BIODIVERSITY AND ECONOMIC DYNAMISM[1]

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Introduction

This paper examines the relationship between biological diversity and economic dynamism with the objective of learning how the promotion of the former can contribute to the latter. That is, with the objective of identifying forms of action capable of encouraging simultaneously the conservation of biodiversity and the creation of firms and jobs. Therefore, it seeks to extract from international experiences in these two domains evidence that contradicts the general – and dominant – hypothesis that environmental restrictions do not facilitate economic growth and can even harm it.

The central argument is the need for profound changes in the vision that insists on the use of traditional fiscal resources (augmented by royalties obtained from bioprospecting) in the expansion and maintenance of natural protected areas. Rather, the text seeks to show that it is necessary to tax many of the activities that contribute to the erosion of biodiversity and invest the resources thus collected in the promotion of entrepreneurship geared to making use of rural amenities.

1. Biodiversity

Though biodiversity involves three sub-sets – genes, species, and ecosystems – combating its erosion tends to concentrate on only two economic avenues, both contributing to the conservation of the species: genetics and ecosystemics. In the first, large investments in biotechnologies lead firms from the pharmaceutical and food sectors to be interested in *in situ* and *ex situ* collections, which require the practice of bioprospecting. As a consequence of this interest and the Biodiversity Convention adopted at Rio-92, new types of contracts of financial compensation to suppliers of genetic resources also tend to include royalties on any new merchandise made from biological material thus obtained. In the other avenue, governments and international

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organisations co-ordinate forms of financial compensation that stimulate and make feasible conservation initiatives and/or durable use of protected ecosystems. As a consequence, alongside new lines of international finance, projects aimed at conservation and sustainable use of ecosystems begin to receive more economic incentives than in the past.

The implications of these two broad avenues of biodiversity conservation are quite different. If the main problem of the reduction of biodiversity is the loss of genetic information, its consequences will be more global than local. However, if the drop in resilience reveals itself to be more important, the consequences will be more directly related to the debility of a determined ecosystem, being, therefore, more local than global. The need for a change of emphasis – from the loss of genetic information to the loss of resilience – is the main warning of studies promoted by the "*Beijer International Institute of Ecological Economics*". But for this change of emphasis to occur, the ecosystemic avenue will need to acquire more economic viability.

1.1 The genetic avenue

Rio-92 led 157 countries to sign a Convention in large part geared to the establishment of modes of exploring biological resources by genetic engineering. Today that Convention has been signed by 174 countries that, with the illustrious exception of the USA, also ratified it. Institutionalising physical and intellectual property rights, it facilitated the direct negotiation between public authorities and private biotechnology firms, which tends to result in bioprospecting contracts that foresee a non-destructive economic exploration of genetic resources, and a "just and equitable" division of profits. The source of inspiration was the contract that had already been established between the American laboratory Merck & Co. and the National Biodiversity Institute of Costa Rica (INBio), a private non-profit organisation that depends on the Ministry of Natural Resources of that country. In exchange for 1000 samples, the INBio received more than one million dollars in two years, with the firm further committing itself to pay royalties on medications that are developed from that genetic base.

This model has earned a lot of criticism. Small underdeveloped countries could be placed in heavy competition, in the face of the emerging regulation of the market of genetic resources. Being in similar natural conditions, they could even be led to practice a real "ecological dumping". Those that, on the contrary, do not have comparable biological wealth, would be unable to find any kind of solution to their problems of environmental degradation in this formula. Furthermore, the "just and equitable" distribution of the financial results of these operations (foreseen in the Convention) could only be exercised by means of international public evaluations realised in the arena of a multilateral negotiation, instead of depending on bilateral agreements made between a multinational and a country with insignificant bargaining power. As for the rest, the terms of these contracts do not need to be divulged or submitted to any organisation of control and arbitration. (Hermitte,1992 ; Pistorius & Wijk,1993)

There is also a lot of uncertainty on making a reasonable estimate of the part of the final price of a medicine that should be attributed to a DNA sequence taken from an organism. Especially because this price depends much more on the firm's market power than on its production cost. It is very common for the profit margin to be composed essentially of monopoly rents. In these circumstances, it is unlikely that the local or regional community can really make good use of this type of contract with a multinational. And it is precisely because of this that many NGOs denounce these agreements as "politically correct" ways of legalising biopiracy, at the same time as large pharmaceutical firms seem to lose interest in bioprospecting. They may see it as more advantageous to make an agreement with firms specialised in the access of data banks of gene sequences, or even to simply access brokerage firms of genetic resources, such as *Biotics* or *Shaman Pharmaceuticals*, presently *Botanical Pharmaceuticals* (Aubertin & Vivien,1998:64).

There are still other nuisances. The specific interests of the demand of genetic resources can come to determine the orientation of the research, favouring the study of certain families, instead of stimulating knowledge of the set of local biodiversity (including fauna, which does not usually interest these firms, despite its crucial influence on plant reproduction). It also usually takes a good dozen years and more than 200 million dollars for a molecule endowed with special qualities to give rise to a new medicine. And part of the financial compensations that precede the eventual royalties can even be used by the governments for ends that have little or nothing to do with the objectives of the Convention. In the symbolic case of Costa Rica, half of the more than one million dollars paid by Merck went to the government coffers with no obligation whatsoever of being utilised in policies of the type previously determined. (Hermitte,1992 ; Pistorius & Wijk,1993)

These and many other criticisms only serve to show the institutional immaturity of the emerging international market of genetic resources, a problem that is closely related to the fragility of national legislations, particularly among the exporters. But they also indicate that overcoming this fragility can result in opportunities of resource collection. These institutional arrangements can evolve in a direction more favourable to the exigencies of an effective conservation of biodiversity coupled with a development perspective. There is nothing stopping, for example, the release of 'bonds' or 'risk contracts' to encourage responsible bioprospecting in natural protected areas. If good use is made of such opportunities, they will certainly be able to contribute both to reinforcing and expanding the protection of ecosystems and to financing other environmentally beneficial development initiatives.

