Fondazione Eni Enrico Mattei

Policy Instruments for Creating Markets for Biodiversity: Certification and Ecolabeling

Paulo A.L.D. Nunes* and
Yohanes E. Riyanto**

NOTA DI LAVORO 72.2001

SEPTEMBER 2001

SUST – Sustainability Indicators and Environmental Evaluation

*Department of Spatial and Environment Economics,
Faculty of Economics Sciences,
Free University of Amsterdam
**SOM Research School, Department of Economics,
University of Groningen

Fondazione Eni Enrico Mattei
Corso Magenta, 63, 20123 Milano, tel. +39/02/52036934 – fax +39/02/52036946
E-mail: letter@feem.it
C.F. 97080600154

Policy Instruments For Creating Markets For Biodiversity: Certification And Ecolabeling

Submitted to the Journal of Economic Perspectives

March 2001

Paulo A.L.D. Nunes
Department of Spatial Economics
Free University Amsterdam
De Boelelaan 1105
1081 HV Amsterdam
The Netherlands
E-mail: pnunes@econ.vu.nl

Yohanes E. Riyanto
SOM Research School
Department of Economics (WSN 349)
University of Groningen
P.O. Box 800, 9700 AV Groningen
The Netherlands
E-mail: Y.E.Riyanto@eco.rug.nl

1. Introduction

Biodiversity provides a wide range of benefits to human activities. Since most human activities are priced in some way or other, the temptation exists in some decision contexts to downplay or ignore biodiversity benefits on the basis of non-existence of (market) prices for biodiversity. The simple (and simplistic) idea here is that the lack of prices is identical with the lack of values. This is not correct. Thus value signaling plays a crucial role when one decides to coup with market failure and pricing biodiversity externalities. If property rights were clearly defined, enforced, and traded, the essence of biodiversity externalities would be mitigated. Unfortunately, this is usually not the case. One way of addressing the market failure problem is a direct government intervention through the introduction of taxes and standards. The best-known price instrument for environmental policy is the optimal or Pigouvian tax, which incorporates marginal biodiversity external benefits. Standards, in turn, allow setting strict limits to the intensity or amount of human activities that affect biodiversity non-market benefits. Alternatively, one can come up with regulation policy instruments target at the creation and reinforcement of market mechanisms. Often, this approach is characterized by the generation and strengthening of demand for different hidden, non-market biodiversity benefits. The recent applications of ecolabeling in the organic food and electricity markets as well the forest's products certifications represent well-known examples of such a regulation practice.

This article presents a comprehensive view and discussion on certification and ecolabeling policy instruments for creating markets for biodiversity. The article starts with the identification and characterization of the range of biodiversity non-market benefits or externalities. Next, attention is focused on the evaluation of the public good nature of most of the biodiversity benefits and its impacts on the market failure. Alternative policy instruments for creating markets for biodiversity strategies are reviewed in Section 3. Section 4 provides a comprehensive view and a critical review on certification policy in the domain of biodiversity. General ideas will be made concrete with three certification examples as reported in Section 5. Section 6 discusses some caveats. Section 7 concludes.

2. Biodiversity economic value and market failure

2.1 A classification of biodiversity economic value

Biodiversity provides a wide range of benefits to human activities. The total economic value of biodiversity is classified into four categories of benefits (Nunes and van den Bergh 2001, Nunes *et al.* 2001). These are illustrated in Figure 1. A first category, denoted by link 1 6, depicts biodiversity benefits in terms of ecosystem resilience by the protection of ecosystem life support functions over a range of environmental conditions. This value category includes benefits in terms of functions that regulate the climate, the genetic balance, the provision of water supply and clean air, flood control, waste absorption, recycling of nutrients, conservation of soils, carbon storage, and pollination of crops.

A second category, denoted by link 1 4 5, captures the value of biodiversity in terms of supply of ecosystem space or natural habitat protection. This includes the benefits provided with taking for *in-situ* conservation measures such as the establishment of systems of protected areas.

A third category, denoted by link 2 5, captures the benefits conferred to society in terms of an overall diversity provision of biological resources, notably specific animal and species for use in agriculture and medicine. Examples of such services include valuable foods and goods as fish, timber, pharmaceuticals chemicals, and flowers.

A fourth category, captured by link 3, refers to the direct impact of biodiversity on human welfare. The economic value of biodiversity is then measured in terms of the philanthropic considerations, independently of biodiversity use or consumption (e.g., species existence value).

Most of these biodiversity benefits have a public good character – showing either non-rivalry in the consumption, or non-exclusivity – for which no market price is available (see Biller 2001). Since most human activities are priced in some way or other, the temptation exists in some decision contexts to downplay or ignore biodiversity benefits on the basis of non-existence of (market) prices for biodiversity. The simple (and simplistic) idea here is that the lack of prices is identical with the lack of values. This is not correct. Thus value signaling plays a crucial role when one decides in favor of proper

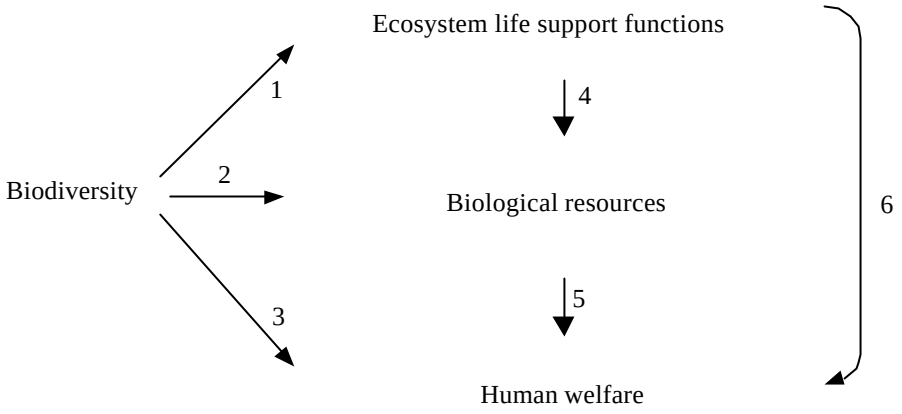

Figure 1: Economic values of biodiversity

Source: Nunes and van den Bergh (2001)

biodiversity pricing, i.e. when deciding to address market failure and pricing biodiversity externalities. Pricing such biodiversity benefits requires the use of special valuation tools. These are discussed in the following section.

