon with both physical and economic consequences. Furthermore, the application of the notion of common interest often suffers from the gap between political decisions and their real consequences: for example, the energy policy of one country may cause acid rain in another, or fishing policy may influence another's catch. There is no supranational authority to respond to these situations and the common interest can only be globally articulated through international cooperation. Finding this interest would be easier if there were solutions applicable to everyone, which is rarely the case. Many problems result from the fact that access to resources is quite unequal. Therefore, an inequitable land tenure regime may result in the overexploitation of resources on the smallest lands, which penalizes both development and the environment. Generally speaking, the "losers" in development/environment conflicts are those who bear more than their share of the costs of pollution through effects on health, prosperity or damage to ecosystems. Also, as a system approaches its ecological limits, inequalities only increase: when a river basin deteriorates, it is poor farmers who suffer the most because they do not have the means to take measures against erosion, unlike the richest. This is how our difficulty, or even our incapacity, to work within the framework of sustainable development is very often the product of our relative indifference to economic and social injustice, both in a single country and also between nations (which is even more obvious).

1.5.1.5. *Strategic imperatives*

The aim here is to determine the different strategies that will allow us to abandon the current pathways of growth and development, which are often the most harmful and destructive, to move toward sustainable development. This obviously requires

political changes in all countries of the world, whether regarding their own development or the effects of their development on other countries. A number of development and environmental policy objectives are logically derived from this attitude, which can be summarized as follows.

1.5.1.5.1. The resumption of growth

Sustainable development must first address the problems of the large number of people who live in absolute poverty. Therefore, for some, we must ensure an economic recovery in developing countries, because it is precisely in those countries that the relationship between economic growth[79], poverty alleviation and the environment operates most rapidly and directly. However, developing countries are part of an interdependent global economy, and their prospects also depend on the level and structure of growth in industrialized countries. In developing their economy, developing countries will see increased domestic demand, whether for agricultural products issuing from their food production, manufactured goods also produced by their industry, or even with the development of services: thus, we can admit that the logic of sustainable development involves an internal stimulation of growth in the Third World. In order not to hinder this development, we must finally conceive a remodeling of international economic relations, since domestic markets cannot be sufficient for this development. That said, and in any case, the problem remains: how may a country develop without altering the environment?

1.5.1.5.2. A change in the quality of growth

Sustainable development cannot be reduced to economic growth alone, at least not only from a quantitative point of view; it even seems that the reverse is closer to the truth. It is therefore necessary to modify its content to make it less destructive. It must therefore rest on a more stable basis, that is, according to its underlying reality. For example, the income from logging is conventionally measured as the value of timber and other products, minus the cost of extraction. The cost of regeneration is not considered unless funds are specifically allocated to it, so the profit figure rarely considers the loss of profits caused by forest degradation. Furthermore, the distribution of income constitutes one of the aspects of the quality of growth; rapid growth accompanied by a poor distribution of income may be more harmful than slower but better-balanced growth, accompanied by a redistribution of income to the benefit of the poorest. For example, in many developing countries, introduction of large-scale commercial agriculture will quickly increase revenues, but at the same

79. Such a statement deserves to be qualified: in fact, with the effects of economic liberalization and globalization, poverty has been growing sharply for decades. Thus, in France, for example, it is estimated that more than eight million people are poor, while for others, a single salary is no longer enough to live on.

time contribute to dispossessing small farmers and reducing them to starvation, which is currently happening with the rules imposed by the WTO. Economic development can never be sustainable if it makes the most vulnerable the most sensitive to crises: whether it is "natural" causes, drought or economic causes such as collapsing prices, the weakest and the most vulnerable are the first victims. That said, it is not enough to broaden the range of economic variables, and the issue of needs and well-being must integrate non-economic variables such as education, health and environmental purity, so that economic development and social development reinforce each other, instead of excluding each other.

1.5.1.5.3. Developing countries

The satisfaction of basic needs and human aspirations is obviously the main objective of any productive activity, especially in the context of sustainable development. The principal challenge remains that of meeting the needs and aspirations of the growing populations of developing countries. With the growth of the global population, another imperative appears: feeding the planet in good conditions. This is all the more acute as the protein content of most goods consumed is lower than what it should be for more than half of humanity. Another essential need is for energy, and this cannot be met without changing consumption patterns: in some parts of the world, wood is consumed for cooking and other household needs faster than stocks can replenish. In the developing countries concerned, cooking would require 250 kg of coal equivalent per capita per year, which represents a very small part of the energy consumption of industrial countries. Obviously, we must significantly improve the satisfaction of needs for drinking water, housing, public hygiene and medical care, as deficiencies in these areas are the most obvious manifestations of social and environmental tensions. It is in these sectors that the damage caused by growth is most spectacular, and it is also in these areas that we must act quickly with suitable local solutions.

1.5.1.5.4. Development of the resource base and its preservation

In this area, as in others, we will have to change our policies to cope with the enormous consumption of the industrial world, the necessary increase in consumption in developing countries and demographic pressure. Moreover, it is a moral obligation toward living beings and future generations. Several aspects seem decisive. On the one hand, pressure on resources can only intensify when the populations concerned have no choice; in this case, aid is needed to avoid the over-exploitation of resources (for example, by maintaining prices). On the other hand, there is an urgent need to preserve our agricultural resources because marginal lands are already being cultivated in many parts of the world. In this case, improved productivity would partly relieve pressures on agriculture and livestock.

This increase must be supported by better controlled application of agricultural chemicals and greater use of organic fertilizers and non-chemical pest control. Finally, the ultimate limit to development may well be that imposed by the availability of energy resources and by the capacity of the biosphere to support the by-products released by the use of energy. These problems (or some of them) can be solved using renewable energy sources. As for mineral resources other than fuels, they pose fewer problems and reserves are large. However, in the case of minerals, exporters should be given a greater share of added value and access to developing countries should be improved, at least where it is currently lacking. Finally, prevention and reduction of air and water pollution remains an essential task because the quality of these elements is fundamental. The countries involved should therefore establish standards that set emission thresholds, taking long-term effects into account.

1.5.1.5.6. Reorientation of technology and risk management

To achieve all these objectives, we will need to reorient our technology. Firstly, we must strengthen the capacity of developing countries for technological innovation so that they are better equipped to meet the challenge of sustainable development. Secondly, environmental factors must be given a greater role in technological development. The technologies of industrial countries are often inappropriate or ill-suited to the socio-economic and ecological conditions of developing countries. This problem is amplified by the fact that research and development around the world focuses very little on the urgent problems facing these countries (e.g. dryland farming, tropical disease control, etc.). Too little attention is paid to the conditions for adapting new technologies to the needs of developing countries, particularly in areas such as materials technology, energy saving and information technology. New technologies most often have a high market value, whereas we should be primarily concerned with “social” goods. In addition, the development of environmentally sensitive technology is also linked to risk management. The ecological risks posed by decisions around development and technology affect people and sectors who are not given the right to intervene in decisions affecting the future. The interests of the persons concerned should therefore be accounted for by establishing institutional mechanisms to evaluate the possible consequences of new technologies before they are disseminated, to verify that their use will cause no undue environmental damage.

1.5.1.5.7. Some economic and environmental considerations in decision-making

There is a common thread in the strategy for sustainable development: the need to integrate economic and ecological concerns into decision-making. In reality, these problems are interrelated and interact; behaviors, objectives and institutional

arrangements at all levels would need to be changed. Economic and ecological considerations are not necessarily contradictory, at least if we do not impose the sacrosanct rule of maximum profit, which is dear to liberals. For example, policies to conserve land under cultivation and protect forests improve prospects for long-term agricultural development; or again, a better yield from energy and other resources which have environmental benefits as well as allow for a significant reduction in costs. In this regard, the lack of flexibility on the part of institutions is clear, for example, and the tendency to deal with firms or industrial sectors in isolation and without recognizing the importance of intersectoral relations. These inter-sectoral relationships create an economic-ecological interdependence to which politicians have paid very little attention to date. Sectoral organizations tend to set sectoral objectives and see their effects on other sectors as secondary effects which are only dealt with when legal obligations require. For sustainable development to become a reality, it is imperative to put an end to this fragmentation. The integration of economic and environmental dimensions into legislative systems and decision-making conditions at the national level must be mirrored at the international level. The increase in consumption of fuels and raw materials requires us to strengthen the concrete links between different countries' ecosystems. Growing interactions in trade, finance, investment, transportation, etc. will also strengthen economic and ecological interdependence.