1.2 The ecosystemic avenue

It is obvious that the erosion of biological diversity can only be controlled if there is simultaneous retraction of activities that degrade the habitats and growth of those that conserve or recuperate them. For this to occur, it is necessary that the latter be more advantageous than the former, which requires the combination of several types of public intervention (in general the state) of stimulus and dissuasion. Other forms of collective action (in general led by entities of the so-called 'third sector') tend to be more effective

when inserted in a context that includes encouragement from regulations and norms, or from subsidies, taxes, quotas, tradable permits, etc. It is useless, therefore, to discuss the eventual superiority of this or that form of collective action for the preservation of biodiversity. It is more important to establish that the protection of ecosystems only exceptionally dispenses with some type of intervention from public authorities, be it of a normative character[3] or more directly economic.[4]

The problem is that in these public interventions there is a very strong predominance of compensatory projects that, in financial terms, end up being merely neutral, when not giving deficit. This becomes very clear in two surveys of the most recurring incentive measures to the protection of ecosystems in the 28 member countries of the OECD (OECD,1996-a,1999-a). Only exceptionally do they generate some usable surplus for the financing of other conservationist actions, or of socially and environmentally beneficial economic initiatives.

In world terms, it is estimated that the annual expenditure on conservation of the present 13,1 million km2 of protected areas reaches 6 billion dollars. A more adequate conservation of these units would demand a supplement of 2,3 billion dollars. The inclusion of another 7,4 million km2 in these global reserves (90% of which are in underdeveloped countries) would require 11 billion dollars for their obtainment and another 3,3 billion annually for their maintenance. According to the authors of these estimates, these are laughable quantities when compared to the amount of harmful subsidies (mainly agrifood), estimated at 1 trillion dollars per year (James, Kevin & Balmford,1999).

As an indictment, the reasoning is acceptable. But the idea that resources presently used to subsidise agribusiness activities in the developed world could be transferred for the maintenance and expansion of protected areas (mainly in peripheral countries) can only be considered quixotic. The present projects of regulation of first world agricultural activities result from institutions sedimented by many decades of socio-economic pragmatism. At the beginning they were exclusively geared to sustaining internal prices, in order to guarantee stability of minimum income to multitudes of farmers. But gradually they began to acquire many other dimensions, insofar as farmers became the minority in the rural area. And they were adaptations that always responded to imperatives of regional development and social cohesion.

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[3] These interventions of the public authorities can remain merely normative, as is the case of the natural protected areas with a special judicial statute. But frequently they advance to the terrain of implementation of policies of handling and control of the soil, as occurs in the Ecological Stations and Biological Reservations, whose property belongs to the organ responsible. In Environmental Protection Areas (APA), generally instituted in urban areas, on third party lands, the norms produce special standards of control of use and occupation of the soil.

[4] In addition to the regulations and the most directly economic means, there is a third type of institution inherent to all forms of human behavior, not to mention much more frequent in civil society than among public authorities: the agreements of auto-control, the codes of good conduct, etc. There is nothing keeping these arrangements from tending to precede both legal measures and market signals (prices) that usually make as yet unheard of practices more attractive (Lipietz,1999:146).

It is likely that new adaptations will cause these subsidies to become less harmful, aiding, for example, the various types of alternative agriculture, the so-called "reasoned" agriculture[5] and, mainly, a multifunctionality of multiactive farmers that favours biodiversity conservation. But it is an illusion to assume that these resources will be taken from the agricultural sector to be used in the expansion of protected areas of the underdeveloped world, or even in the maintenance of the American, European, and Japanese natural protected areas.[6]

Predominating in the organisations geared to conservation of biodiversity is the idea of utilising the most traditional fiscal resources to maintain and expand reservations controlled by public authorities, or creating funds that compensate costs taken on by enlightened rural businesspeople (that is, proprietors of forests, plantation farmers, and family farmers willing to adopt ecologically more correct practices than the conventional ones, but almost always less rentable). What is worse, the necessary maintenance resources are never collected from the agents who most benefit from the existence of natural protected areas. Most common is that the landlords in the area reap the new rents of location and other types of quasi-rents engendered by the existence of parks, reservations, or stations, without any type of compensation. The most prejudicial activities to biodiversity are almost never penalised, nor are the less aggressive activities managed by means of economic instruments that also allow a collection of resources to be used in the encouragement of beneficial activities.