2.2 Alternative biodiversity valuation methods and their applicability

On the basis of the process by which valuation methods retrieve individuals' preferences one can distinguish two groups of valuation methods: revealed and stated preference methods (Braden and Kolstad 1991, Garrod and Willis 1999). Revealed preference methods use existing market data to retrieve individuals' preferences for biodiversity benefits whereas stated preference methods are based on collecting data by means of questionnaires (Carson *et al.* 1992, NOAA 1993, Nunes 2000). The latter are often supported by multidisciplinary research teams in order to describe and present accurately the environmental good under consideration.

The group of revealed preference valuation methods consists of four methods: the travel cost (TC), the hedonic price (HP), the averting behavior (AB), and the production function (PF). These methods play also a crucial role to assess the monetary value of the above mentioned value categories of biodiversity.

Table 1: Total economic value of biodiversity

Value category (as illustrated in Figure1)	Interpretation	Examples:
1 6	Ecosystem diversity Functional diversity	Flood control, groundwater recharge, nutrient removal, and toxic retention.
	Methods for monetary valuation and their applicability	
	CV: - TC: - HP: + AB: + PF: +	
1 4 5	Natural habitat diversity	Protection of wildlife in their natural habitat and natural areas related to high tourism and outdoor recreational demand
	Methods for monetary valuation and their applicability	
	CV: + TC: + (recreation) HP: - AB: - PF: +	
2 5	Species diversity	The impact of biological resources as inputs to the production processes of pharmaceutical (bioprospecting) and agriculture industries (AnGR)
	Methods for monetary valuation and their applicability	
	CV: + TC: + HP: + AB: + PF: +	
3	Nonuse values	Moral or ethical satisfaction that biodiversity is kept protect in Nature, independently of human use
	Methods for monetary valuation and their applicability	
	CV: + TC: - HP: - AB: - PF: -	

Source: Nunes and van den Bergh (2001)

One should not, however, consider these tools with an universal application for all valuation questions related to biodiversity. According to the specific nature of each valuation tool, one can indicate that certain valuation methods are more appropriated than others according to the various value categories of biodiversity, see Table 1. For example, when using the travel cost method, researchers estimate the economic value of biodiversity values, such as fishing recreational benefits, by looking at the generalized travel costs of visiting a natural site where one can fish. Alternatively, when using the hedonic price method to estimate the economic value of a biodiversity benefits in terms of CO_2 storage by the analysis of house market prices and the surrounding air quality characteristics. In addition, researchers can estimate the economic value of clean air on

the basis of expenditures made to avert or mitigate the adverse effects of air pollution. Finally, the economic value of biodiversity benefits in terms of CO_2 storage can be assessed through a cost or production function. The first approach focuses on the replacement costs to substitute for the loss of air quality benefits. The second uses a demand and supply model and, depending on the size of the air quality change, assesses a welfare measure is terms of "revenue changes" (output change evaluated at fixed output prices) or "profit changes" (evaluated at the new input mix and fixed prices). If the change in the environmental input is so large that it influences the price of the output, then "producer and consumer surplus changes" should be taken into account.

Valuation of the biodiversity benefits is, however, only part of the problem when dealing with market failure. It is equally important to identify possible government, and other institutional, intervention strategies in order to develop decision rules or protocols designed to internalize the biodiversity non-market benefits (or externalities) and thus be able to achieve an effective and broadly accepted management of biodiversity. These issues will be discusses in the following sections.

3. Alternative strategies for government' involvement in biodiversity policy design

3.1 Direct government intervention: taxes and standards policies

One way of addressing market failure is direct government intervention. This involves the introduction of taxes or standards in the markets. The best known price instrument is the optimal or Pigouvian tax, which is equal to the marginal external costs in the optimal equilibrium. Such a tax restores a situation with biodiversity externalities to a social optimum. Such policy requires, however, an important amount of accurate information concerning the general public's map of preferences of with respect to biodiversity nonmarket benefits. Such information plays a crucial role for the design of an effective tax system. Thus government needs to conduct a thorough research on the assessment of the economic value of biodiversity nonmarket benefits. This is a fairly costly activity.

Standards, also known in the literature as command-and-control system, are especially attractive from the perspective of effectiveness. This is because the government directly dictates a clear quantity target (restriction) that has to be followed by market participants.

An example of this type of policy is the air pollution permits. Here the government restricts the amount of polluting substances that the firm may emit. Another example of the command-and-control policy system is the setting of a limited number of visitors to certain sensitive nature areas, or to the amount of animal species caught (hunting, fishing), and to land use across different economic activities. However, adopting command-and-control policy also implies embracing high monitoring and enforcement costs. For instance, in the case of emission permit, the government has to determine the acceptable threshold level of emission. In addition, the government may have to set-up a regulatory body, which monitors the amount of emissions that a particular firm has emitted and enforce punishment to a violator. In a world of asymmetric information, in which firms may have an incentive to conceal the true information, it is unavoidable that the government should intensely monitor firms' conduct. Environmental auditing could be an example of such an intense monitoring activity.

