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Nature and the Wealth of Nations

English version
December
2015

*Quality of growth and ecological
transition*

*What exactly are we talking
about?*

Measurement attempts

Integration into economic choices



Renewable natural resources and the accounting systems of organisations

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Responses to environmental challenges – climate change and the degradation of biodiversity – do not necessarily require us to call into question the capitalist system, but rather to reform it in order to ensure that the maintenance or indeed the creation of natural capital creates value. For an organisation, the creation of value must now involve an internationally recognised accounting system. In this paper, we shall therefore be proposing potential solutions to be considered for the creation of new accounting rules, e.g. in terms of capital increase or depreciation, which will help to improve the integration of biodiversity issues into the strategies of organisations.

The question of accounting for the management of natural resources in the economic world was ignored for a long time, although as far back as 1908, Theodore Roosevelt proposed forging closer links between economic development and environmental protection in the following declaration: "We have become great because of the lavish use of our natural resources and we have just reason to be proud of our growth. But the time has come to inquire seriously what will happen when our forests are gone, when the coal, the iron, the oil and the gas are exhausted, when the soils have been still further impoverished and washed into the streams, polluting the rivers, denuding the fields and obstructing navigation." While adhering to this view of development, it should be noted that despite a certain number of obstacles, some progress has been made in recent years. Our aim is to present and analyse them. This is not a question of challenging the capitalist model, but proposals for reforming the system are required in order to take better account of natural capital because, as Jacques Weber declared in 2008: "In the capitalist system, the creation of profit is the driving force for action. Let us keep this basic rule. And develop incentive rules that change the conditions for the creation of profits: we will still have a capitalist market system, but now, first and foremost, it will help to maintain the viability of the planet and of the societies that inhabit it." This is the framework of analysis in which we shall endeavour to propose some general answers to the question: how can we take better account of natural resources in the strategies of organisations? To this end, we shall be presenting the specificities relating to the management of renewable natural resources and analysing the consequences of different approaches for the accounting systems of organisations.

1. Renewable natural resources and biodiversity: What are the specificities?

Before attempting to answer this question, let's remind ourselves of what biodiversity means: It refers to the *variability of living organisms of any origin, including, among others, terrestrial, marine and other aquatic ecosystems and the ecological complexes to which they belong: this includes diversity within species, between species and of ecosystems* (article 2 of the Convention on biological diversity). Biodiversity is the "living fabric of the planet" (Barbault, 2006, Barbault and Weber, 2010) and humans are obviously part of it.

1.1 The context and key issues

Society as a whole uses services derived from the ecosystems functioning, and these services are often used free of charge, i.e. they have no price and are therefore have no value on the balance sheets and income statements of organisations. The following question arises: To improve the management of ecosystems and natural resources, do these services need to be included in companies' balance sheets? In other words, does the fact that there are no prices attached to these services which are procured by organisations imply that they have no value? In attempting to answer this question, it seems appropriate to refer to the work carried out on the costs of inaction⁸⁹. There may be two categories of costs of inaction:

- firstly, the substitution costs for these services, i.e. if a stakeholder benefits from a service for free and if this service is destroyed, it will have to pay a substitution cost for the service if there is an existing

⁸⁹ In this article, we shall not be going back over the work of Sir Nicholas Stern (2007) on the cost of inaction vis-à-vis climate change or of Pavan Sukhdev (2009) on the cost of inaction regarding biodiversity. We shall simply be using their work, which tends to be aimed at the macroeconomic level, to create tools at the microeconomic level, mainly by means of financial accounting.

technology that performs the same service. There may also be a service restoration or re-creation cost, bearing in mind that in this case, it will be necessary to take account of the time frames required for the restoration to take effect. In this way, restoring polluted soils by excavation will be more costly but quicker than by phytoremediation;

- secondly, the costs associated with the relocation of production if the organisation is obliged to look for this service elsewhere, or indeed the cost associated with the stoppage of production (if the service is destroyed and there is no replacement).