In this sense, the integration between environmental policies and economic policies is much more "behind" in the arena of conservation of biological diversity than, for example, in the energy domain, in which the resources collected by ecotaxes have been more and more used to reduce taxes that inhibit the creation of jobs (OECD,1996-b,1996-c,1997). At the heart of it, what is being called here "ecosystemic avenue" corresponds to a set of deficient interventions of conservation and recuperation unaccompanied by other interventions capable of simultaneously dissuading degradation and generating monetary surpluses (at least during the time in which the degradation persists). It should be considered, then, whether it would be possible to encourage the conservation and sustainable use of biodiversity with policies based on the logic of the so-called "double dividend" that already guides the debate on the forms of economising energy and fighting the most polluting emissions (Whalley,1998; Kahn & Farmer,1999)

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1.3 The conflictive "double dividend"

Contrary to the fine, which should liquidate its own reason for being (the infraction), a tax tends to regulate a sustainable use plan, even if, ultimately, it can lead to the same result. It all depends, of course, on the levels at which the fines and taxes are set. In principle, the level of an ecotax should conciliate three basic variables: the capacity of

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[5] The French agribusiness firms that already invested in food healthfulness created a movement denominated "Farre", which is led by three of the largest groups in the agrifood sphere: Danone, Carrefour and Auchan. – at the beginning of 1999, "Farre" already counted on 481 institutional members in France.

[6] A more detailed treatment of this issue can be found in Veiga (1999).

support of an ecosystem, the intensity in which it is (ab)used, and the population of the users. An analogy that can clarify this difference between fine and tax is that of parking. Whereas the fine should encourage not parking, the tax should capture the quasi-rent intrinsic to the right of using a determined location for that end. *Mutatis mutandis*, it is the difference between fining the driver that violates car ban strategies, rather than forcing him to pay a toll for the right of abuse; that is, for the inconveniences he creates for community. Hence, the most evident advantage of the tax – its "first dividend" – is that of inciting the agents to reduce the ruin they provoke. As for the fine, if set at an appropriate level, it aims to extirpate a given behaviour so that the corresponding impact disappears, or is at least minimised.[7]

The "second dividend" of the tax is the collection of resources that, in addition to making public investments feasible, can allow the reduction (or even the end) of other fiscal impositions whose effects are much less beneficial and oftentimes even become harmful to community. In addition to the justification of the incitement (in the case of parking: to not abuse the public roadways), there is another, of public financing (both of road work, as well as, for example, reduction of property tax).

The utilisation of this "second dividend" to increase the collective well-being is not necessarily linked to the domain in which the tax was charged. There is nothing forcing the resources collected from parking to be used only to expand the number of parking spaces.... They can even reduce them if they serve, for example, to expand the green areas of the city. Thus the always conflictive nature of this double dividend. In the example cited, there would be frontal opposition between the defenders of motorists dissatisfied with the lack of parking and advocates of the residents dissatisfied with the lack of parks and gardens.

In the current European debate with respect to the adoption of ecotaxes on fuels, an ample consensus is formed that the "second dividend" should serve first and foremost to lower the fiscal burden on labour, favouring the creation of new jobs. But there is also a growing opposition, to whom the "second dividend" should serve to finance the transition to cleaner and cheaper motoring styles, based on electricity or gas (Lipietz,1998; Bureau & Hourcade,1998).

In the same way as we discuss the introduction of ecotaxes on fuels that pollute the air, we could consider their comparable incidence on the main factors of water pollution and –why not? – on the main factors of erosion of biodiversity. It is also certain that other serious conflicts will emerge around these types of ecotaxes, be it on their economic rationality, or on the destination of the "second dividend". That is why, before discussing how the "second dividend" could be used to dynamize the economy, it is necessary to

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[7] Evidently, fines can acquire in practice the meaning of the tax because they are established at very low levels, as occurred, for example, in the experience of the São Paulo State Authority's Environmental Car Ban. But this is a misrepresentation, because what was intended was to stop the use of part of the vehicles on given days of the week, and not charge a "toll" to those who preferred to disrespect the rule. Similarly, if a tax is set too high, it becomes, in practice, a fine.

know what type of ecotaxes could be appropriate to the conservation and sustainable use of biodiversity.

1.4 Ecotaxes for biodiversity

It is very difficult to establish with assurance the relative importance of the six phenomena that most provoke the loss of biodiversity: (i) destruction and alteration of habitats; (ii) exploration of "wild" species; (iii) introduction of exotic species; (iv) homogenisation; (v) pollution; (vi) global environmental changes. As for the global extinction of animals, it is estimated that a third is provoked by destruction/alteration of habitats, another third by the introduction of species, and the last derives from unsustainable forms of hunting and fishing. But about two thirds of the "stocks" of marine fish are being ultra-explored, or have already become extinct. And three-fourths of the disappearances of birds derives directly from changes in the use of soils, exactly as occurs with the extinction of plants. (WCMC,1992)

The most visible forms of these changes of use of the soils are the cutting down of forests, the draining of wet areas, the construction of roads, the expansion and creation of urban agglomerations, etc. However, the worst seems to be the resulting fragmentation of natural formations that previously were continuous. Many species disappear; many times the population from which they subsist diminishes; movements become restricted; and the presence of predators and competitors that lost their natural habitat becomes more frequent. (Meffe & Carroll,1994)

Comparable to the impacts of the changes in use of the soils is the damage caused by homogenisation, that is, the losses of diversity provoked by standardisation of the systems of agricultural production. In addition to the diminution of the number of species and of the genetic variety of the plants utilised, there also occurs a dramatic reduction of the number of other species, such as nitrogen-fixing bacteria, fungi that facilitate the absorption of nutrients, pest predators, pollinators, etc. Ultimately, the genetic base of innumerable species that co-evolved for centuries or millennia diminishes (Norgaard,1988). Simultaneously, surface and subterranean waters are contaminated, both by the growing use of the basic inputs of this conversion (chemical fertilisers and agrochemicals), and by the excessive concentration of husbandry. In addition to health problems, this lack of functional diversity compromises the resistance and the resilience of the agroecosystems, increasing their vulnerability to pests, droughts, and other climactic changes (Hazell,1989).