From an economic point of view the discussion and evaluation of these two instruments of environmental policy is traditionally done on the basis of their efficiency features (Baumol and Oates 1988). Effectiveness and distribution effects, such as equity and fairness, often work as secondary policy evaluation criteria. The most common comparison is between uniform standards and uniform taxes. Taxes on visits to parks, for example, are attractive as they provide better incentives than standards to change individuals' behavior, say recreationists, when visiting natural areas, and thus fulfill more efficient outcomes, meaning that either social welfare is maximal. Furthermore, the establishment of a fixed number of park's visits does not benefit from any democratic appealing, which reveals to be a crucial factor for a long-term success of a government intervention.

As is mentioned before, there are some factors that hinder the effectiveness of direct government involvement. It involves huge administrative costs, because the government may have to establish a monitoring and enforcement agency. It may also not be effective if the flow of information is not smooth. Such a policy requires high amounts of accurate information, and in the presence of information imperfection an accurate and a smooth flow of information may not be available. Finally, such policies may create bureaucratic inefficiency. Bureaucrats may pursue rents and prone to influence and lobbying activities

by market participants (see Milgrom 1988). Even if the rent-seeking behavior is absent, such a direct involvement may instead create disincentive for market participants to innovate or to employ the most efficient method of production. In such a context, policy instruments based on market creation mechanisms reveal to be a valid alternative to command-and-control policies. These are discussed in the following section.

3.2 Market creation mechanism: information provision policies

Certification or ecolabeling refers to act of provision of information to the consumer that a product, or product characteristics, is environmentally friendly relative to other products in the same category. The overall objective is to link the consumers who wish to favor more environmentally or socially responsible sounding products with the producers of these products and the raw materials and processes from which they are made, creating a separated market for these differentiated products. This involves several assumptions, including (a) similar products can be differentiated according to their environmental or social attributes; (b) producer behavior can be influenced by market signals based on environmental or social concerns; (c) the premium generated through differentiation will provide sufficient economic incentive for producers to adopt improved management practices, and (d) market efficiency and competitiveness will increase by internalizing environmental or social concerns.

In practice the provision of information work under one of two basic conceptual frameworks. On one hand, there is the scheme of evaluation of a product or practice against particular specifications. The idea here is to measure and confront specific characteristics attributed to the product's origins to specific ecological, social and economic specifications, in other words ecolabeling. On the other hand, there is the evaluation of the potential management system to produce a desired outcome, based on the ability to manage in an environmentally sound and sustained manner, i.e. certification. Assessing the integrity involves an evaluation of management practices judged against defined standards, generally fixed at the management unit level. In either case, a credible scheme must evaluate the integrity of the producer's claim, the authenticity of product origin. Furthermore, it needs to be seen to be objective and impartial. Finally, the assessment of the authenticity of the product's origin involves the

identification and monitoring of the supply chain, including raw material's transport and processing, secondary manufacturing and, finally, retail distribution. Therefore, the success of certification and ecolabeling strategy *per se* may prove to be a difficult to achieve. For such a reason, this strategy often goes hand-in-hand with other micro-economic policies, giving rise to *mixed policies*. These are discussed in the next section.

3.3 Mixed policy

The core of this policy lies in the combination of the command-and-control policy (direct government involvement) and market mechanisms. The goal of this policy is to circumvent the weaknesses and inefficiencies that may occur when adopting either the command-and-control policy or the market mechanism approach. We will make the use of two examples so as to explain this policy strategy. The first example is taken from the electricity sector, namely the *green certificate mechanism*, and the second one is the well-known *tradable emission-permit*.

The green certificate system, like the command-and-control strategy, is based on a centrally determined target. In addition, in the green certificate system the market provides an incentive for the market participants to adopt a cost-efficient behavior (see Nielsen and Jeppesen 2000).[1] More precisely, the green certificate system requires consumers to purchase a fixed share of electricity based on renewable energy sources. An electricity producer, provided that it generates a specified amount of electricity from renewable resources, is awarded a certificate, i.e. a "green certificate". Thus, the number of certificates that a producer obtains depends on the amount of renewable electricity production. When a consumer buys electricity from this producer, she can obtain these certificates, which then can be used as a proof of compliance with the government regulation.[2] Thus, this regulation put restriction on the demand side of the consumers rather than on the production side. The production of the renewable electricity will, in turn, adjust to the consumption quota of consumers. It is expected that this green

[1] We will discuss in more detail the use of green certificate in the electricity sector in Section 5.3.

[2] In the presence of many small consumers who purchase the electricity below the amount specified to obtain a green certificate, the producer may purchase certificates on behalf of those small consumers.

certificate system could enhance a cost-efficient method of renewable electricity production, thus will sustain biodiversity policy and protect the environment.

The tradable emission-permit has a similar flavor as the green certificate system. A certificate, which is commonly known as emission-reduction credit is issued to a market participant if she decides to reduce emission below the threshold level allowed by the regulatory body. It has two features: a ceiling is set on all disturbances by distributing a finite amount of permits; and permits are tradable. The first feature makes sure that the total (e.g., national, regional) level of disturbances is limited from above. This threshold level is reminiscent to the command and control system. The second feature assures flexibility and efficiency (cost-effectiveness) at the level of individual agents, and leads to equal costs (the equilibrium permit price) of disturbance reduction at the margin among all individuals and firms. This is because the certified emission reduction credits can be sold to another participant who needs to satisfy the threshold level of emission. Such a trade possibility enhances agents' incentive to conform to the environmental standard. So far, this instrument has been widely applied to controlling air pollution in the United States, although it has not yet led to applications in the area of land use, nature conservation and biodiversity protection.