Therefore, in the future more than now, sustainable development requires the seamless integration of economics and ecology into international relations. Given the magnitude of the questions posed to ensure the future of the planet in livable conditions, and of the difficulties in realizing the conditions that make such a prospect possible, a crucial question arises: is sustainable development as a normative concept sufficient to address the immense challenges we face?

1.5.2. *A critical approach to the concept of sustainable development*

We have raised above the need to recompose in many respects the conditions for growth, its reorganization and its better distribution. It seems that this is not enough, since the issue of sustainable development refers to a key concept around which it is built, namely development. This is why we have constructed this contribution around a concept whose practical application has led humanity to the current situation, which everyone (or almost everyone) admits must not continue, lest it lead the planet toward a catastrophe whose extent we have indicated. The first consequences were highlighted by the Brundtland report, which puts the need for sustainable development into perspective. The critical approach that we propose here is structured around two essential points: on the one hand, regarding the report itself and the problems it raises due to the aporias with which it collides; on the other

hand, a critical approach to the concept itself judged as an oxymoron, as a vector of insurmountable contradictions. In reality, what is at stake in this perspective is the very question of development, and the question we are asking can be summarized as follows: can we identify here and now a concept of development which is respectful both of the environment as a whole and of the social conditions of its realization and respect for general economic equilibrium?

1.5.2.1. *The limitations of the Brundtland report*

We will focus here on a few aspects of the Brundtland report[80] without exhausting the subject, due to lack of space.

– The Brundtland report[81] highlights, among other things, the importance of social needs and their satisfaction, and also underlines the need to respond to them without jeopardizing future capacity to respond to the needs of future generations. This statement raises two questions: on the one hand, how to identify current needs, that is, how to determine current needs according to membership in this or that social category (or social class) and who decides, how and why to determine differences in needs, expressed or not, as – let us remember – only solvent needs can be known; and above all, what needs can be given and defined as fundamental. On the other hand, and as an extension of the above remarks, how can we think we can know and therefore determine the needs of future populations and future generations? Therefore, there are many questions to which the report provides no answer, for the good reason that it does not ask them.

– Furthermore, "humanity", even if it is at the origin of the disruptions we are witnessing, is also capable of reflection, of a will to provide adequate solutions at the technical level: "Humanity has the ability to make development sustainable. (….) Technology and social organization can be both managed and improved to make way for a new era of economic growth."[82] This reference to an impersonal subject, "humanity" is all the more curious since the situation observed appeared, or at least accelerated considerably, with the industrial development that followed *Les Trente Glorieuses*; and it seems that the main problem lies in this unprecedented acceleration. "Humanity" then takes on an inclusive function, becoming a collective subject that is difficult to clearly identify and therefore makes any contestation impossible. If human activity is centrally responsible, this responsibility

80. For the drafting of this paragraph, we refer to the work of Rist, G. (2013). *Le développement – Histoire d'une croyance occidentale*. Les Presses de Sciences Po, pp. 313–344.

81. World Commission on Environment and Development – United Nations (1988). Our Common Future – Introduction by Gro Harlem Brundtland. Report, Du Fleuve, p. 434.

82. WCED - United Nations, op. cit, p. 10.

nevertheless remains very diluted because it is not precisely identified. The technologies used for production, the social organization and the resilience of the biosphere are all factors based on which it becomes possible to ensure a future development of human activity in the service of a rediscovered harmony (with nature). However, what is it about industrial activity destructive of the environment and causing serious damage to this very nature, that the answer could then only be technological?

– In these circumstances, it is difficult to understand why the report "paves the way" for a new phase of economic growth that is deemed necessary to guarantee the "social" aspect of sustainable development. Because if, for the authors, poverty should not be considered inevitable, it is through economic growth that it will be overcome. Therefore, more goods produced, more goods consumed; that is, identical conditions to those currently known. A strange evocation and curious recourse to a system whose raison d'être for decades has been growth at all costs, whose "deep soul" is still development, and which contributes, by the authors' own admission, to destroying the planet. This seems all the more curious since these same authors provide no explanation for the generalization of poverty which they also denounce.

There is no doubt about one point: the Brundtland report is full of good intentions, especially since the diagnosis made about the state of the planet and the risks incurred if we continue in the same direction are particularly well founded. That said, questions remain: on the one hand, denouncing the effects of coupling growth/development with destruction of the environment in order to promote the idea that what we need to break the impasse is "a new era of economic growth – growth that is forceful and at the same time socially and environmentally sustainable".[83] On the other hand, the assertion that this growth should be different finds no positive answer as to how that should be achieved. The case of the energy needed to ensure growth is symptomatic: the report clearly mentions the need for "innovative efforts" in this area without specifying possible pathways. The innovative effort comes down to the evocation of technology, its capacity to allow substitution effects and a call for "technological advances" for which, when it was written, nothing was planned.

1.5.2.2. *Critical return to an ambiguous concept*

The repetition, now become systematic, of the conclusions of the various IPCC reports has had the effect over time of putting sustainable development on the political agenda and, in fact, of making it now a major electoral issue. Everyone uses the term sustainable development in such a way that ultimately, we no longer really

83. WCED - United Nations, op. cit, p. 22.

know what we are talking about and why we are talking about it. We want to highlight the difficulties, even the aporias, to which sustainable development leads us, even if we do not claim to exhaust the subject. The importance of this theme concerning the future of the planet therefore requires critical rigor, that is, to analyze as closely as possible the meaning, scope and conditions of what we mean by sustainable, particularly in regard to development. Especially since sustainable development[84] is defined as a balance, firstly, between the interests of future and present generations; secondly, between quality of life and the preservation of ecosystems; and finally, between the interests of developed and developing countries. Our overview, as limited as it may be, refers to what we consider as a limit, or even to future difficulties, especially since the objective ultimately remains the sustainable city. As an inventory of disparate items, we offer the following few remarks.

– Sustainable development returns us to the question of the relevance of the activities being performed, particularly with regard to borders. Indeed, pollution is a mass, in the physical sense of the term and with the following observation: emissions of greenhouse gases often have an impact far from where they are emitted. This means that regional emissions, of very localized origin, will often have effects elsewhere and that the territories on which (or from which) action must be taken diverge in that they suffer the consequences and have no means of action. This is because the functional space of an industrial center does not necessarily correspond with the geographical territory of the nuisances it generates for the environment, the negative atmospheric physico-chemical and geographical impacts. We can therefore see a disconnection between the institutional territory of origin, which is supposed to create regulations, and those which suffer the consequences. Therefore, massive pollution in developed countries produces irremediable effects on countries which did not participate in it (or did so very little). For example, the same applies to pollution of a river upstream, whose downstream territories suffer the consequences without any responsibility for triggering them.

– There is also the problem of the articulation of scales of action and the inequalities, or even injustices, among individuals and territories and between them. Imported inequalities occur when a territory ensures the sustainability of its development by shifting its costs to other territories. Here, we are talking, for example, about exports of waste, transfer of polluting activities, undervalued purchases of natural resources. In this way, the territory concerned manages to satisfy both its own needs and the general conditions and standards of sustainability: the internal constraints of sustainable development are certainly respected "locally", but to the detriment of neighboring territories due to the export of nuisances. In this

84. Heran, F. and Zuindeau, B. (eds) (2001). Développement durable et territoires. *Cahiers Lillois d'Economie et de Sociologie*, L'Harmattan, p. 37.

regard, the translation of "Agenda 21" into local agendas leads to more questions and interrogations than positive answers. The global/local relationship which is thus posed brings us back to the problem of the fields of application of sustainable development. There is no need, in fact, to mechanically apply to different spaces concepts which are not suited to them for historical, geographical, sociological, cultural reasons, etc., any more than to impose on them, in an unequivocal and uniform way, the manner in which environmental issues should be addressed.