Thus, though it is impossible to hierarchize the six main manifestations of the loss of biodiversity, perhaps it is not abusive to underscore the brutal agricultural artificialization (which ironically became known as "modernisation" or "green revolution"), as long as it is duly inserted in the spatial context of the development process. However, this emphasis on agriculture should not allow us to forget the disastrous effects of other primary activities, such as the various forms of forest, mineral, and fishing extraction. For example, it is vital that the importance of the marine and, mainly, coastal, ecosystems

always be present, when considering the tendencies of spatial distribution of populations. Unfortunately, the available data almost always refer to a narrower dimension of this territorial face of development.

It is estimated that the extension of the areas of low demographic density and with reasonable occurrence of primary vegetation is well below 20% of the European territory, but that it varies between 40 and 60% on the other continents (OECD,1996-a). Indeed, in four European countries – the Netherlands, Belgium, United Kingdom, and Germany – the 'essentially rural' regions occupy less than 20% of the territory, because the 'essentially urban' always occupy more than 30%, whereas the intermediate, or "relatively rural", vary between 30 and 50%. At the other extreme are Ireland, Sweden, and Norway, where this spatial distribution is similar to that of the four countries of the "New World" that developed most: United States, Canada, Australia, and New Zealand. In this group, the essentially rural areas cover more than 70% of the territory and the relatively rural have portions less than 20%. In the intermediate are France, Austria, and Switzerland (and also Japan), countries in which between 50 and 70% of the territory belongs to essentially rural regions and about 30% to relatively rural regions.[8]

Thus, even considering only the "terrestrial" face of development, with the due emphasis on primary economic activities, it would be much simpler to know what factors do not cause loss of biodiversity than to attempt the contrary. That is, the list of potentially ecotaxable goods is immense, be they private, "club", "common", or "collective"[9]. In the name of biodiversity it is possible to justify the introduction of ecotaxes on the commerce of seeds, on the use of portable phones, on the exploration of shoals of fish, on the use of landscapes, and so on. It is therefore about knowing which ecotaxes could be viable in economic and political terms, and not about preparing an interminable list of those that would be theoretically conceivable.

Disregarding the regional and local scales, there are at least 40 types of ecotaxes in effect in the national arena (Table 1). They are mainly geared toward fighting air pollution provoked by motorised vehicles, their fuels, and other energy products. But they are also very frequent in combating water pollution and sound pollution provoked by airplanes, as well as in garbage management. They also already reach, in some countries,

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[8] According to the typology of the OECD, based on the proportion of the regional population that lives in rural localities, i.e., with less that 150 inhab/km2. 'Essentially Rural' are the regions in which more than 50% of the localities are rural; 'Relatively Rural' are the regions in which between 15 and 50% of the localities are rural; 'Essentially Urban' are the regions in which less than 15% of the localities are rural.

[9] To surpass the simplistic division between only two types of goods – private and public – it is necessary to cross the criteria of 'exclusion' and 'rivalry'. Private goods are 'exclusionary' and 'rivalrous', that is, they belong to whoever paid for them and are not usually consumed simultaneously by other agents. At the other extreme are pure collective goods, that is, that not only belong to collectivity, but also simultaneously benefit all its components (the best example is the system of national defense). The "club goods" approach the private goods by the criterion of 'exclusion', but are similar to collective by the criterion of 'rivalry'. The best example is that of cable television, in which the acquisition of the right of use does not block the simultaneous consumption by many other agents. "Common goods", in the sense of "*common pool resources*", do not 'exclude', but 'rival'. The best example is the most frequent form of fishing. They are goods that are available to all fishing boats only until one of them catches something. (Lévêque,1998:78-98). A very similar classification can be found in Barbier, Burgess & Folke (1994).

agrochemicals, chemical fertilisers, batteries, plastic and paper packaging, tires, solvents, etc.

Table 1 – Frequency of Ecotaxes* in the 28 countries of the OECD
In March 1997, cf. OECD (1997:52-54)

	Types of Taxes	**Number of Countries**
(A) Fuels	6	**28**
(B) Other Energies	4	**23**
(C) Vehicles	2	**22**
(I) Garbage	4	**22**
(H) Water	4	**20**
(F) Direct taxes	5	**20**
(G) Air transport	2	**15**
(E) Various goods (batteries, etc.)	11	**14**
(D) Agricultural inputs	2	**4**
TOTALS	**40**	**28**

* Ecotaxes from the infra-national arena were not considered.

When examining these 40 types of ecotaxes it is easy to perceive that they are entirely related to the problems of pollution that most harm the populations of metropolitan areas and large cities. There are no ecotaxes that aim to control the spatial tendencies of the urbanisation process, that is, precisely those that were mentioned above as the main causes of the erosion of biodiversity.

To reach the factors most responsible for the erosion of biodiversity, the ecotaxes should be geared also toward territorial organisation and toward the primary sector of the economy, with special emphasis on agriculture. They should reach real estate business, civil construction, and all the inputs of the so-called "technological package of the green revolution" (not only the agrochemicals, but also seeds, motor-mechanisation equipment, veterinary products, etc). The choice of the specific goods that should be the object of these ecotaxes, as well as the calculation of the levels at which they should be set, are questions that cannot be discussed in the arena of this text. Mainly because they involve serious distributive problems. For example, it would be more necessary to reach the luxury condominiums than popular housing, ships and yachts than humble fishing boats, large plantation farmers than family farmers, and so on.