4. Biodiversity certification and ecolabeling policies

4.1 Introduction

In this section we explain the details of the certification and ecolabeling policies of biodiversity and how its role can be combined with the common and control policy to achieve higher effectiveness. In principle, the difference between the two is quite obvious. A certification policy is directed to induce an endogenous role of market mechanism to sustain biodiversity. The government does not directly involved in the process. However, it has a crucial role in providing a favorable environment that helps in enhancing the effectiveness of certification and ecolabeling policies. On the contrary, in the command and control policy, the government directly influences the conduct of certification and ecolabeling policies by imposing either a requirement for producers to produce the environmentally sound products or for consumers to buy such products.

4.2 Certification as an information provision instrument

Certification is an integral part of a policy directed to the use of market mechanisms, without a direct government involvement in the supply and demand forces. This seems to be quite logical, as it is obvious that the proper working of market crucially depends on the flow of information, and that certification serves as an information provision instrument.

In his seminal article, Akerlof (1970) has shown that indeed the presence of informational problem could lead to market failure.[3] The existence of market failure may be used as a justification for the government intervention. However, this creates a contradiction. On the one hand the government wants to stimulate the use of market mechanism and thus to avoid any direct government intervention, but on the other hand the informational problem requires the government to get involved. This is where the fundamental role of certification comes in. The use of certification can relax the above trade-off. Thus, *a certification only matters when there is an informational problem*.

This section critically analyzes the role of certification as an information provision instrument. To begin with, let us present a diagram (see Figure 2) summarizing our comprehensive view on the basic foundations that underpin the design of a certification and ecolabeling policy.

As we have seen, the goal of biodiversity certification policy is to inform consumers that a product has been processed in an environmentally sound production or method. Thus, in making their purchasing decision, consumers will be exposed to a choice between buying environmentally and non-environmentally friendly products. If in fact, some consumers prefer to buy the former, then the policy maker can effectively "segment the market". A new market-niche, i.e. the market for the environmentally clean product, will then emerge. To sustain the biodiversity policy, the policy maker should enhance the role of this new market-niche.

[3] He analyzed a specific type of informational problem, i.e. hidden information (adverse selection). In the literature we distinguish two types of informational problem, i.e. hidden information (hidden information) and hidden action (moral hazard) problem. Hidden information refers to the pre-contractual problem, in which one party knows more about her true type than the other party before the contract is signed. Hidden action refers to the post-contractual problem in which one party knows more about her type (effort) after the contract is signed.

The crucial questions to ask here are; to what extent the certification and ecolabeling policies would be successful for creating markets for biodiversity? Would an emerging segment-of-market where biodiversity benefits are internalized in the respective market price be, in fact, an effective tool to improve the biodiversity friendly practices and, thereby, achieve a better allocation of such a scarce resource? Should other policy measures be complemented with this policy?