– As Mancebo points out, "articulating the spatial scales" of sustainable development resembles "squaring the circle", with "temporal horizons" appearing to have "variable geometry, between self-interested calculations and uncertainty"[85]. The question that arises here is that of the resources at our disposal, whether renewable or not. This is because these are not given to humanity for two reasons: on the one hand, the objects that make up our environment only take on the character of resources if society recognizes them as such and gives them this quality. "Rare earths" did not exist socially in the Middle Ages, although they existed physically, because they were only recognized when the technical means for their exploitation developed. On the other hand, the inventory of resources continues to evolve, with some appearing, others disappearing. Therefore, coal played a major role as primary energy, before being rejected as too polluting. As a result, the perception of the relationship between resources and "nature" changes from one historical period to another. Furthermore, this remark is part of the perspective of preserving the interests of future generations, even though it is very difficult for us to predict what these are and therefore to envisage them precisely. Hence, the importance of the question of determining exactly to what time horizon we are referring and what generation we are talking about. For example, is the perception of the future the same, or even of the same nature, whether life expectancy is 40 years or 80 years? At this point, there is a first level of contradictions in that by substituting for future generations, the present generation instead decides what should be good for them, without them having any say in the matter. However, this is to quickly forget that the history of humanity is not linear, that it is the result of alternating calm periods and more or less brutal ruptures which it is impossible to determine in advance. This difficulty, this aporia, constitutes a major contradiction of sustainable development, which presupposes by its normativity that it imposes a continuity that we do not see.

85. Mancebo, F. (2007). Le développement durable en question. *Cybergeo: European Journal of Geography – Epistémologie, Histoire de la géographie, didactique* [Online]. Available at: http://cybergeo.eu/index10913.html.

See also: Mancebo, F. (2006). *Le développement durable.* Armand Colin.

– As we discussed earlier, the issue of sustainable development is primarily based on a form of development, or what has been termed sustainable growth. However, it should be noted that this might be easily mistaken for Fordist growth, as described above, except that its intensity and therefore its consequences for the environment are less: the consequences for the environment are less glaring and even if we change the intensity of growth, we do not change its nature. The mechanical association between improving human well-being and "social development" as the third pillar of sustainable development is evident. What seems hard to accept is that we can admit the viability of such a project and therefore of taking its solutions into account, to attain the objectives of a form of development which, quite rightly, rejects such a vision of the economy: economic growth as a response to the problems posed by the progressive destruction of the planet to which it already largely contributes, and – the height of irony (or cynicism) – in the name of sustainable development. Such a posture includes as many ambiguities as there are ambivalences.

– Competition and the emulation that it generates have been said, since Adam Smith, to constitute the optimal conditions for production and the satisfaction of needs, and the "invisible hand" is its "deus ex machina". Furthermore, with Descartes and in a very recent historical era, the belief was established according to which humanity is called to "become master and possessor of nature"[86]. Around these two pillars of the modern era, the myth of development has developed and become strengthened, and sustainable development thus appears as an avatar of it with additional forms. In this regard, sustainable development seems to be, on the one hand, contradictory (it expresses a contradiction in terms); and, on the other hand, a perfect oxymoron (the two terms are of opposite meaning)[87]. Certainly, sustainable development demonstrates consciousness of the risks that development and endless growth pose to humanity, which are expressed in all forms of serious attacks on nature. However, development, because it is based on massive, intensive use of capital and technology, has totally excluded the self-regulating power of nature. As Latouche rightly points out: "the stranglehold over nature, its constitution as a radical adversary of humankind, establishes the myth of a common interest of

86. Descartes (1596–1650) and A. Smith (1723–1790) are rightly considered to be the first thinkers of the modern era, whose first moments of philosophical thought they initiated. Contrary to popular belief, Smith is first and foremost a philosopher who tried his hand at economics at a time when it was beginning to take its first steps. Furthermore, the 18th century is the one from which thinkers of the Anthropocene date the beginning of industrial activities whose form would, over the following centuries, seriously alter the environment.

87. See on this subject: Latouche, S. (1994). Développement durable, un concept alibi. *Revue Tiers Monde*, (137), 77–94. See also: Latouche, S. (2004). *Survivre au développement*. Mille et Une Nuits.

humanity upon which the ideology of development is based." In reality, what sustainable development suggests is the introduction into the growth and development process, perceived until now only from a quantitative point of view, of a more qualitative aspect, a form of self-regulation. Different actors have understood that the previous form of development could not continue indefinitely: sustainability then becomes the alibi for development which we would like to be infinite. With sustainable development, growth does not change in nature but in function, and the new, more qualitative functionalities constitute means of self-correction, in order to better save the essentials of what can be saved. From this perspective, development and economic growth would be merely disguised forms of market domination, with globalization being its most accomplished form. However, we know from experience that these are the consequences for the planet's future if we do not very quickly change the paradigm.

The abundant and multifaceted literature on the theme of sustainable development makes it a theoretical corpus as considerable as the contradictions that run through it: its strong penetration of both political and activist, even entrepreneurial, discourse explains this phenomenon. However, the real question is whether the discourse (in the Greek sense of "logos") that promotes sustainable development is actually operational, and under what conditions is its feasibility as significant a problem as its objectives. "Any sustainable development policy that does not take account of collective representations, rumors, power struggles and the shortcomings of the moment, precisely in that they are human, is heading straight for failure."[88]

1.5.2.3. *Alternative responses to environmental problems*

The critical approaches we have presented above have had the effect of reshaping the landscape of alternative possible solutions, as they are considered more "effective" and likely to better respond to current problems. The criticisms made and the responses proposed can be classified into two distinct categories: on the one hand, in the sense of the concept of development, in the form of two distinct contents of sustainability, namely strong sustainability and weak sustainability; on the other hand, more radical proposals of a more systematic nature and which involve responses on the themes of rupture with a logic of a systemic nature.

1.5.2.3.1. Weak sustainability and strong sustainability

Sustainable development is presented as a possible solution for reconciling a specific economic dynamic, on the one hand, and ecological constraints, on the other hand. Here, we will put into perspective two approaches which are distinct as to the

88. Mancebo, op. cit., p. 10.

conception of the sustainability of economic development upon which they are based, particularly in relation to clearly identifiable ideological presuppositions.

– The neoclassical paradigm or weak sustainability.

The anchoring point of this approach is the growth model of R. Solow[89] whose characteristics are as follows: on the one hand, an approach to the conditions of long-term growth; on the other hand, derivation of this growth from a production function (revisited in 1992)[90] that integrates technical progress. It aims to explain economic growth on the basis of considering its two essential components, namely capital and its accumulation, on the one hand, and the labor factor, on the other hand. It bases its assumptions on diminishing returns of factors, which implies that any increase in factor use leads output to rise until a limit point and then decrease. Due to diminishing returns, capital depreciation is superior to growth, which ultimately implies stagnation in production: Solow describes this situation as a stationary state, a state toward which all economies tend in the long term. However, Solow's contribution lies in a complementary hypothesis which he introduces into his model: technical progress. The production function is thus written as:

$$Y = c + K\alpha + L\beta,$$

with Y, the level of production, K, the capital, L, the labor, and c, α, β are constants expressing the consequences of the introduction of technical progress.

In this context, the model is in stable equilibrium; in other words, in the long run, any economy tends toward this equilibrium state, and only the rate of population growth can change this trajectory since production growth depends on population growth. The model also emphasizes the existence of a close link between demography and poverty, as an increase in population leads to a decrease in capital per capita, implying a decrease in income and thus impoverishment. The sustainability model that is established on the basis of the above production function and long-term economic growth will be qualified as "weak sustainability". This designation of the form of growth is due to the fact that the constraints which oblige economic dynamics to match the trajectory of development remain very weak. This is because, for the neoclassicists, what matters is growth in the individual well-being of future generations, which must be at least equivalent to that of present

89. Robert Solow is an American economist, awarded the Nobel Memorial Prize by the Bank of Sweden in 1987 and best known for his work on growth theory.