One of the questions is to know whether remuneration can be defined and implemented for the maintenance of ecosystem services ("beneficiary pays" principle) or a penalty in the event of the destruction of a service ("polluter pays" principle).

In the framework of biodiversity and ecosystem services in the strategy of organisations, we need to bear several elements in mind: Organisations have impacts on biodiversity that need to be taken into account; organisations use biodiversity and ecosystem services, which help to create value for both profit-making and non-profit-making organisations.

An important point to be considered when dealing with renewable resources is that in principle, they are indeed renewable. As emphasised by Trommetter and Leriche (2014): "The capacity of ecosystems to provide these different services is fragile. Under these conditions, biodiversity firstly appears to be useful "for its own sake". This is what is referred to as the "supporting" service: nutrient cycle, soil maintenance and primary production. In fact, the ecological efficiency of this supporting service determines how efficiently the ecosystem will operate, and this in turn dictates the standard and quality of the services that humans will be able to obtain from biodiversity. Furthermore, the standard and quality of the supporting service at a given moment depend on the services that have been used by humans previously, and constrain (positively or negatively) the standard and quality of the services that humans will be able to obtain subsequently."

In attempting to explain the relationships between humans and biodiversity in detail, several points can be raised: Taking the example of an organisation: in its uses, it may require a certain number of ecosystem services, but in addition to this quantity, it may also need a certain quality of service. We presume that it will initially have no problem in accessing and using these services. There may be impacts when the organisation uses these services: on the future services that the organisation itself will want to use and on the uses that the other stakeholders will want to carry out. This requires the consideration of the effects of the current uses on the resilience of ecosystems and the associated services that are procured by the different stakeholders⁹⁰. The key issues in terms of the resilience and operation of ecosystems are therefore essential. The resilience must be analysed: in relation to the future needs⁹¹ of the organisation under the constraints of its current uses; in relation to its future uses under the constraints of other stakeholders' current uses; in relation to other stakeholders' future uses under the constraints of its current uses.

It is at this level of analysis that the approach based on the costs of inaction is particularly relevant, because inaction may jeopardise the resilience and future operation of ecosystems: the inaction of one organisation may have impacts on the others and on the organisation itself; the inaction of others may have impacts on the organisation. This means that thought needs to be given to defining what actually constitutes inaction. Inaction by whom? Inaction in relation to what?

It is in this context of dynamic interactions in which the supporting service is at the heart of economic, social and, of course, ecological development that we need to striving to maintain an adaptive potential. But who are the different stakeholders and what do they have in common? The stakeholders to be considered are companies, public authorities and inhabitants. They all share the characteristic of using accounting tools of variable sophistication in terms of assets and liabilities. An accounting system is therefore a tool that allows us to compare and extend the analysis to all interested parties, including those that are not situated within a given region but that will have an influence on the strategy of organisations (e.g. shareholders). But are they individually aware of their dependency on biodiversity?

1.2. The Business and Biodiversity Interdependence indicator (BBII)

This tool has been created to provide guidance for organisations – from a broader perspective than the corporate standpoint – in their analyses of their interdependencies on biodiversity and ecosystem services. There may be multiple and diverse fields of application for the indicator, as is the case for multinationals and regional authorities. The framework of analysis is based on five categories (taken from Fromageot, Leriche and Trommetter, 2014).

⁹⁰ It should be borne in mind that the fact of maintaining an ecosystem for a service does not necessarily guarantee its resilience. Certain services may be favoured to the detriment of the operation of the ecosystem as a whole.