Ultimately, the purpose of this reflection is not to propose ecotaxes on certain goods, be they private, club, common, or collective. For now it is enough to underscore that there exists an immense spectrum of concrete possibilities that allow an extension of economic rationality of the ecotaxes to biodiversity. That is, to show that the conservationists should propose taxation of permissible activities that are less aggressive to biological diversity, instead of limiting themselves to the administration of deficient natural protected areas, to the use of public resources to compensate the lower rentability of "green" activities, and to the rare forms of penalising some of the behaviours that most provoke the erosion of biodiversity. Taxation can make investments viable that, if well

chosen, can simultaneously stimulate the conservation of biodiversity and the creation of firms and jobs. And if this happens, these investments will help to open one of the paths to the much talked about "sustainable" development.

2. Economic dynamic

For well-known reasons, in the last decades the adjectives used to emphasise certain dimensions of development have proliferated. If all of these emphases were joined, soon we would arrive at something like << *an economic, social, and cultural development, centred on man ("human") and ecologically durable ("sustainable")* >>. As Ignacy Sachs says (1994), it is time to cut several zeroes off this overvalued currency, returning to the term "development" without any qualification. After all, the development process is necessarily multidimensional. As every complex and multifaceted process, it imposes analytical clippings, without meaning that these clippings can exist as concrete phenomena. The demand that we isolate mentally something that never occurs separately in reality results, of course, from the desire to understand. It is the wish to comprehend a complex phenomenon that forces us to consider first its parts separately. But the study of the economic side of development should not provoke the illusion that the "economic development" could be something distinct form the "social development", even if for the purposes of analysis it is perfectly possible to address the economics of development separately from its corresponding sociology.

As for the dispute between the adjectives "human" and "sustainable", it is imperative to recognise that it corresponds to an objective split between promoters of development and protectors of the environment. A conflict that manifests itself with great clarity inside the United Nations. It is symptomatic that one of the bitterest registers of this tension is precisely in the Human Development Report of 1997, prepared by the UNDP. Instead of the "biunique and indissoluble link" that, according to the Earth Summit, should occur between development and the environment, this report found what it calls a "tectonic fault" caused by the practice of international organisations responsible for the implementation of Agenda 21.

According to the UNDP, the United Nations Commission on Sustainable Development and mainly its financial arm – the Global Environment Facility – do not give due importance to the poverty-environment ratio. Simultaneously, says the same report, the United Nations commission in charge of implementing the resolutions of the World Summit for Social Development – in which poverty was the central concern – in practice does not face the reduction of poverty in the context of its relationship to environmental protection and the sustainable utilisation of resources. "This 'tectonic fault' must be recognised and repaired", warns the Human Development Report of 1997. And what most scandalised the UNDP was discovering that the agencies geared to the promotion of "sustainable development" do not direct their resources towards forms of environmental protection that can create opportunities of income generation by the poor, or to priority incentives to technological innovations that increase the productivity in marginal environments.

In sum, this contradiction between "human" development (UNDP) and "sustainable" development (UNEP), is one of the most patent manifestations of the profound and objective difficulty of establishing the so-called " biunique and indissoluble link" between environmental preservation and modern economic growth. That is, growth with the continuous elevation of productivity resulting from the cumulative integration of teaching, research, science, and technology in the most diverse branches of the economy (Bairoch,1997:317-88). This is an excellent definition of modern economic growth, a much more recent phenomenon than one might imagine. What really provoked a fundamental change in the functioning of the world was much more the marriage between science and technology – at the end of the 19th century – than the industrial revolution of the end of the previous century.

Both the convenient commitment to 'sustainable development' (which only became set as of the mid-80s) and the previous notion – and less euphemistic – of *ecodevelopment,* are unequivocal manifestations that it had become crucial to find a less destructive mode of growth. But, to conquer *more* sustainability (since the development process cannot attain it in absolute terms) it is necessary to define the set of operations necessary for a complete reorientation of the process of economic growth.[10] As long as it is the main foundation of development, its sustainability will depend first and foremost on a radical change in the characteristics it assumed during the "Golden Age", that is, a profound change in its institutional structure of incentives.

However, any institutional arrangement is path-dependent, because every prior trajectory tends to be consolidated by the learning process of the organisations, by the subjective modelling of the issues, by network externalities, etc. That is, the economy tends to engender policies that reinforce the existing incentives and organisations (North,1990:99). Therefore, the idea of a brusque turn in the institutional structure of incentives that had been sedimented during the three centuries could only be an illusion. It multiplied productivity by 40 or 45 times, and during the very "dynamic" seven previous centuries productivity had not even doubled (Bairoch,1997). A situation that becomes even more severe at a historic moment in which the fight against unemployment tends to impose an unbridled – and unscrupulous – search for any formula that could favour the growth of national economies. In these circumstances, the change of direction dictated by environmental concerns will only become legitimate if it can simultaneously

[10] And so it will be until growth can stop being a central element of development. To be precise, the sustainability of development would demand more than the absence of physical growth of the product embedded in the idea of 'stationary state'. It would demand, indeed, its inverse, the decrease, the retraction. Not to recognize this would be to ignore the entropic nature of the economic process, revealed by the pioneer work of Nicholas Georgescu-Roegen. It would be to cultivate the illusion that the economy can stop increasing the entropy of the energy matter that it absorbs. Entropy is a sufficiently complex notion to not be easily understood even by physicists themselves. Nevertheless, for the purposes of this note, it is enough to assume that the increase of entropy corresponds to the transformation of useful forms of energy in forms that humanity cannot utilize. Every living organism is subject to an increase of entropy, but tries to keep it constant by taking from its environment the elements of low entropy necessary to compensation. See Georgescu-Roegen (1976).

lever a rich growth in jobs (instead of restricting them). That is, if the ecological precaution can propel “entrepreneurship”.