90. See: Solow, R.M. (1956). A contribution to the theory of economic growth. *Quarterly Journal of Economics*, 70(1), pp. 65–94. For his revised model, see: Solow, R.M. (1992). An almost practical step towards sustainability. In *The RFF Reader in Environmental and Resources Management*, Dates, W.E. (ed.). RFF Press, 263–272.

generations. For this to happen, the economy must generate a savings rate high enough to maintain the capital stock at a level sufficient to ensure the same for future generations, which implies maintaining (at least) the capital stock at a constant level. However, it is possible to envisage a substitution between the different forms that capital can take. Therefore, an increasingly large quantity of capital created by economic agents (means of production, collective facilities, training, research, innovation) can (and must) substitute for a quantity of "natural capital" (mainly non-renewable natural resources) and thus leave future generations with a greater quantity of productive capacities in the form of a stock of equipment, skills and knowledge (or technological mastery). Several hypotheses underlie this model: on the one hand, technical progress provides the key that allows substitution between different forms of capital. With the relative scarcity of natural resources and the consequent increase in prices, we see a significant development of technology in the production process. On the other hand, and in order to ensure the take-up of new technologies, a special regime of investment must be implemented. In this regard, the Nordhaus model[91] addresses the question of sustainability, particularly in its "weak" aspect. The "D.I.C.E"[92] model connects climate and economic activities, relationships which complement the Solow model. Ultimately, the neoclassical approach leads to the conclusion that it only takes a "modest" effort to make over a short period (in terms of financing investments) to reduce GHG emissions, particularly with the implementation of a price system which allows the different economic agents to carry out their economic calculation in a rational manner and therefore to ensure the equilibrium of the system over the long term.

– The ecological economy: for strong sustainability. Here, we find proponents of an ecological economy who take the exact opposite position of the neoclassicals, even if this current of thought remains particularly heterogeneous. One of the principles (together with the basic principle) of ecological economics lies in considering a process of co-evolution combining the biosphere and the natural environment, on the one hand, and the socio-economic system, on the other hand, with the interaction between the two playing a decisive role. The ecological economy thus sets itself the objective of integrating ecology into the framework of social regulation, with the whole of society having to integrate itself into the natural environment and the biosphere without altering it. Conversely, neoclassical economics submits the natural environment to the objectives of economic logic, with

91. Nordhaus, W.D. (1973). Brooking papers on economy activity. *The Allocation of Energy Resources*, 4(3), pp. 529–576.

92. Dynamic Integrated Climate economy. For more details, see Nordhaus, W.D. (1993). Rolling the "DICE": An optimal transition path for controlling greenhouse gases. *Resources and Energy Economics*, 15, pp. 27–50.

the social framework itself having to be integrated into the biosphere. In this case, the interaction takes place first within the framework of the natural sphere, the rules of the economy being required to respect this. The ecological economy thus sets the limits that must be respected in environmental matters, defining the outlines of "strong sustainability". Therefore, the objective sought consists of placing more or less drastic limits on economic growth, while leaving open the possibility of development which is only expressed qualitatively. The central idea lies in the fact that capital produced by economic agents cannot be fully substitutable for "natural capital". There is therefore a form of asymmetry between goods created by human activity and what nature gives us, whose reproducibility cannot always be guaranteed. In this context, strong sustainability is characterized by the need to maintain over time an essential stock of non-renewable "natural capital" that future generations will not be able to do without. This posture entails some rules to be respected, namely: first of all, the percentages of use of renewable resources must be equal to their capacity to regenerate; secondly, production of waste must not exceed the assimilation and recycling capacities of the environment into which it is released; and finally, non-renewable resources must be used at a rate equal to that of their replacement by renewable resources. Therefore, all the constraints defined above require the definition of the most equitable means of distribution for all resources. This necessity also corresponds perfectly to the three pillars of sustainable development as defined by the Brundtland report, that is, the social dimension. Therefore, it is appropriate to implement "normative management under constraint",[93] from which we get tradable permits for GHG emissions whose objective is to fight against climate change.

1.5.2.3.2. From sustainable development to degrowth

We mentioned above the two most widespread cases of sustainability of development that may be (or claim to be) in accord with the requirements of a harmonious and nature-friendly production system. However, some have questioned these approaches, thus indicating the incompatibility already mentioned between economic development (and/or growth) and respect for the environment. This is because the critique of development has led certain authors to consider a radical alternative to it, based on the self-organization of the vernacular economy. These different forms of social organization come under the common generic term "degrowth". Certainly, there are multiple interpretations and conceptions of degrowth, but this polysemy of meaning is linked to both different domains of existence and different academic disciplines, namely ecological economics (see above), anti-utilitarianism, scientific ecology, utopian thinking and extending to diverse practices and other forms of political activism. Therefore, degrowth defies

93. Passet, R. (1979). *L'économique et le vivant*. Payot.

any definitive and unambiguous definition. For all authors, similarly to the concepts of justice and freedom, degrowth expresses an aspiration, a set of ideas as rich as they are varied, or even different. We do not wish to discuss this multiplicity in detail but to identify some significant orientations that allow better understanding of the concept and its multiple variants. It is in fact a "framework where different imaginaries, different lines of thought or conduct come together". Also, "this diversity is a strength" resulting in a richness of vocabulary which constitutes, therefore, "a network of ideas and conversations firmly rooted in radical and critical traditions, but modifiable and open to multiple relationships"[94]. The choice of authors presented is not arbitrary but corresponds to the diversity of these approaches, as different as they are rich.

– Degrowth: a radical assumption.

All economic models dedicated to growth assume that increases in production and consumption can occur continuously in a cycle that repeats itself indefinitely, especially if we manage to reuse the resources we use. Georgescu-Roegen radically changes the paradigm by reversing the relationship and showing that, on the contrary, this circularity of the economy necessarily leads to catastrophe. We can summarize the long-ignored contributions of this author as follows.

– The physical/economic relationship and entropy.

By transposing the second principle of thermodynamics, the principle of entropy, to economics, Georgescu-Roegen radically changes the paradigm for economic analysis. According to this principle, any transformation of matter increases its entropy, that is, the proportion of unavailable energy it contains. For example, if you burn a piece of coal, it will produce heat only for a while because part of it will dissipate until it is completely dissipated: part of the heat will produce work, the other being transferred to the colder matter around it. At the end of this process, the piece of coal can no longer produce any work and the matter has reached a new point of irreversible equilibrium. Furthermore, this initial choice reverses the reasoning inherited from Newton's thinking and which subsequent economic thinking has not yet shaken off.

– Critique of the foundations of post-Newtonian political economy.

The first critique of economics is based on categorical refusal of the circularity of the relationship between production and consumption. Indeed, the classic pattern

94. D'Alisa, G. et al. (eds) (2015). *Décroissance – Vocabulaire pour une nouvelle ère.* Le passager clandestin.

of economics consists of thinking of growth as a mechanical relationship with the level of production which depends on hypothetical production functions, thus making reversibility an acquired and universal principle. By putting the principle of entropy into perspective, the author highlights the irreversible nature of the consequences of growth for resources, in addition, denying that technology has any capacity to repair errors from which it is impossible to recover because they are irreversible.

– Critique of technology as an alternative response to environmental damage.

For the author, we cannot escape the law of entropy, and so all possible references to technological solutions constitute so many errors and alibis. Neoclassical economic thought (for example, that of Solow) is based not only on the mythical belief that reversibility is possible in environmental matters, but that we will have technological answers to the problems that the infinite growth of economic production will not fail to generate. In this regard, the treatment of waste as a technological solution to the problems of pollution and environmental damage remains wishful thinking. Indeed, it seems impossible to escape the laws of dissipation of energy while economic reasoning considers the functioning of the system to remain mechanical and endless. Therefore, for Georgescu-Roegen, reference to the stationary state cannot constitute a solution and only degrowth constitutes a viable solution. Under these conditions, sustainable development is an alibi insofar as it allows us to avoid the real problems: on the one hand, it serves as a "good conscience" for those who refer to it; on the other hand, it turns out that the only solution lies in degrowth, which is understood here not as a backward step but as a path to the future. Therefore, "ecological development" cannot be identified with a more or less acknowledged form of growth but should involve a "physical degrowth" of human activities, mainly in "overdeveloped" countries which are the largest consumers of energy and of raw material. "It is indeed the path of structural reorientation of the production process of industrial civilization that degrowth indicates."[95]

– Serge Latouche or convivial degrowth[96].