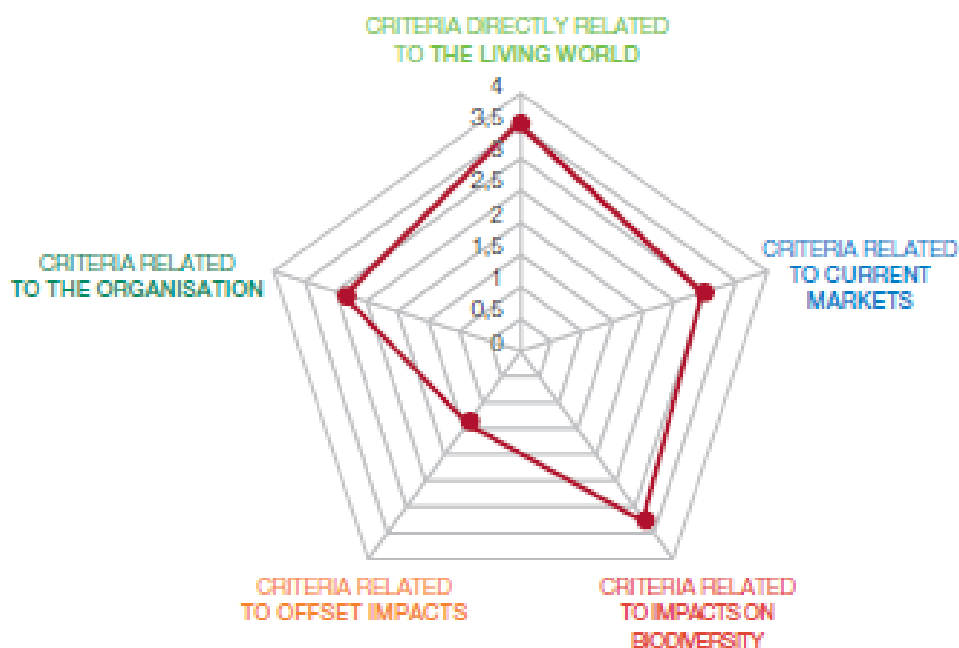
⁹¹ It cannot be excluded that future uses may be different from the current uses, which further complicates the analysis.

Criteria directly linked to the living world: This type of criterion includes questions concerning the organisation's dependency on raw materials through its activity, with these resources originating from the present or past living world (e.g. fossil energy sources). It also includes dependency on technologies and services of the living world, through the ecosystem-services based approach...

- Criteria linked to current markets: this type of criterion is based on an analysis of turnover and its dependency vis-à-vis biodiversity: proportion of the cost of the use of raw materials derived from biodiversity in the total manufacturing cost; proportion of the company's turnover depending directly or indirectly on biodiversity in relation to global turnover.
- Criteria relating to impacts on biodiversity: this type of criterion, which is more common, allows the organisation to investigate the impacts of its activity on the living world and, more specifically, whether or not these impacts are reversible.
- Criteria relating to compensation for the impacts: this type of criterion places the emphasis on the implementation of compensation – whether compulsory or voluntary – for the impacts of the activity.
- Criteria relating to the organisation's strategies: this type of criterion poses the question of the position occupied by biodiversity in the company's strategy. Is biodiversity a key factor for ensuring the sustainability of the stakeholder's activities? Is the consideration of biodiversity the source of a competitive advantage? What are the challenges and prospects for innovation and access to new markets for the stakeholder in relation to biodiversity?

On the basis of these five criteria, organisations can create a pentagram that can help them to analyse their positioning in relation to other organisations.

Figure: Pentagram for two organisations



Source: Houdet, 2008; Fromageot, Leriche and Trommetter, 2014

The BBII was developed as a tool for internal consultation within an organisation. The BBII is an analytical phase prior to the development of an action plan, or the use of other tools. Since its creation, more formalised voluntary approaches have been developed⁹². Biodiversity is thus no longer perceived as just a simple

⁹² The Ecosystem Services Review (ESR) is the fruit of a collaboration mainly involving the World Business Council for Sustainable Development and the World Resource Institute. The ESR is a methodology designed to help decision-makers organise strategies for considering the risks and opportunities relating to their impacts on ecosystems. The publication "Guide to Corporate Ecosystem Valuation" (WBCSD, 2011) is intended to become one of the key tools of the WBCSD. The CEV should allow the company: "to explain, in concrete

environmental issue for which it is sufficient to minimise costs to attain an imposed reduction target. Biodiversity becomes a strategic factor for stakeholders due to the fact that new issues emerge (Trommetter and Leriche, 2014):

- Can minimising costs in order to achieve an anticipated reduction of impacts today be the source of additional costs that will allow us to benefit from services tomorrow?
- Could financing restoration costs today be a requirement in order to allow us to benefit from services tomorrow?