2.1 Entrepreneurship

Entrepreneurs are the main agents of economic change, because they are the ones who generate, disseminate, and apply innovations. In seeking to identify the potential opportunities of business and assuming the risks of their bets, they expand the frontiers of economic activity. Even though many are unsuccessful, it is their existence that makes society constantly generate new products and services.

Unfortunately, it is not very well known what the determinants of “entrepreneurship” are, despite their crucial influence on economic growth. There is not even an agreement on the indicators that would best reveal the relative degrees in which the phenomenon manifests itself, despite the strong conviction that it is the essence of economic dynamism and the certainty that its promotion is a great way to expand employment.

Crucial questions such as that of the effects of education on the entrepreneurial dynamic remain without convincing answers, though it is known that the educational systems were conceived to form good wage-earners, instead of preparing youths for the perspective of self-employment. And everything indicates that scientific knowledge on the subject will only advance when it is possible to make a systematic and comparative assessment of the recent public policies to stimulate the creation of small and medium firms. Mainly of the most intelligent programs, which matured in the local and regional arenas to better enjoy the territorial advantages in the formation of innovative environments. After all, entrepreneurship never occurs in a homogeneous manner among the regions of a single nation. Comparing extremes, we perceive that in certain regions of Germany more than twice the number of new firms emerge than in others. The same ratio approaches triple in Italy, Sweden, and the United Kingdom, reaching about quadruple in France and the United States. And it is very likely that these spatial divergences of entrepreneurial creativity correspond to the phenomenon of “clustering”.

According to one of the most accepted definitions, a “cluster” is a geographically delimited concentration of independent businesses that communicate, converse, and transact to share collectively both opportunities and threats, generating new knowledge, innovative competition, chances for co-operation, adequate infrastructure, in addition to frequently attracting the corresponding specialised services and other correlated businesses. Some studies reveal that the confluence of many firms to a determined point may correspond much more to certain specific characteristics of the place – such as prestige and amenities – than to need of contact with other firms that supposedly would make up part of these clusters. Others emphasise that the true basis of clustering is knowledge, which does not necessarily mean ‘high technology’ (OECD,1999-c). But most of those who approach the existing relationship between the formation of these clusters and “entrepreneurship” end up almost always emphasising the cultural factors that sometimes are compacted in the seductive notion of “social capital”: a complex of

institutions, customs, and relationships of trust that stimulate three fundamental pairs: that of competition with co-operation, that of conflict with participation, and that of local and practical knowledge with scientific knowledge (OECD,1998).

The government policies geared towards the promotion of entrepreneurship barely start to incorporate these territorial, institutional, and cultural dimensions. Until a short time ago, these policies were aimed almost exclusively at fomenting high technology and big industries capable of "polarising" the regional and/or national economies. It was only as of the mid-80s that the role of the so-called "SMEs" began to be (re)valued, mainly for their superior capacity to generate jobs. But this change of attitude still did not generate persuasive results on the best way to promote this more "diffuse" entrepreneurship, which can reach all the economic branches and all types of regions, from the most urbanised to the most rural.

Hence, the support to local initiatives for the creation of new enterprises ended up adding even more programs to an already existent "quilt" of entrepreneurship promotion (to which the American federal government, for example, attributes 65 billion dollars annually). Efforts to formulate a more coherent strategy emerged recently in Australia, the Netherlands, and Spain. But it is too early to see their results (OECD,1998). At the same time, more specific studies on the determinants of entrepreneurship in unfavourable contexts tend to emphasise the strategic role of the local political-administrative institutions, immediately followed by the regional networks of banks and business associations. But the knowledge on the roles played by these actors in the development process continues to be "fleeting" (*sfuggente*), as Sonia Floriani showed in a recent case study on Calabria, financed by the European Social Fund (De Rose & Floriani,1998).

Nevertheless, despite all the precariousness of the scientific knowledge on the subject, recent advances in the understanding of its rural dimensions allow us to think that the conservation of biodiversity can be a strategic factor for the creation, consolidation, and growth of new enterprises.

2.2 Rural dynamic

Over the last decades public policies that aim to offer perspectives of a more promising future to rural areas have gained a lot of importance. Particularly the most peripheral, where economic dynamism tends to evaporate, or never even occurs. It is rare, however, that these programs are successful, because during the development process the dynamism of a rural region ends up being determined by the difficult formation of a virtuous triangle.

In a distant past, the essential thing was being able to dispatch to the cities a growing volume of the primary merchandise that they demanded: food, wood, minerals, and energy. A necessary condition was having available the base of the triangle: the capacity of rational exploration of natural riches that were rarely abundant and not always renewable. But it didn't take long before it became more decisive to transform the

primary goods locally before exporting them to the cities, because this value-adding soon began to generate more income and employment than the agricultural, forest, fishing, or mining activities. Dynamism began to depend heavily on the business sense of those that obtained the capital necessary to employ the labour freed from other activities. Success in the industrialisation of primary products helped attract other endeavours crucial to the regional development.