Degrowth, as Latouche presents it, cannot be considered as a concept in the traditional sense of the term, and in any case, it is difficult to speak of a "theory of

95. Georgescu-Roegen, N. (2011). *La décroissance – Entropie – Écologie – Économie*. Sang de la Terre, p. 21.

96. We could also have used a subtitle taken from a work by the author: "frugal degrowth as an art of living: happiness, gastronomy and degrowth" – See Latouche, S. (2020). *L'abondance frugale comme art de vivre. Bonheur gastronomie et décroissance*. Payot et Rivages.

degrowth", in the sense that economists have been able to elaborate in the context of a "theory of growth": degrowth cannot therefore be considered symmetrical to "growth". Therefore, "degrowth is simply a banner behind which are grouped those who have proceeded to a radical critique of development and who want to sketch the outlines of an alternative project for a post-development policy"[97]. It takes "indestructible faith" to continue to think, as neoclassical economists do, that unlimited substitutability between technological capital and "nature" is capable of solving problems, or even improving the quality of life of future generations through continued growth. Reality shows the opposite, and the warnings from the scientific community about the risks involved are clear proof of this. Reformist approaches based on sustainability, as well as reference to the possible existence of a "stationary state" as solutions to environmental problems, prove to be both impossible and undesirable. On the one hand, impossible, insofar as the economic process cannot be considered mechanical and reversible, as development and/or growth at all costs far exceeds the capacity of what the planet can give us. Therefore, if humanity as a whole were to live at the same level and at the same pace as the United States, we would need the equivalent of five planets[98]. This factual situation thus inevitably leads us to the need for degrowth as a response to a worrying future situation. On the other hand, undesirable because the proposals put forward constitute the temptation (or attempt!) to reconcile the preservation of the environment with the maintenance of a system which still enshrines the economic domination of nature, but in other forms. On the basis of such an assumption, we see that there is no renunciation of either the (productivist) mode of production or the mode of consumption and therefore the "lifestyle" generated by a system of growth.

However, according to Latouche, the goal of degrowth is to protect the environment (and therefore humanity which is consubstantial with it) as well as to establish social justice without which the planet is condemned to implosion. Furthermore, degrowth does not necessarily mean a regression in well-being, and refers more to a renewal of the economic imagination of a society whose belief boils down to the idea that consuming more means living better: "good and happiness can

97. Latouche, S. (2006). *Le pari de la décroissance*. Fayard, pp. 16–17.

98. In the same vein, an "average" American citizen consumes 9.6 hectares, compared to 7.2 for a Canadian and 4.5 for a European. We therefore remain very far from the global equality to which the third pillar of sustainable development aspires – namely, the social aspect – and which would require us to limit ourselves to 1.4 hectares each if we start from the hypothesis of a stable population. Also, although some dispute the figures put forward here, the fact remains that the orders of magnitude are indeed confirmed. Latouche, S. (2004). *Survivre au développement*. Mille et une nuits, pp. 93–94.

be achieved at little cost". Therefore, degrowth presupposes a limitation of unnecessary movements of people and goods around the planet, the environmental impact of which is considerable and places a strain on the local environment. At the same time, it calls for a strong limitation of annoying, costly and harmful advertising, an end to accelerated obsolescence of products, etc. The author, in a long and diverse inventory, lists the costs of the different positions associated with a society of growth and its destructive effects (without being exhaustive). In addition to military expenditure, advertising expenditure amounts to €45 billion, road accidents represent a direct cost of €20 billion and an indirect cost of €60 billion; in the field of health, the financial consequences of air pollution amount to €27 billion. As for the pollution clean-up market (growing by 8% per year) and repairing the effects of growth, it is estimated at $640 billion without including the consequences of water-related problems, which represent $400 billion. Latouche has no difficulty in concluding that the "cost-benefit" ratio of degrowth is clear! In reality, degrowth should not be considered as negative growth because it is only possible within the general framework of a "degrowth society", which presupposes a radical change in social organization as well as in social relationships. The place of work and social relations becomes decisive instead of mass production and consumption. The emergence of new social relations in the form of LETS (Local Exchange Trading Systems), and of cooperative production and distribution, that is, alternative social relations, becomes essential. Therefore, "social relations thus take precedence over the production and consumption of useless, even harmful, disposable products, where contemplative life and disinterested and playful activity find their place"[99]. Thus, degrowth promises to be convivial and constitutes a global, urgent objective that must be implemented in a local framework: revitalize local action, develop social ties based as much as possible on local exchange, on reciprocity and not on the global market. As the author states, "what is fundamental in this logic of the gift is that the *relationship* replaces the *good*"[100]. The economy is located within and remains framed by the social, which expresses itself in a local framework of proximity, itself part of a globality based on the same principles. The concept of degrowth has in fact been developed in several ways and we refer to the bibliography for a deepening of the question of degrowth, which has also been developed in several ways. However, we will not fail to mention a philosophy of what has been called "socialist ecology", which André Gorz largely contributed to developing. In contrast to technocratic thought and "managerial practices", the

99. Latouche, op. cit., p. 99.

100. Latouche, op. cit., p. 109 – (author's emphasis) – on this theme, see also Godbout, J. and Caillé, A. (1992). *L'esprit du don*. La Découverte.

latter[101] is part of a political ecology which is based on a radical critique of forms of domination, both in the context of work and of a return to nature or a critique of consumerism. Due to lack of space, we cannot develop its essential themes and we encourage the reader to go further.

The question we ask is the following: what happens to the urban environment itself when faced with the problem of sustainability; what becomes of the city, this monstrous city which brings together millions of individuals in dramatic conditions while others display a provocative opulence: because faced with a shameless display of wealth and opulence, the worst ghettos, deprived areas, poverty and disease develop at their gates.

1.5.3. *The sustainable city and its limits*

It is from the 1990s that the term "sustainable city" emerges in discourse concerning the relationship between the city and environmental problems. Indeed, it was in 1994, following the Rio conference, that European authorities launched the sustainable cities campaign with the support of the European Commission. At the same time and in parallel, a certain number of initiatives emerged and sustainable development strategies for the built environment in urban areas were grouped under the term "Local Agenda 21". Therefore, the concept of a sustainable city gradually replaced the "ecological city" that was initiated by the first activists of the environmental cause. This takes account of the central role that cities can play particularly in preventing global risks, thus facilitating more integrative approaches.

Therefore, beyond the fight against urban nuisances, the sustainable city considers more transversal aspects and themes: the reconquest of public spaces, the recycling of urban spaces and resources, mobilities, the control of peri-urbanization, the political reappropriation of the city by its inhabitants, the management of time, etc. These different aspects obviously involve urban planning problems, especially the dimensions of daily life in the city. The question then is to know at what cost this paradigm shift might be achieved.

101. We refer to our references for more details on this author and his work. Furthermore, at the same time, we must mention authors as important as Baudrillard, Castoriadis and Illich whom we have not discussed here due to lack of space, who played a determining role both in raising awareness of environmental problems and perspectives on what has become their struggle. Those who wish to do so will find opportunities to go further in the references.

1.5.3.1. *The sustainable city between town and countryside, or the contradictions of peri-urban development*

A first aspect that seems decisive to us results from the following observation: while during *Les Trente Glorieuses* urban growth was very strong (more than 75%) and it was contained in a small space (growth of 25%), an opposite and exactly symmetrical movement occurred from the end of the 1970s in the form of peri-urbanization. This movement is not the result of a rediscovery of "love of nature" (not only so, in any case); rather, it is mainly about how thanks to the car, which has become king, a society succeeds in finalizing its aspirations, which are mainly related to access to property, security and more living space. This phenomenon has been accentuated by public policies supporting the construction of detached houses, the development of roading infrastructure, tax exemptions, as well as by real estate and land speculation; all of this is accentuated by the erosion of urban planning and under-investment in marginalized suburbs. Therefore, it seems quite curious to see architects and urban planners subscribe to the logic of the "emerging city", somewhat too quickly associated with an "urban revolution"[102]. This is because the construction of the city in the countryside, that is, the construction of peri-urban villages, does not necessarily offer prospects likely to respond to the challenges of global urbanization. We can even already see a certain number of negative effects. On the one hand, in terms of the environment, we know the consequences of peri-urbanization, namely a three-fold increase in travel and the energy consumption associated with it, a quadrupling of GHG emissions, infrastructure congestion, reduction in the usable agricultural area, etc. On the other hand, the tranquility associated with the suburban environment implies significant corollaries such as loss of time, tensions linked to very high mobility, transport expenses, etc., all of this not necessarily being compensated for by the apparent costs resulting from accessing new accommodation[103]. A question arises here: the goals that advocates of sustainable cities want to achieve are not necessarily to abandon the car or restrict the need for space otherwise expressed, but rather to ensure that public incentives contribute to loosening the contradictions that result from freedom for everyone. Conversely, it is appropriate to seek compromise solutions, particularly in terms of public transport, in the spaces between alterations, through the rehabilitation of degraded neighborhoods, through the profession of

102. See on this subject: Ascher, F. and Godard, F. (1999). Révolution urbaine, *Le Monde*.

103. However, with the recent Covid-19 pandemic and the development of teleworking, it seems that we are witnessing the beginnings of a rupture in this infernal cycle of behavior. However, the various ongoing experiments have not yet acquired the force of proof regarding the changes that we are beginning to perceive.

green urbanism. That said, are we not at risk of creating a situation in which the design of the sustainable city becomes profoundly unequal?