Beyond individual perceptions, the BBII promotes awareness of the interdependency among organisations on the subject of biodiversity and ecosystem services. How can we take account of these interdependencies?

2. Biodiversity and accounting systems of organisations: initial possibilities

We are seeking avenues of research in order to integrate natural resources into the financial accounting of organisations, by taking account of both the interactions among stakeholders on the subject of biodiversity and the negative and positive impacts of stakeholders' strategies on natural capital.

The aim of the accounting system is to improve the consideration of changes in natural capital in the strategies of organisations (be it in terms of amortisation, provisions, depreciation, investment or creation). The accounting system provides a snapshot of the interactions between stakeholders in which the interactions associated with natural capital are under-represented today. Nevertheless, we believe that an accounting system is an appropriate tool for improving how this resource is accounted for, because this capital is not a corporate asset but rather a liability (a resource), which is a debt that the organisation has towards the party that placed the capital at its disposal. This point justifies amortisations (of assets) and provisions (for liabilities) in association with the organisation's activity and with the maintenance of the capital. Financial capital, which is a resource in the liabilities, can be used to purchase machines, for example – a use of resources in the assets – whose uses must be amortised, as it is unacceptable for the company to solicit the shareholders again when the machine is obsolete. The same must apply to the consumption of natural capital.

2.1. An accounting framework adapted to the renewal of the environment (*Comptabilité Adaptée au Renouveau de l'Environnement – CARE*)

Management accounting starts with the consideration that a manager must maintain (and in a certain manner renew) its ecosystem (natural capital) in the same way that a company maintains and renews its financial capital (through the amortisation of its machines, for example). This approach forms the basis of the CARE method (Richard, 2012, Rambaud and Richard, 2015)

The simplest situation that can be modelled is one in which the company is required to manage natural capital for the sake of its own economic viability. In this context, the natural capital that the company uses is only profitable for itself. It is therefore in the company's interest to ensure its maintenance. It bears the costs of maintaining this capital and the anticipated future costs in each financial year (amortisations): in a compulsory manner or as a precautionary measure. The aim is to avoid harmful behaviours. These amortisations are a form of savings, amassing amounts that are available once the thresholds of irreversibility are reached. The sums "saved" and then "invested" remain within the company. This model is based on the principle that the maintenance of natural capital is compulsory (as for financial capital) and cannot be replaced. This model is based on a strong view of sustainability. We are considered to be too close to the thresholds of irreversibility in the theory of viability (Aubin, 1991) to ignore the risks that are posed.

Matters are a little more complicated when the manager is required to maintain natural capital in order to ensure the sustainability of the supplies of goods and services that human societies obtain at the local and/or global level. This is because the amounts allocated to the maintenance of this capital by the manager will not be savings, insofar as the manager cannot benefit financially from its own "investments"⁹³. On the contrary, compliance with the limitations that lead to a resilient ecosystem may be achieved to the detriment of the manager. This approach is fully compatible with the "polluter pays" principle. In this type of situation, a negotiation between managers and beneficiaries might lead to the provision of a financial contribution by the beneficiary. In theory, this could be envisaged and be economically efficient enough to ensure the economic viability of the manager. We shall examine this point in detail, because one question that arises is: how do you find the right balance between the "polluter pays" principle and the "beneficiary pays" principle?

terms, the way in which it evaluates, exploits, manages and reports on its impacts on ecosystems and biodiversity". (Fromageot, Leriche and Trommetter, 2014).

⁹³ In fact, the manager compensates for a deterioration of natural capital through its own fault and in its own interest even if the most serious consequences might appear on other stakeholders' sites.