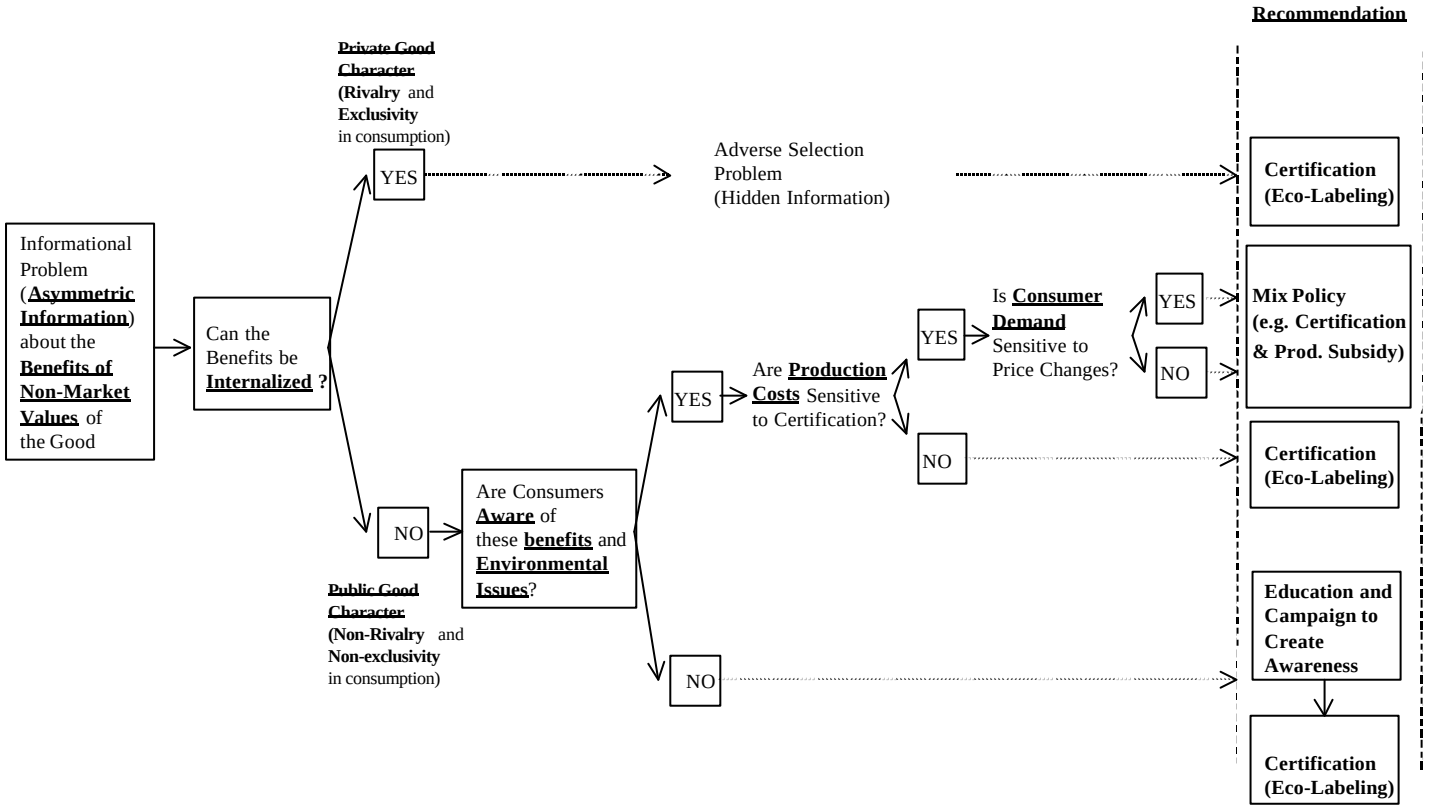

Figure 2: A Comprehensive View on Certification and Ecolabeling Policies

Our starting point in answering those questions is the identification of the market and non-market values of the environmentally friendly good. What we mean by the non-market values are the net marginal social-benefits of consuming the good that largely accrue to society at large and are not explicitly considered by the producers in their

strategic decision-making, including the benefits climate regulation, provision of water supply and clean air, conservation of soils, and carbon storage. The answers to these questions are discussed in detail the following sections.

4.3 Market and non-market benefits of biodiversity

Market values refer to the benefits that are directly related to the use or to the consumption of the goods under consideration and are taken into account in the price determination. The participation of consumer in markets for these differentiated, eco-friendly products usually permits immediately the internalization of the market values. If consumers internalize the non-market benefits of biodiversity, they are willing to pay for these benefits.[4] Then the question is: can consumers, who purchase the environmentally friendly good, internalize the non-market benefits of the good? If the answer to this question is yes, we can then categorize the good as a *private good*. Otherwise, the good is categorized as a *public good*.

An organic vegetable product, i.e. a vegetable product that is planted without chemical fertilizers, could be an example of a private good. Consumers believe that there is a difference in taste between an organic and a non-organic vegetable. It is often argued that the organic vegetable tastes better than the non-organic one. Furthermore, consumers are also relatively able to distinguish the two products by looking at their appearance. They also perceive that the organic product is healthier than the non-organic one. Hence in this case, consumers are able to internalize the benefits of consuming the good. They can experience the satisfaction obtained from consuming the good.[5]

Nonetheless, it does not mean that in this situation consumers will not face any informational problem anymore. The problem remains, as consumers are lacking perfect knowledge of the quality standard of the organic vegetable. A quality standard certification can be helpful in providing assurance to consumers. Here, the role of certification is simple. It acts as an instrument to resolve the standard hidden information

[4] The Environmental Protection Agency (EPA 1993) reported that "several surveys indicate that a majority of Americans consider themselves to be environmentalists and would prefer to buy products with a lessened environmental impact when the quality and costs are comparable".

[5] Van Ravenswaay (1995 and 1996) indeed shows that organic products exhibit a high consumer awareness of the environment and private benefits of these products.

problem. The market is also accommodative here, in the sense that if there are enough consumers who want to buy the organic vegetable, then some producers will enter the segment. They have the proper incentive to do so. They also have interest to use certification to try to differentiate themselves from the other producers.

Things become more complicated when the good is a public good, in the sense that the biodiversity benefits of consuming the good are experienced by the society at large, which may include those who do not purchase the good. Two examples of such good are 'green' electricity and 'green' forest products. Let us take the case of electricity. Everybody will gain social benefits from having electricity that is produced using renewable sources. However, nobody can internalized the benefits and exclude anybody else from enjoying the benefits. Furthermore, the nature of the 'green' electricity product cannot be really distinguished from the 'non-renewable' electricity one. Borrowing from the language of Industrial Organization theory, the electricity product is a homogeneous product. The same case applies for the green forest products, for instance plywood. Nobody can really distinguish the 'green' plywood from the 'non-environmentally friendly' plywood by just inspecting the two products.

It is therefore harder to design a certification policy here than in the previous case of private good. Our diagram shows three important components that determine the success of the certification policy in the case of public good. The first one is the *consumers' awareness* of the environmental issues and the social benefits of having a clean environment.

4.4 Consumers' awareness

Consumers' awareness is the necessary condition, however to be sufficient it should be coupled with their willingness to take into account the social benefits in their consumption behavior. Of course there will be no willingness when consumers are not aware at all about the environmental issues.

If consumers have no awareness, then there is a crucial and urgent action that has to be taken before the policy makers can launch the certification policy. Consumer awareness may take many years to develop (see van Ravenswaay and Blend 1997). Hence, the policy makers should launch extensive information campaigns, target at the general

public, as well as initiate formal education programs about the values and the benefits of having a clean, and biodiversity friendly environment. Let's imagine a country or a society in which the public is not at all aware about the need to sustain biodiversity and to protect the environment. In such a society, there is no use of implementing a certification policy, because it is doomed to fail (see a study done by Salim *et al.* 1997). Once there is sufficient consumer awareness about the need of a biodiversity friendly environment, then there will be a willingness to pay for a price premium for ecolabeled or certified product respects.

The next point to consider does not refer to the demand side but rather to the supply side. It refers to the *production costs* with respect to the adoption of certification schemes.

4.5 Firms' incentive to endorse certification and ecolabeling policies

If production costs are not sensitive to the certification, then producers may have sufficient incentive to accommodate the certification policy. However, in most of the cases the adoption of certification and ecolabeling policies will increase firm's production costs because producers may have to install a new production technology or that they may have to avail themselves to certain kind of inputs in order to satisfy the environmental standards that are stipulated in the product 'green' label - see van Ravenswaay and Blend (1997) for more details. Therefore, adopting certification implies higher production costs, which force them to increase the price. This, in turn, will damage the firm's market competitiveness. Furthermore, under a certain conditions of *the elasticity of consumer demand*, an increase in price means a reduction in the firm's profits. Hence, hardly any producer would like to be active in this new market segment, i.e. embrace markets for the environmentally friendly certified products. In other words, there are simply not enough incentives for the market mechanism to work.