It happens that lately the economic dynamization of a rural region has begun to be more determined by the capture of urban incomes that are transferred by the frequent stay of family that build second homes (recreational country houses, summer homes, or mountain chalets), by the seasonal presence of families on vacation, by visits of the most varied types of tourists, athletes, congress participants, or even, by the significant migration of retirees. The third dimension is, then, the capacity to value the "amenities" present in territories that could avoid or impede the degradation of their natural and cultural patrimonies by the highly destructive and polluting forces of the two preceding impulses.

The range of amenities available in rural spaces is immense. They can vary from fragments of untouched nature to minutely planned landscapes, and from the most ancient historical relics to the most alive cultural traditions. The increase in the demand for all these types of amenities accompanies the evolution of income and free time of urban inhabitants, generating new businesses and jobs. But there is a double obstacle to the formation of the triangle by making use of this third type of opportunity. It is that the amenities occur more in regions that were never among the most dynamic, not having, therefore, adequate human resources and institutions.

There is a greater propensity to create new enterprises in rural regions that already are (or already were) prosperous and in those that attract "refugees" from urban agglomerations, than in rural zones that have always been among the most peripheral or that stopped being dynamic a long time ago.[11] Many of the difficulties to any effort of economic dynamization derive from the low demographic density that is at the core of the very definition of rurality: distance from decision-making centres and information networks; lack of networks of transport and telecommunication; rare opportunities of human resource valorisation; difficulty to create close relationships that generate partnerships; etc. But there are also obstacles to economic use of the amenities that result purely and simply from the "agrarian" inertia that marks most rural zones.

The problem of making economic use of the rural amenities can perhaps be compared to the exploration of "market niches", though there is no correspondence with the classic examples of this type of phenomenon. The two situations involve processes of product differentiation. But in the cases of niche markets, this differentiation aims to reach (or

[11] Interesting evidence was found in studies on several American rural areas and, particularly, in the experience of the *Southern Development Bancorporation* (SDB), accompanied by a study of regional development of the southern part of the state of Arkansas conducted by a partnership between the University of Chicago and Henderson State University d'Arkadelphia. Cf. report by Grzywinski, Taub & Reardon (1992).

create) a market segment that tends to be small, narrow, and specific. As for taking advantage of rural amenities, the differentiation based on the territorial identity is not usually geared toward such a restricted market segment. It is always a question of a "symbiosis" in which the territory is used to promote the product and the product promotes the territory, resulting in an increase of the value of many local resources, be they quality primary products, traditional handicrafts, tourist attractions.[12] The problem is that this type of "symbiosis" is not very frequent, because agrarian societies tend to have very little propensity for the practices of marketing.[13]

The need to attribute the highest priority to the capitalisation of the value of rural amenities was the main conclusion of the workshop the OECD promoted in Japan in September 1997, at which the rural dynamics of a dozen countries were discussed. And from it resulted the recommendation of two basic types of policies: those that stimulate the direct co-ordination between the providers and the beneficiaries of amenities (support to collective action and to commercial valorisation); and those that help change certain economic rules (regulations and financial incentives). The most interesting thing, however, is that the eight case studies mentioned are experiences that link good economic use of amenities to conservation of biodiversity, despite the latter's not being among the main objectives of the event[14] (OECD,1999-b).

One of the most interesting examples is that of France, where 38 "Regional Nature Parks" (PNR) are revealing themselves to be one of the most concrete paths of conciliation between the two great exigencies: protection and development.[15] They are protected spaces, but open, inhabited, negotiated, and self-managed, which have become a symbol of the re-conquest of natural spaces previously spurned, though supported on an institutional arrangement whose origin is very different. The beginning of the "PNR" was established in March 1967 by General De Gaulle so that protected zones would be delimited near the big agglomerations. The first decree mentioned explicitly the need to create "green lungs for new cities". The social practice inverted the political choices: in addition to being attractive, the "PNR" helped create activities and jobs, causing a much more appropriate legislation to emerge in 1993.

It is first and foremost about constructing together a territory in which we would want to live, says Serge Juskiewensnki, co-ordinator of the Quercy park and regional adviser of the Midi-Pyrénées region. At the heart of the department of Lot, the so-called "causses du

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[12] See "matrix" of the rural "niche markets" in OECD (1995-a).

[13] "*Agrarian societies either relied on 'middlemen' to buy products and take care of marketing, or relied on guaranteed farm prices to sell produce. Niche markets are both highly specialised, and fiercely competitive*." (OECD,1995-b).

[14] "Regional Forest Agreements and Social Assessment process"(Australia); "Rural Development in a Regional Nature Park (France); "Historical '*fudo*' and amenities of the Asuka Region (Japan); Terraced rice fields in Tanada (Japan); Traditional rice farming and hot springs in Yufuin (Japan); Sailing trawl fishing (Japan); "The cultural landscape of mountain areas (Austria); The Napfbergland border trail (Sui.....) (OECD,1999-b:95-106).

[15] The perimeters entirely protected, formed by 6 "National Parks", 128 "National Reservations", and 430 other natural protected areas ("*arrêtés de biotope*"), cover only 1% of the metropolitan territory. The present 38 "PNR" already cover 12% and another 15 projects are underway.