The CARE model focuses on the consumption of natural capital and therefore on the company's impacts on its environment. Jacques Richard insists on the notion of a maximum threshold for the use of nature in the same way as there are maximum "thresholds" of use for a machine in a company (a certain number of hours per year, for example). These maximum thresholds of use are then associated with the amortisable life of the machine. We can indeed over-exploit nature and prevent it from being resilient. Irreversibilities must be avoided. The CARE model thus adopts an approach involving the "amortisation of natural capital consumption". The notion of amortisation in accounting takes account of the notion of uncertainty about the reality of the effect. Therefore, there are amortisation charges, extraordinary amortisation charges and provisions. In the case of provisions for future charges, there may be a reversal of a provision if the charge is ultimately lower than predicted. Jacques Richard (2012) thus specifies that:

- If the depreciation of the environmental function is certain and systematic, it is an ordinary amortisation charge;
- If it is certain but episodic, it is an extraordinary amortisation charge
E.g. loss of nutrients from soil;
- If it is a possibility, it is a provision.

According to Jacques Richard: "Natural, non-renewable resources should be entered as liabilities at their replacement cost in terms of renewable energy. They would then be amortised as assets as the natural, non-renewable resources are extracted. The amortisation funds would then be used for investing in renewable energy sources."

This model takes account of amortisation issues in relation to the consumption of nature. This model also works in the case of the management of renewable resources. Taking the example of a farm that pollutes a river (green algae):

- A farmer carries out an assessment that reveals nitrate levels which are above the acceptable standards for maintaining soil functions;
- The cost of repairing the environmental functions by using a different method of farming (under-cropping) is €100,000;
- This cost of replacement (of one method by another) will be entered under liabilities (as natural capital to be conserved) and under assets (as a soil resource);
- It will lead to amortisation over the period during which balance is expected to be restored;
- In principle, no dividends will be distributed before the situation has been rectified.

Jacques Richard points out that this approach differs from the internalisation of externalities, as the aim is to ensure the *ex ante* consideration of the costs for the "avoidance" of damage. This is a preventive rather than curative approach. It allows for the consideration of the effects of nature conservation on the company's future activities and possibly on the other stakeholders' activities. However, this approach has certain limitations. We shall present three of them:

- It is difficult to incorporate the need to have a quantity but also a certain quality of inputs in order to produce and thus create added value. To incorporate this into the CARE method, we would need to redefine the characteristics of natural capital in quantitative and qualitative terms;
- There is no consideration of the positive and negative interactions among stakeholders, as the CARE model focuses on the relationship between a company and natural capital;
- There is no taking account of incentives to invest in biodiversity, which would amount to increasing the natural capital available for all stakeholders.

The CARE model remains highly instructive on the issue of damage prevention because it "does not wait for disasters or even a rise in temperatures to occur before recording a charge: it does so at the occurrence of an event that casts doubt on the subsequent capacity of the capital to operate". J. Richard, 2011.

2.2. Possible new accounting solutions

One of the questions that arises is: who pays for the maintenance of a service? Another is: should we continue to adopt a stock-oriented approach? It is indeed important to encourage companies to invest in biodiversity in order to create "natural potential". But who will finance it? And how is the value of this investment accounted for on the company's balance sheet and income statement? In an attempt to provide answers to these questions, we propose to investigate new approaches to the criteria of provisions, amortisation and investment.

2.2.1. Maintaining an ecosystem service

The situation that interests us here concerns an organisation that can now no longer benefit from an ecosystem service when it used to benefit from such a service free of charge. As long as the upstream stakeholders have uses that remain within the legal standards, the impacted organisation must compare the cost of inaction (replacement of the service) with the cost of helping the upstream stakeholders change their practices in order to maintain or restore the service from which the downstream organisation benefits. The following question arises: must we now pay for a service that used to be obtained free of charge, before its disappearance? Should we be compensated for a service from which we no longer benefit?

This is the example of the Vittel company, which witnessed a deterioration in the services that it was using to sell its mineral water, in terms of the nitrate and pesticide levels in its catchment basin. The levels remained compliant with the potability standard but their rate of increase raised fears that it would become impossible to maintain the company's mineral water bottling operations. Vittel thus needed to provide incentives for farmers and other interested parties (golf courses, regional authorities and the French state railway company – SNCF) to modify their practices in order to restore the services required by Vittel. The restoration option chosen by Vittel has local impacts on its business and that of the other stakeholders, in addition to global impacts (not currently accounted for). Vittel has purchased a large proportion of the farm lands, which have become company assets and helped the other parties to modify their practices.