In such a setting, the policy makers need to complement (or combine) certification policy instruments with other micro-economic policies aimed at providing enough incentive for producers to adopt certification. Examples of such mix policies are for instance; input subsidy, technical assistance provision, R&D subsidy, see Figure 2.

It is worth noting as well that even if production costs are not sensitive to the certification, it does not mean that a certification policy is always advisable. Under certain conditions, as shown by Dosi and Moretto (1998), a certification or ecolabeling requirement could also stimulate investment in the production technology of the conventional product.[6] This in turn may lead to an increase in the output of the conventional product, and thus making the certification policy misses its goal in stimulating biodiversity friendly management practices. If this prevails, then the certification should again be complemented with other policies. Dosi and Moretto (1998) propose a restriction (rationing), i.e. awarding certificates and ecolabels only to some firms that meet certain criteria. Finally, the last crucial aspect behind the success of a certification policy is the *nature of the consumer demand*.

4.6 Sensitivity of consumer demand to production costs

As is mentioned before, under a certain conditions of the elasticity of consumer demand, an increase in price means a reduction in profits. This elasticity depends on the consumers' awareness of environmental issues. The degree of consumer awareness with respect environmental protection, in general, and biodiversity friendly products, in particular, is different across with countries with different socio-economic status. For instance, one would agree that in the developing countries the degree of consumer awareness tends to be lower than in the developed countries. If the trend is such that consumers tend to become more environmentalists, which is the current trend in some major European Union countries, then they might be willing to pay more for the biodiversity friendly products.

On the contrary, consumers in the developing countries tend not to have a high willingness to pay for the environmentally friendly products. If consumers are not willing to pay premium for the certified products while at the same time the introduction of ecolabel or certification scheme boosts the production costs, then producers' profits will inevitably decrease. Without any further developments, the certification scheme would be predestined to fail. Therefore, the success of the certification scheme calls for need to

[6] They show that "marketing complementarities" between different production lines could not only encourage environmental innovation but also conventional innovation on the existing product.

combine such certification with other policy strategies, i.e. pursue a *mix policy*. For instance the policy makers can launch a certification and an environmental campaign at the same time. NGO's could be encouraged to disseminate information that may trigger consumer awareness. In particular, the design of ecolabels and certificates is important. It should be clear to consumers as to what benefits they can obtain from buying ecolabel products.

Finally, whenever consumers are aware and willing to pay a price premium, *and* the production costs are not too sensitive to the certification schemes, then certification policy can be sustained as an instrument for creating markets for biodiversity. Nevertheless, policy makers should still be concerned with the possibility of "benefit spillover" to the non-environmentally friendly products. Mattoo and Singh (1994) argue that such benefit spillover may indeed prevail, showing that the product differentiation created by certification could, under certain conditions, lead to an increase in sales of both environmentally friendly and non-environmentally friendly product. As a result, the certification policy fails to achieve its goal, i.e. to gradually promote the market share of the environmentally friendly product.

4.7 General remarks on certification and ecolabeling policy

The distinguishing aspects of certification and ecolabeling policy can be summarized in Figure 3. The dashed-lines indicate that the government does not directly interfere in the market for biodiversity. Instead, it helps creating a favorable environment. For example by extending input subsidy for producers to induce them to endorse certification policy (see Section 4.5), launching facilitating policies such as extensive campaign, education to increase consumers' awareness of biodiversity benefits (see Section 4.4), and subsidizing the 'green' products to ease the burden of consumers (see Section 4.6). The effectiveness of this indirect government policy in inducing the proper working of the market mechanism depends on the nature of the biodiversity products. We argue that a pure certification policy tends to work well for *private goods* in which consumers can internalize the benefits of consuming them (see discussion in Section 4.3).

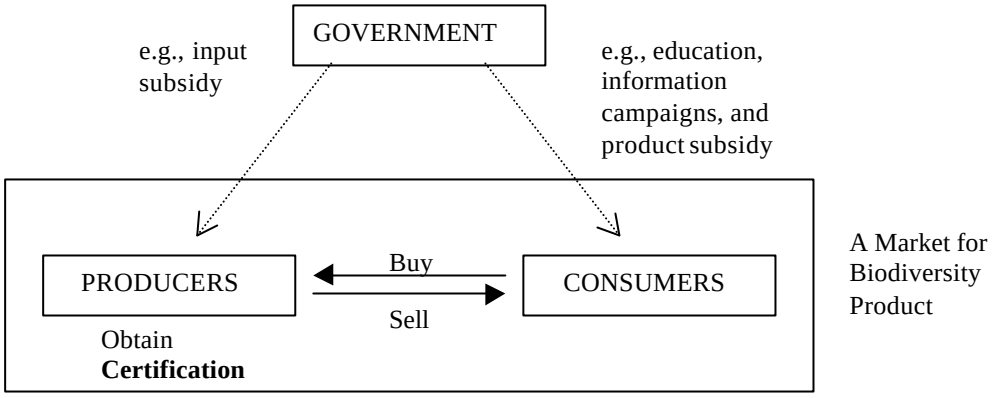

Figure 3: Certification and ecolabeling policy

Otherwise, if the products possess *public good* character, then a complementary policy that combines certification and ecolabeling policy and a certain degree of direct government involvement (e.g. a command and control policy) may be needed. In the following sub-section, we position command and control policy in the context of certification and ecolabeling policy.