1.5.3.2. *Sustainability as a discriminating factor*

We know that sustainable development is also defined in social terms, which constitutes, with the environment and the economy, one of its essential pillars. This social ambition of sustainable development is also reflected in the objectives of the sustainable city, the challenge then being to restore a minimum of equilibrium regarding social problems. Therefore, at the crossroads of social and environmental issues, sustainable city projects must necessarily deal with the inequalities resulting from dealing with the constraints of sustainable development applied to the city. These most often relate to income level and access to work, as well as to social behaviors that generally lead to inequalities in urban policy choices. Therefore, in France, a suburban district composed of multi-unit housing has four chances out of five of being crossed by an arterial route, and the inhabitants of large complexes are four times more likely to suffer a particularly unpleasant level of noise[104]. We might thus provide many more examples which show that historically the quality of the environment associated with land tenure problems constitutes an important factor in social segregation. Generally, we see that in most cases, the importance given to the social dimension of sustainable development remains mainly rhetorical. Social aspects are only taken into account in a marginal, general way and we mainly retain the image of the city, particularly through what we call "total quality": quality of infrastructure, quality of training, quality of life, high environmental standards, etc., in short, "zero defects" applied to the city – but which has a high cost and which therefore quickly becomes discriminatory. The same goes for "eco-neighborhoods", neighborhoods of high environmental quality designed according to very strict principles, well served by public transport, with abundant vegetation and equipped with numerous local amenities. In this regard, we note a certain analogy, even convergence, between eco-neighborhoods and privatized neighborhoods in the style of "gated communities"[105], particularly in terms of social discrimination. This situation can also be seen in the case of developments in urban centers whose objective is to control urban sprawl. Therefore, rehabilitation of certain districts of the city centers, by greatly increasing land values, is done to the detriment of the existing populations and to the benefit of much more favored social strata (the process of "gentrification").

104. For an enlightening report on this subject, see: Lavoux and Rechatin (1999).

105. See on this subject: Davis, M. and Monk, D. (2007). *Paradis infernaux : les villes hallucinées du néo-capitalisme*. Les Prairies Ordinaires.

These contradictions thus tend to cast doubt on the seemingly very generous intentions of the sustainable city. Regarding peri-urbanization, rising transport costs and household debt pose problems for modest families, suggesting that urban sprawl is not economically viable in the long term. Furthermore, in the name of sustainability, we will one day have to find political solutions to the increase in ecological inequalities and thus the worsening of the environmental and social problems facing our societies. The development of new forms of economy and/or services, a social modulation of tax incentives and the involvement of local authorities are all factors likely to lead to major urban renewal operations. Finally, the intervention of residents–citizens will play a determining role.

1.5.3.3. *Citizenship and the sustainable city*

As emphasized above, sustainable development is a concept that has been imposed from above, institutionally, without the citizens who are otherwise the first to be affected having had a say. There is a real problem with democratic functioning to the extent that, in enacting the goals of sustainable development, inevitable discrepancies will occur between announcement and reality. This is all the more important since at the local level, it seems difficult for elected officials to articulate a long-term approach in combination with the institutional rules of short-term electoral cycles. In this context, the concept of sustainable development takes on two opposite forms: on the one hand, a participatory approach that sanctions the return of the political that citizens can use; on the other hand, a technocratic approach that takes decisions away from citizens.

Given the developments already observed, it seems logical to question the reality of the intentions, otherwise laudable, concerning intergenerational equity, especially as state technocracy, based on moralizing discourses on the planetary situation and on individual responsibilities, does not aim to impose a vision of the world to which the citizen has not explicitly subscribed. Because, to a certain extent, through Agenda 21, sustainable city projects hardly hide their technocratic character to the extent that a certain number of proposed measures are based on standards or principles whose legitimacy has not been established. This approach is difficult to reconcile with the idea implicitly contained in (and judiciously claimed by) the principle of sustainable development of legitimation from the base, that is, from citizens. Therefore, in regard to the development of sustainable cities, it seems that democratic consent is a necessary and sufficient condition for the applicability of its principles. Finally, taking account of experiments carried out in certain cities (Bologna, Leicester, Hamburg, Amsterdam, etc.), it seems important to emphasize that the sustainable city project can also be an irreplaceable lever in terms of citizenship and democratic innovation, for several reasons: on the one hand, certain

objectives satisfying the conditions of sustainability cannot be achieved without a clear commitment from citizens (tenants, neighborhood associations, waste management, etc.). On the other hand, there is not necessarily a single solution for the objectives established to achieve the sustainable city, which gives collective deliberation a particular significance insofar as it reinforces the effectiveness of procedures and the transparency of practices; the whole package should enable a practical consensus to be reached. Faced with the rise in civic disinvestment and the difficulties of legitimation of politics, the organization of a public debate on territorial projects in general and the sustainable city in particular can only strengthen the democratic functioning of local institutions.

1.5.3.4. *The sustainable city between local and global*

In relation to the special relationship that links sustainable development and sustainable cities, a legitimate question arises: to what extent can we say that the sustainable city is the essential means for protecting the planet as a whole? In other words, in the context of sustainability, how to articulate the global – protecting the planet – with the local – the development of the sustainable city?

By definition, sustainable development implies a responsibility of the same nature and function both in the local context and at the global level. Its implementation and the achievement of these objectives therefore involve endogenous economic development strategies which can only be achieved to the detriment of other areas. The dialectic between local interest and global interest must be able to drive agent behavior which takes "altruistic" behaviors into account. Indeed, cities which take part in a logic of limiting greenhouse gases are fighting at the same time against local and global pollution[106]. All these experiences clearly show that there are not necessarily internal contradictions between the global and local objectives developed by sustainable cities. One problem, however, is that it is just as easy to develop an equally large number of counter-examples. Indeed, for some, sustainable development concerning the planet involves constraints at the local level with which they must come to terms, thus producing a set of uniform

106. For both the ICLEI (International Council of Local Environmental Initiatives) whose objective is to control local mobility and the phenomena of peri-urbanization, or the EUROCITES Association, a network of car-free cities, the goal remains the same: namely, through a local arrangement, to take measures relating to the whole planet, particularly as an example to follow. We understand that the symbolism of the actions implemented also aims to develop exemplary behavior toward the planet as a whole. That said, there is nothing to prove that downstream exemplarity is enough to resolve problems whose systemic nature would require that the entire chain joins in.

rules that the local must respect[107]. This is because the ecological imperative has real meaning and scope only at the planetary level. Also, the ecological balance of the planet may in certain respects involve local imbalances or even damaging effects at local level. Economic logic explains that not all cities necessarily have the same objectives and do not follow the same trajectories. Conversely, local authorities do not necessarily have the future of the planet or their region as their main motivation. Also, here we find the contradiction between the long term of ecology and the short term of politics: certain local elected officials will not take the risk of committing to long-term programs whose tendencies they are not sure that their voters will approve of. Under these conditions, we will safeguard local jobs, particularities and sensitivities and will try to develop the natural tendency to outsource to our neighbors the problems that we do not wish to resolve for electoral reasons. Accordingly, the question is how to manage these apparent contradictions between local dynamics and global issues. Several factors may come into play, namely the establishment of problem management adapted to each territory by using the most effective instruments (price, taxation, constraints by standards, public contracting, etc.), a cultural change in the behavior of local officials as well as of citizens. Generally speaking, sustainable city strategies must be rooted in a representation of space which avoids unnecessary piling up and also which avoids the breakdown of territorial solidarity or even aggravates the development of inequalities. The difficulty lies, through the sustainable city, in developing solutions of continuity between different scales of space and time, in connecting territories, regions, countries and cultures, both at the level of the Global North and at the level of North/South relations. Therefore, the sustainable city moves away from a logic aiming to isolate and divide the global and the local, and toward an articulation between territories and an original and profoundly modified conception of politics capable of reconciling singularity and universality, diversity and unity.