The Vittel example is not an isolated case, as organisations often face uncertainties regarding the availability of a service that is used as an input. In accountancy, there are "coverage accounting systems to cover the risk components of inputs and outputs" (IFRS9). Consequently, there are provisions for the depreciation of raw materials that are in stock. This means that in the event of having to purchase a raw material of the same quality as one that is in stock, and which would cost less, the value of the stock would have to be depreciated. But how can this conception of provisions be adapted to provisions for losses of flows of free services?

An organisation can invest on its own behalf, so that it can benefit from a service in the future. This is a simple situation in which the company just needs to be aware of its own dependency. It can invest to make sure that other parties change practices (or in certain cases do not change practices) so that⁹⁴ it can continue to use services. We are not dealing with an "amortisation" approach, because it is possible for an organisation to be deprived of a service without the resilience of an ecosystem necessarily being affected. Likewise, machines used by others are rarely amortised. Organisations thus adopt a "risk management" approach, with the mobilisation of provisions for risks, which are quite numerous in accountancy. Companies need to be aware that the price of renewable natural resources does not reflect their value for organisations and the Earth's ecosystem as a whole. So what is the value of a resource that is used free of charge? First of all, the organisation must evaluate the cost of replacing the service, and then take account of the cost for the upstream company of adapting its development and practices to the downstream service needs. Finally, the downstream organisation must compare these miscellaneous costs with the participation of the service in the creation of added value for the organisation. In certain cases, however, a single service may be used downstream by several stakeholders. How can we manage a service that is used collectively and dependent on collective upstream use? This is the challenge for the future.

2.2.2. Investing in Biodiversity

At present, organisations have at least two reasons to invest in biodiversity: investing in response to a legal obligation, and investing in a voluntary manner in anticipation of future returns.

Investment in response to legal obligations.

The organisations studied here are developers that have to compensate (in a compulsory manner) for their development operations (e.g. land take and development of transport corridors: roads and railway lines). This compulsory compensation can be carried out directly by project managers, or by purchasing biodiversity units from suppliers (equivalent to "mitigation banking" in the USA). Developers can therefore apply to suppliers of compensation options (such as the French Caisse des Dépôt et Consignations Biodiversité [Biodiversity consignment and loan fund]). They can then implement compensation according to supply or demand. Compensation according to supply may prove to be more ecologically efficient as it will generally be carried out within an ecological continuity (green and blue belt networks), but it may also prove to be riskier if the supplier cannot sell all of its biodiversity units. Indeed, the existence of competition in the supply of compensation puts us in a competitive context, and if there are too many suppliers, there is a risk of a drop in the prices of biodiversity units. If they drop sufficiently, it will be detrimental to companies proposing a compensation offering based on the re-creation of ecosystems (more costly than simply purchasing and

⁹⁴ "Today, in financial and fiscal law, a company is not entitled make risk provisions without proof of a probable legal obligation or of a probable quasi-obligation to a third party." Jacques Richard, personal paper.

possibly restoring land). The compensation market according to supply then turns out to be less attractive than anticipated. On the other hand, if there are too many applicants, this could raise the prices of compensation units or biodiversity units, which might encourage certain firms to implement ex post impact avoidance or reduction activities whose cost could then prove to be prohibitive in relation to the anticipated benefits of the project. This raises the question of the definition of a biodiversity unit: does one hectare purchased to prevent its future destruction yield as many biodiversity units as one hectare purchased for the re-creation of a habitat, and whose cost is much higher. This is all the more important because these biodiversity credits are assets of the company (but at what "value" – price per unit on the market? Amount invested by the company to obtain a biodiversity unit?), and because selling at a lower price than the value of the biodiversity units on the asset side of the balance sheet would be damaging to the company, as would be the depreciation of financial assets⁹⁵. This reflects all the importance of the definition by the regulatory authorities of the meaning of a compensation obligation and a biodiversity unit. A definition leaving room for a wide range of interpretations can be given to the detriment of an ecologically effective compensation offering, in relation to the *no net loss* issues that have been recently imposed.