Quercy" allowed the growth of activities from pre-history to the 1950s, when its agricultural activities were no longer competitive. Beautiful landscapes and caverns continued to be tourist attractions for millions of annual visitors, but it was a "passing tourism, without durable benefits". That is why the 24 thousand inhabitants of the 97 localities of the "des Causses" zone mounted the project to transform their territory in a Regional Nature Park. It was exactly the idea that provided the basis for the recent EU directive entitled "Habitat" which intends to delimit a European network of protection by 2004: "Natura 2000" (*Le Monde*, 23/10/99, p.13).

The general idea is that the preservation of the amenities should not paralyse local development, but it also cannot be allowed that the economic dynamism destroy the amenities that are characteristic of the region. It is a question of striking a balance between the maintenance or the increase of the supply of amenities and the promotion of economic growth. As pioneers of a "multi-actor" approach to development of rural areas, the "PNR" constitute a valuable source of ideas, experiences, and competencies in the management of rural amenities. The "PNR" show that there are many ways to monitor the diversification of rural economies, even if they concentrate along three basic lines: a) the promotion of alternative methods of agriculture; b) promotion of enterprises supported on educational and tourist innovations, by means of a quality seal; c) promotion of initiatives based on the ties of solidarity among municipalities that help establish bridges between cities and the interior (OECD,1999-b:100).

The rural amenities are very frequently linked to the handling of important sources of biodiversity, from natural protected areas of little altered natural fragments (such as national parks), to very artificial landscapes (such as the traditional terraced rice-growing), passing through intermediate situations, such as the Swiss or Austrian mountains. In addition to sources of biodiversity, they can also be hothouses of the most important competitive advantages that the development process reserves for rural regions. But the synergy that can exist between the conservation of biodiversity and exploration of these competitive advantages will hardly ever manifest itself spontaneously, because it comes up against enormous cultural and institutional obstacles. If these obstacles are not overcome, it will be very difficult to guarantee, for example, the preservation of what is left of the Mata Atlântica and the Brazilian Cerrados, where the supply of mass tourism packages seems to surpass the maturement of territorial pacts that can ally little erosion of biodiversity with lots of economic dynamism.

3. Conclusion

The promotion of biological diversity tends to be a crucial factor in the dynamization of rural regions. Particularly those where economic growth has not yet destroyed the sources of amenities. In these it is perfectly possible to encourage simultaneously the conservation of biodiversity and the creation of enterprises and jobs. The international experience in these two domains confirms that, at least in this case, environmental restrictions can lever economic growth rather than harm it.

What is less evident is the strategic line and the forms of action that should be adopted so that this synergy between biodiversity and entrepreneurship can be more intensely promoted. The arguments presented in this text seem to indicate the need for profound changes in the vision that prevails among the main international organisations geared toward conservation of biodiversity, be they more involved in the "genetic vein" or the "ecosystemic vein". Instead of insisting on the need to apply traditional fiscal resources (with the addition of revenues obtained from bioprospecting) in the maintenance and expansion of natural protected areas, it is necessary to start taxing activities that contribute to the erosion of biodiversity and investing the resources thus collected in the promotion of an entrepreneurship directed toward the better use of rural amenities.

The forms of action that correspond to a given change of strategic line will depend on many political variables that, at this time, could only be approached in an impressionistic and speculative form. But two things seem clear when considering the Brazilian case: a) the necessity that a tax reform contemplate ecotaxes not only in the energy domain (and in the forms of pollution associated to it), but also in the fight against the erosion of biodiversity; b) the necessity that the "second dividend" of these ecotaxes be utilised in new programs to foment entrepreneurship, mainly in rural regions where the amenities can favour a symbiosis between conservation of biodiversity and economic dynamization.

None of this can be achieved in the short term, because Brazilian society does not seem inclined to accept ecotaxes on agrochemicals, on urban expansion, or on the sale of yachts. Much less is it prepared to adopt the institutions necessary to promote the forms of rural entrepreneurship that can make use of the innumerable amenities available. But for these things to one day come about, it is absolutely necessary that we start to overcome the immaturity of strategic thought on "sustainable development", be it in the choice of objectives, or – mainly – the definition of means of attaining them. An immaturity that has been made public by the preparation process of the Agenda 21, in which long lists of excellent intentions are called "strategies", "priority strategies", or strategic actions", without ever discussing the set of operations necessary to conceive, prepare, and guide the collective action that can promote the "sustainable" development of Brazilian society[16].

It can be supposed that this lack of strategic formulation results from an objective difficulty, and not from a fortuitous intellectual deficiency of the different social actors that are already mobilised to respond to the challenge. This objective difficulty is enormous, because the point is to define the set of operations necessary for a complete reorientation of the process of economic growth, starting with profound and radical reforms of the tax and innovation (S&T) systems coupled with a new (territorial) approach to the programs of job creation. Without that it is impossible to talk about incorporation, both of the restrictions and environmental opportunities in the economic policies. For now, some advances of this "pair" can only be observed in Scandinavian countries and in the Netherlands. Nothing comparable is really happening in the rest of

[16] The preparation process of the Brazilian Agenda 21 has been in progress since 1997 by the Commission of Policies of Sustainable Development.

Europe, North America, and Japan. And it should not be expected that the process advance in the rest of the planet, while so much perplexity and paralysis remains in the three main dynamic poles of the world economy. But this should not serve as an excuse for a country so rich in biodiversity, like Brazil, to continue to be incapable of seeing that its natural patrimony can be one of the main trump cards of a new development project.

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