1.5.3.5. *Urban demography and the sustainable city*

As already said, the demographic challenge is primarily posed for cities whose size has continued to grow over the past 50 years, especially (and mainly) in developing countries or so-called emerging countries: the most populated urban areas[108] are home to an increasing proportion of rural populations who come to find

107. For example, see on this subject: Godart, O. (1999). Le développement durable et le devenir des villes. Bonnes intentions et fausses bonnes idées. *Futurible*, 209.

108. Thus, as an example, we have: Tokyo with 42,796,714 inhabitants, Jakarta with 36,143,473, and São Paulo with 36,315,473. Of the 10 largest megacities in the world, eight are cities in Southeast Asia, one in Latin America and one in Africa. For comparison, a city like Paris has 2,175,000 inhabitants within its boundaries and more than 12,000,000 for the entire Ile de France region.

work in the cities along with much of the world's poverty. These gigantic concentrations of population cannot fail to pose serious problems, particularly in terms of sustainable city development. We chose to put into perspective the problems faced by the sustainable city using two significant examples of the difficulties in achieving it. The choice of the largest city in Latin America, São Paulo, and one of the largest cities in China, Shanghai, is deliberate in that they crystallize within themselves the difficulties in achieving the objectives of the sustainable city. The case of the latter city will be an opportunity to address structural problems linked to the massive urbanization of coastal areas, appearing in the form of what is called "soil liquefaction" and "subsidence".

1.5.3.5.1. São Paulo and the difficulties of realizing the social aspect of the sustainable city

The choice of the most important megacity in Latin America is no coincidence for several reasons: on the one hand, because São Paulo is the most populated city in Brazil, which itself is the most unequal country on the continent; on the other hand, with more than 36 million inhabitants, it crystallizes all the problems encountered by urban planning, which wants to meet the challenges of sustainability and therefore of the sustainable city. São Paulo is built in the tropical highlands, and its multiracial and migratory composition, as well as its very strong social inequalities, crystallize all the problems encountered by megacities. The challenges are multiple on the social level with significant urban violence, itself associated with great poverty resulting from a high concentration of migratory movements. In this respect, São Paulo perfectly represents the country to which it belongs. Indeed, just like Brazil as a whole, which is one of the most unequal countries in the world, São Paulo alone features more than 12,000 slums or "favelas" in which crime is endemic, notably with a rate of unemployment greater than 40% of the population. While the issue of tropicality is not without its problems (heavy and devastating rains, floods, frequent soil accidents due to the unique geology, etc.), the major problem in achieving sustainability lies above all in the realization of the social aspect of sustainable development and the difficulty (or even impossibility) of solving it; indeed, with several million people living in difficult material conditions, the sums needed to re-establish a so-called "normal" situation are close to the amount of tens of billions of dollars, even if the effects of the mafia corruption that exists in most of São Paolo's "favelas" are not considered. Several factors account for this difficulty: on the one hand, there is a strong social disparity in the origin of its inhabitants, most of whom came from immigration at the time of the coffee boom at the end of the 19th century. It should be noted, conversely, that this multiplicity of origin is also a characteristic, an attractive feature as demonstrated in many situations. On the other hand, there are very strong inequalities in terms of income and standard of living. Here, as elsewhere, while the heart of the city features the highest incomes, as we

move away from the center, incomes decline, with the most distant earning incomes up to three times less than the minimum wage[109]. Obviously, the favelas constitute this ultimate urban fringe in which both poverty and high crime reign. São Paulo has for a long time rightly claimed to be better off than Rio de Janeiro in terms of the number of favelas, which is no longer the case today. This is indeed where the largest number of poor and unhealthy neighborhoods have developed with a large population concentrated there. Finally, although São Paulo is not the worst city in this area, there is a high concentration of urban violence that most often occurs in the poorest neighborhoods and which generally affects the most marginalized populations, which are often racially characterized. Therefore, although the homicide rate in the center of the city is similar to that of European cities, it is much higher in the peripheries and increases with distance away from the center.

Reminders of such a situation should not be considered neutral since the objective sought is the construction of a sustainable city. We chose the city of São Paulo because it is emblematic of such a situation: the growing development of inequality and therefore mass poverty is incompatible with the very idea of the city's sustainability, both in terms of the infrastructure necessary to promote material living conditions compatible with environmental protection and a functioning economy that contributes to this functioning. Without respect for these three constituent variables of sustainable development, the breeding ground for the vicious cycle of poverty will continue to produce its negative effects, thus hampering the desired objectives.

1.5.3.5.2. From Shanghai to Dongtan, or how to build the sustainable city

The sustainable city[110] must respond to very precise indicators in relation to respect for the environment, both in terms of GHG emissions and with regard to respect for biodiversity. As a second example, we chose the case of Shanghai, and more particularly the desire expressed by the Chinese authorities to develop the archetypal city in terms of sustainability, named Dongtan. This city of the future would illustrate, in the eyes of its leaders, the future of urbanization in China for meeting the constraints of sustainable development. This project, which began in the mid-2000s, is all the more important as urbanization in China has taken on crucial importance: in the ranking of the top 50 urban areas in the world, 12 are located in China (and 24 in Asia), and the level of pollution there is considerable. We therefore understand the importance of promoting a form of urbanization that is very

109. For more information regarding the figures for different income levels within the city of São Paulo, see the local government website: "infocidade.com", www.prefeitura.sp.gov.br (in Portuguese).

110. Douay, N. (ed.) (2016). *Aménagement et urbanisme en Chine*. Armand Colin.

respectful of the environment for a country with no less than 1.4 billion inhabitants. As such, the Dongtan project was meant to embody the future realization of several hundred new cities built on the same model. Dongtan was also meant to serve as a showcase and example at the Shanghai Universal Fair of 2010 and be presented on this occasion, but it was not completed and was abandoned because it was considered too expensive. This project is part of a broader perspective planned by the Chinese government, which consists of creating just over 400 new ecological and sustainable cities by 2030, with the objective of significantly reducing CO_2 emissions and energy dependence by almost two-thirds. The project was located on Chongming Island at the mouth of the Yangtze River, and the city was originally designed to house between 50,000 and 80,000 inhabitants in early 2010, to accommodate 500,000 in 2050 and at the same time to be the typical example of the sustainable Chinese city. We will approach the Dongtan project from two particular angles: on the one hand, at the level of the principles put forward for its construction, representing the foundations of its existence; on the other hand, the reason for the failure of the project, its shelving and its final abandonment.

– The major principles underlying the Dongtan project.

Within this limited framework, we propose to draw up a relatively exhaustive inventory of the project that accurately reflects its sustainable characteristics, namely: in terms of energy, installation of wind turbines for each multi-unit construction, systematic use of biomass, insulation of buildings using green roofs, and orientation toward the sun to better capture solar energy. In terms of public transport, use of fuel cells for shared individual vehicles, and development of solar-powered river shuttles. In the field of quality of life: full recycling of all waste produced, limitation of the size of buildings to eight floors, green spaces which must cover 40% of the city's total space, privileged pedestrian spaces, local construction materials, and local organic food production. In short, a set of measures with strong ecological connotations with the objective of reducing the ecological footprint to a minimum by systematizing the search for the most efficient technologies in terms of respect for the environment[111]. The work would in fact stop quite quickly, the scale of the project not allowing the initial budget of $1.3 billion to be met.

– From project to failure.

In fact, failure was due to the convergence of several reasons. First of all, the choice of the location itself was fatal to the project: in fact, the island concerned constitutes a marshy expanse classified as a "nature reserve" and therefore protected

111. By 2007, work had barely begun and only the bridge linking Chongming Island and Shanghai was completed by 2009.

at global level, since these places are a migratory stopover for endangered birds ("spoonbills") which regularly migrate between Siberia and Australia. We might therefore legitimately question the ecological nature of such a choice and locating such constructions in such a sensitive location. Furthermore, although the carbon footprint was better than in most Chinese cities (which are among the most polluted on the planet), the ecological footprint was 2.2 hectares per inhabitants, while the sustainable limit is 1.9 hectare. In reality, the most general criticism of the project itself consisted of calling into question the idea of a "showcase" which would hide the more general fact that the 30 largest cities in China are the most polluted on the planet and that they receive no significant means for, if not escaping, then at least reducing the effects of such a situation. Chinese experts argued that the same amount of money dedicated to improving the situation of existing cities would have been much more effective. Finally, regarding the financing of the project, it turned out in view of the targeted ambition (as well as of the 40 other projects which were to follow) that the sums required were far too high, equivalent to several tens of billions of dollars. Especially, since the project itself, upon analysis, revealed some significant flaws: the volume of automobile traffic between Dongtan and Shanghai via a bridge comprising eight traffic lanes, especially since no local sources of employment had been planned, most of them being in Shanghai. Moreover, in response to a possible insufficiency of energy production, the installation of an essential complementary power plant was planned to run on coal!