Investment in a voluntary supply of biodiversity units.

By restoring, rehabilitating or recreating ecosystems, whether ordinary or polluted ecosystems (industrial or urban wastelands). This raises questions such as investment in biodiversity, e.g. in phytoremediation. This tool is used for the prevention or removal of pollution. How can corporate financial accounting take account of these different options in order to make them more attractive, both for companies and for shareholders that have contributed a resource – financial capital – and on which they can expect a return, including in the form of an increase in the available natural capital thanks to the company's actions? Companies may invest in biodiversity for different purposes: to improve their image, for reasons associated with the ecosystem services that the company obtains from the ecosystems it wishes to develop, or for the services that others will obtain from its investment in biodiversity. In this last case, development and the subsequent compensation are directly incorporated into the strategy of the company which, on the liability side of its balance sheet, accounts for the fact that the destruction of an ecosystem and its associated services procured by humans may be harmful to the company itself in the future. This means that there is greater consideration of the dynamic interactions between the company and Nature. For example, biodiversity and climate change are related, because apart from the simple fact that humans speed up change (greenhouse gas emissions) through their actions, allowing biodiversity to decline (deforestation and land take) will accelerate the speed of climate change by reducing the planet's capacity to absorb greenhouse gases. This is the *lose-lose* model. Moreover, as emphasised by Trommetter and Leriche (2014): "reforestation for carbon storage will be all the more effective because it will be conducted with the aim of maintaining an adaptive potential for biodiversity".

In conclusion

The CARE approach makes taking account of natural capital a central concern of companies by compelling them to ensure its maintenance, both for their own use and for the uses of others, through its inclusion in their financial accounts. Therefore, there is clearly a conception of the maintenance of a "stock of natural capital" which is under pressure from uses and the capacity of this natural capital to regenerate (notion of resilience). This model suggests taking account of the "polluter pays" principle in company accounts. This approach forms part of a standard view of environmental issues, in which companies aim to minimise costs in order to attain a given environmental objective (Trommetter and Leriche, 2014). It should be remembered that Jacques Richard (2011) proposed amortising the consumption of non-renewable resources in order to finance the development of renewable energy (maintenance of an energy production capacity). The deliberations in progress are based on the concept of "natural capital" envisaged as a stock that must be optimally managed if it is to remain sufficient to meet the needs of future generations. However, as Jacques Weber put it: "We are no more able to predict the needs of future generations than people at the time of the French Revolution could imagine the advent of the computer, the mobile telephone or the Internet."

It is a question of inventing a system that allows for the consideration of these new constraints and gives companies incentives to invest in biodiversity. The idea is to show that a depreciation of natural capital, which is represented here by a depreciation of ecosystem services, accounted for as the assets (amortisations) and liabilities (provisions) of organisations, may be a cost factor in the same way as the depreciation of financial

⁹⁵ In accountancy, this corresponds to the question of the valuation of "actions" on company balance sheets: at the purchase price or at the market price? ...

assets. Consequently, as Jacques Weber stated: "It would be a good idea to send an urgent message to companies, reminding them that their business is more reliant on the living world than on finance and that it would be harder to rebuild nature than the financial system." Adopting an accountancy-based approach compels chief financial officers, and more generally, the managers of companies and public authorities, to assimilate the question of biodiversity. If biodiversity is perceived to be a source of both costs and benefits, this will involve the company's entire production chain. We need to set the target of maintaining an adaptive potential, i.e. of leaving the greatest possible choice for future generations. This point had already been made by Theodore Roosevelt (1908), who believed that we must take account of the fact that given the "constant rise in the population and the even faster increase in consumption, our people will need greater quantities of natural resources. If we, of this generation, destroy the resources (...) we degrade the standard of living or deprive the coming generations of their right to life on this continent".

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