4.8. Command-control policy within certification and ecolabeling framework

As mentioned in Section 3.3, the government can impose certain restrictions to producers and consumers. For instance the government can require producers to produce a certain amount of biodiversity products and in exchange producers obtain a certificate of compliance. The government can, at the same time, force consumers to consume these biodiversity products. Thus, rather than facilitating the working of market mechanism to sustain the certification and ecolabeling policy, the government directly obliges producers and consumers to embrace the certification and ecolabeling policy. Figure 4 summarizes the idea. For example, let us admit a scheme where the number of certificates that can be issued by a seller depends on the quantity of the environmentally friendly good that the he produces. Therefore, the two markets co-exist, i.e. the market for the product itself and the green-certificate market. If the demand for the green certificate exceeds the supply of the green certificate, then producers will be motivated to generate more green certificates to satisfy the demand.

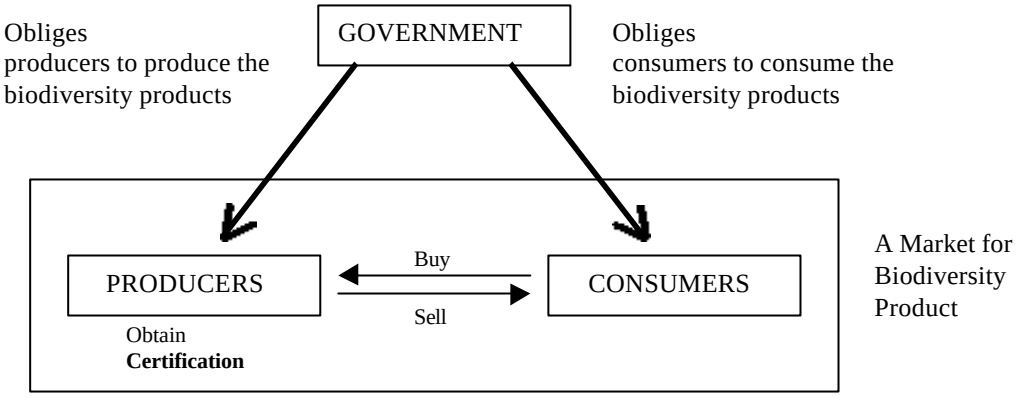

Figure 4: Command and Control policy

The number of green certificates that can be issued by a seller depends on the quantity of the environmentally friendly good that the seller produces. Therefore, the two markets co-exist, i.e. the market for the product itself and the green-certificate market. If the demand for the green certificate exceeds the supply of the green certificate, then producers will be motivated to generate more green certificates to satisfy the demand. This implies that there should be more production of the environmentally friendly good. The revenue generated from trading green certificates compensates the increase in production costs. Of course, one crucial aspect to take into account here is the determination of the "settlement" price for the green certificates. It should be set lower than or equal to the reservation value of the consumers. The magnitude of this reservation value reflects the highest premium that consumers are willing to pay for the environmentally friendly good. In order to move away from the general level of discussion, an example is presented in which, the aspects raised in Sections 4.2 till 4.8 come together.

5. Certification and ecolabeling policy instruments: case studies

5.1. Introduction

In the current section, we present and submit to discussion some case studies related to certification and ecolabeling as policy instruments for creating markets for biodiversity.

By no means the role of the case studies is exhaustive. Our purpose here is to draw some lessons of experience from the current practices of certification policy.

5.2. Organic food and labeling in the Netherlands market[7]

The European Common Agriculture Policy aims at, *inter alia*, the reduction of the environmental impact of agriculture, reinforcing the path towards sustainable development practices, such as organic farming and integrate crop management. In the last decade all European countries have shown a growth of organic acreage and the number of organic farms. There are, however, considerable variations in such figures between the different European countries. In simple terms, four groups of countries can be distinguished: a) booming countries (Denmark, Finland and Italy); b) stabilizing countries (Austria, Germany and Sweden); c) countries with high potential (Greece, Ireland, Norway, Portugal and Spain), and d) countries lagging behind (Belgium, France, Luxembourg, the Netherlands and UK). Such differences are associated to a wide range of factors such as the diversity of national labor markets, the variation in consumer awareness with respect to ecological issues, the distinct direct government interventions in the market's supply and demand forces, and the various labeling and certification strategies for the markets of organic products. The later implies the use of clear and accurate information on the organic status of the product.[8]

In the Netherlands, for example, it has been suggested that the intensive capital nature of the Dutch agriculture, the relatively late entry into force of the government support system for organic farming conversion, and the diversity, fragmented and often not clear certification schemes for organic products played an important role in explaining why the Netherlands is one of the countries lagging in organic food production. As a matter of fact, the capacity to distinguish organic products is very important for creating markets

[7] This section is drawn from van der Grijp and den Hond (1999) and van Bellegem *et al.* (1999).

[8] For example, when the full standards requirements have been fulfilled, i.e. at least 95% of the ingredients are of certified organic nature, products may be labeled as "certified organic". Alternatively, where less than 95% but not less than 70% of the ingredients are of certified organic origin, products will be called "made with organic ingredients" with a clear statement of the proportion of the organic ingredients. Finally, where less than 70% of the ingredients are of certified organic origin, such a product may not be called "organic" (IFOAM 2000).

for biodiversity. From the global point of view there are, however, too many logos. They should be further standardized. Another obstacle for the creation of markets for biodiversity is the fact that in the Netherlands most agriculture products are sold loose or are only packed late in the commercial chain. Take, for example, fruit and meat products. For the creation of an efficient market it is desirable, that a reliable chain of products is established. This can be achieved by individual, separate sales firms for organic products (organic butchers and health food stores) and by a clear, uniform and transparent labeling system under the principles and guidelines of an accredited, independent third party authority, which is responsible for assess the different food retailers (e.g. supermarkets such as the *Albert Heijn*) efforts to separate product streams so as to create a distinguishable product for the consumer. Furthermore, the odds for achieving a successful organic market creation will increase when such clear, uniform and transparent labeling system goes hand-in-hand with fiscal and environmental micro-economic policies, which are found to be particularly popular with investors (e.g. contract loans at reduced interest rates). Again, a very precise definition of the criteria used to define "green" practices reveals to be essential.