As we can see, the difficulties encountered in building a sustainable city both at a technical level and (and perhaps especially) at a financial level very often (too often) lead us to postpone any decision in this area. Also, this is certainly where the system as a whole experiences the worst difficulties in allowing the emergence of new generations of sustainable cities. The question we will address next concerns existing cities that need to be "greened" to escape the trap into which development and growth have led us.

1.5.3.5.3. Some consequences of massive urbanization and climate change: soil liquefaction and subsidence

We are proceeding here in a particular context of expertise which may seem quite distant from our concerns regarding the sustainable city, especially since the questions relate more to engineering sciences in a field far removed from the social sciences and yet so close to them, namely geology. This is because this is a particular aspect of urbanization that may add even more difficulties (as if it were needed!) to the emergence of a sustainable city but which, in any case, does not simplify things. These are two technical aspects in particular whose consequences, still poorly appreciated, may prove to be very significant: soil liquefaction and subsidence.

– Soil liquefaction.

This is a geological phenomenon that is generally associated with seismic movements and plate tectonics. Liquefaction is a movement induced by seismic activity in some geological formations that causes a loss of strength in sandy materials saturated with water, linked to an increase in interstitial pressure generated by the deformation of tectonic movements. Then, the material loses its consistency and its sudden deconsolidation leads to destruction of the soil, making constructions resting on its formations unstable. This phenomenon is particularly sensitive in seismic environments such as Japan, where there are numerous images of buildings which collapsed for these reasons. Generally, soil liquefaction occurs in environments saturated with water, leading to a very clear reduction in soil resistance. As we can see, the phenomenon of soil liquefaction remains mainly due to transformation of a solid medium in contact with water, which then contributes strongly to its transformation. However, with climate change and the rise of water levels due to warming, we are witnessing the possibility of seeing the emergence of situations favoring such a phenomenon, particularly with regard to a large number of coastal cities[112]. There are already 136 coastal cities threatened by the phenomenon of soil liquefaction. Moreover, and in the same logical continuity, the extension of gigantic cities and the anarchy of construction that develops there tend to accentuate this observation by aggravating it. On a global scale, before 2050, more than 300 million people might find themselves affected (nearly 600 million by other estimates). Obviously, this observation does not consider the indirect effects of such a situation, mainly concerning the migratory consequences which would inevitably occur[113]. The cities concerned are located on all continents, from Guangzhou to Rio de Janeiro, from Lagos to Mumbai, from Amsterdam to Buenos Aires.

– The phenomenon of subsidence.

The concept of subsidence in geology is used "essentially to designate settling concomitant with thick accumulations of sediments"[114]. The mechanism of subsidence depends on the depth of the different sedimentations and their effects, as well as on the importance of these sedimentations in the subsidence process, which it can fully account for. The weight of the sediment generally remains decisive in this process. The question we ask here is the following: why bring the specifically

112. Although the increase in sea and ocean levels is barely perceptible, it is no less real: it was 1.7 mm per year on average during the 20th century. However, between 1992 and 2013, that is, over 20 years, it was 3.2 mm, or double that during the last century. Thus in 2100, this increase would be between a minimum of 25 cm and 82 cm, which is considerable.

113. See on this subject: Paul Turban - *Les Echos*, June 24, 2021.

114. Goguel, J. (1985). Encyclopedia Universalis. *La subsidence*, 17, p. 319.

geological concept of subsidence into debates around the sustainable city? The reason is simple: demographic pressure and massive urbanization on a global scale are causing a large concentration of population and of the buildings necessary to house them in acceptable conditions. In fact, the spaces thus occupied display particularly high construction densities. This phenomenon is singularly massive in Asian countries (but not only there), where we find the highest urban concentrations and therefore where the risk of subsidence remains very high. Without going into detail, a city like Shanghai has seen its stock of buildings higher than thirty stories exceed a thousand units, and this density is the consequence of economic development and strong growth in China over the last 30 years. These buildings, which are essential to house the labor force necessary for the functioning of a developing economy, have had a double effect: on the one hand, considerably increasing the pressure on groundwater reserves and thus contributing to a relative depletion of groundwater; on the other hand, and consequently, weakening the sedimentary layers on which the constructions themselves rest. The result is a potential and real weakening of the urban environment, sufficiently significant to seriously concern experts. Japan, whose urban concentration is even greater, has the same concerns because it is subject to the same risks.

As we can see from these two examples above, the promises of the sustainable city are being put to the test and we must consider that nothing has been won. This is because our objective in this context is simply to present a factual situation and not to propose solutions that are not within our field of competence. Especially since the solutions, when they exist, are subject to enormous financial constraints and can only be imposed by political will. In other words, to problems of a systemic nature, only a systemic response will suffice.

1.6. To not conclude

At the end of our analysis, one observation emerges: the sustainable city, an expression at the urban level of the concept of sustainable development, is not currently an objective in the process of being achieved, even if many things have been undertaken. As the obstacles are many, difficulties accumulate along with the needs and imperatives imposed by a worsening situation. As a result, the establishment of concrete modalities allowing solutions to be envisaged in the near future does not seem certain. Several obstacles must first be overcome. On the one hand, and first and foremost, from the economic point of view, allowing the concept of development to continue without modifying its scope, content and conditions, based on economic growth, poses a major problem: we live in a finite world, and it seems impossible to see growth as a possible future (or only in conditions such that

the future of the planet would indeed be called into question); or again, in conditions which might allow us to revisit the concept and consider it mainly in a qualitative form. This is because if we were to commit to maintaining a quantitative approach, we would immediately come up against limits that would sanction such a decision. In the future, it appears that only renewable raw materials will be transformable, or will not be if we want to preserve future generations; with one constraint: respect for the latter's conditions of renewal. Therefore, sustainability cannot be decreed with the wave of a magic wand, but is built on respect for nature and the environment in which we live and act.

On the other hand, the global acceleration of urbanization can only confirm the difficulties for the emergence of the sustainable city everywhere (or almost) on the planet. We have ended our presentation above with two examples of the colossal difficulties encountered in developing this idea. This does not mean that it might prove impossible, but simply highlights the difficulties and challenges of achieving not only a sustainable city but also sustainable neighborhoods, "local Agenda 21", sustainable territories, etc. In any case, and we have emphasized this several times, the first problem lies in the possibilities of financing what is necessary to achieve the objectives of the sustainable city. Although the problems of financing what is commonly called the "ecological transition" of cities remain worrying at this time, including for developed countries, it is easy to imagine the scale of the problem when it comes to financing developing countries and the transition to sustainable cities for urban areas with more than 20 million inhabitants. Also, we know the constraints that finance imposes in this type of situation. This therefore implies a profound, if not radical, modification of the behavior of economic agents who are likely to contribute to these operations of unusual size. We must therefore agree that, from now on, political decision-makers will have to play a determining role in the choices to be made.

Finally, this means and implies that the objectives of "sustainable development" as proposed by the Brundtland report must be redefined and revisited in two ways:

– As seen, the concept of sustainable development remains ambiguous and charged, even connoted with values too often linked to the market economy, precisely that which is currently leading us to a dead end. Economism associated with mainstream economic thought has not proven its ability to avoid the planet's current situation. It is therefore appropriate to redefine and agree on the conditions for responding to such an emergency.

– The sustainable city, beyond the problems and concerns of financing that we have just raised, will not be built without the active participation of the actors that we all are, both collectively (institutions, associations, various organizations) and

individually, that make up society. This condition is no accident insofar as it presupposes the in-depth questioning of current practices as well as the emergence of a real and active participatory democracy.

In general, the latter condition must be imperatively respected insofar as, without it, partisan interests will ensure that it is emptied of its content and meaning. Also, immediate awareness of the difficulties mentioned above must be an additional driver of the desire to act.

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