5.3. Energy market and certification: the Dutch green-label system[9]

In the Netherlands, a system similar to the green certificate system was introduced starting from the 1st January 1998. The aim of the system was to increase the Dutch consumption of renewable energy to 10% of the total energy consumption by 2020, and also to induce producers to increase the production of the renewable energy products.[10] There are two phases of implementation. In the first phase, the sale of the green labels to consumers is based on the voluntary purchase at a premium price. In the second phase, which starts from the year 2001, the sale will be determined by minimum quota of renewable energy consumption.

In this system, renewable energy producers receive a green label for each 10,000 kWh of renewable electricity they produce, which is valid for one year. Thus, there is no

[9] This section is drawn from Nielsen and Jeppesen (2000).

[10] The production of renewable energy is costlier than the production of non-renewable energy, hence increasing the production of renewable energy implies increasing production cots for the producers.

possibility of inter-temporal fulfillment of the quota. The renewable electricity is sold at the same market as the non-renewable one. Thus, their price is the same. To compensate producers for keeping the selling price constant despite the increase in the production costs, they are allowed to collect the proceeds from selling the green-labels to consumers/ distributors. As the system was just started recently, it is hard to evaluate its performance. Thus, it remains to be seen how successful the system will be in inducing production and investment in renewable energy products. Nevertheless, it should be admitted that the design of the system is quite ingenious. It *limits* the direct role of the government, and allows the market mechanism to contribute in achieving the biodiversity goals. Furthermore, it will be less costly for the government, as the government can then reduce the government spending on input and R&D subsidy.

Nevertheless, there are two main obstacles for the proper working of the system, namely the credibility of the system and the determination of the price ceiling for the green-labels. The government should ensure that those who break the rule be sufficiently punished. Thus for instance, if consumers and distributors cannot fulfill the quota, then they are required to pay a non-compliance fee or to buy green-labels at a higher price.

The price ceiling, i.e. the highest price consumers are willing to pay for the green-labels, is easier to be determined if the government knows consumers' reservation value for the green-labels. Unfortunately, this reservation value is private information of consumers. If it is set too low, then there will not be enough incentive for producers to invest in renewable energy products. However, if it is set too high, consumers will find it not individually rational to engage in the green-label market, and if they are required to purchase the green labels anyway, then consumers will be worse off.

5.4. Timber market and certification: the Indonesian setting[11]

Timber certification is a process that results in a written statement attesting to the origin of wood raw material, its status and qualifications. Timber certification typically includes two main components: (a) certification of sustainability of forest management system, and (b) timber product certification. Certification of forest management system covers

[11] This section is drawn from Salim *et al.* 1997.

forest inventory, management planning, harvesting, road construction and other related activities, as well as the environmental, economic and social aspects of forest activities. Alternatively, timber certification can also be used to validate any type of environmental claim made by the producer, or to provide objectively stated facts about the market system, the timber products and its forest of origin, which normally are not disclosed by the producer or manufacturer (Barron 1994, Baharuddin 2001). The main focus of timber certification policy has been on the standard of management of forests as well as on broader environmental credentials. The later include certification of environmental process-related issues such as plant pollution conditions, energy use, transport, disposal methods, etc. This point reveals to be of crucial importance to the pulp and paper industry, which represents a significant revenue share within the timber industry activities. For example, the content of re-cycled or wastepaper used or the processes used to manufacture the product (e.g. whether the product is chlorine-free) are of interest. Furthermore, regulations are increasingly being introduced for packing and packaging, specifying the type of material that may be used, re-used and recycling materials as well as systems of recovery or return that must be followed (Bourke 2000a, b).

In the international context, two different schemes of timber certification emerge. On the hand there are the principles, guidelines and criteria for accreditation set by the Forest Stewardship Council (FSC) system (e.g. SGS Qualifor, SCS, Rainforest Alliance, Soil Association). On the other hand there is the International Organization for Standardization (ISO) system and its 1400 series standards relating to environmental management tools and systems to measure a company's practices. There is a consensus that these schemes complement one each other. However, FCS is largely supported by NGOs whereas ISO accreditation is perceived to be heavily influenced by the industrialist lobby. The FSC has recently reported that about 17,7 million ha have been certified by FSC-accredited certifies (FSC 2000). This represents about 0,5 percent of the world's forest area. Little of this is referred to the tropical area. As a matter of fact, about 86 percent of the area certified is in a temperate countries, largely Europe and North America. In addition, a new European certification process, the Pan-European Forest Certification Framework has been launched with governing bodies established in countries like Austria, Belgium, Czech Republic, France, Finland, Ireland, Norway,

Portugal, Spain, Sweden and Switzerland. In addition Southeast Asian countries[12] have established a national set of criteria for the auditing of forest management on logging concessions, as well as the ecolabeling of products of those concessions at the light of the International Tropical Timber Organization guidelines. For the sake of its rich experience, let us discuss in more detail the experience of Indonesian timber market and certification.

Indonesia has assisted to a rapid growth of the forestry sector, representing US $ 2 billions in earnings during the 80s and US $ 9 billions in 1994. Such a growth rate put the Indonesian forests under considerable pressure. Recognizing the pressing problems, the Ministry of Forestry took several measures, including the initiative to create a an Ecolabeling Working Group. Such a task force played a crucial in the design of a set of criteria and indicators of sustainable forest management and in the establishment of the Indonesian Ecolabeling Institute, a consultative, objective and independent third party authority designed to allow producers to confront their management practices against standards and to demonstrate compliance with those standards. Today, and almost decade of timber certification, the balance shows that certified timber has only exerting pressure on specific products, the niche markets. A commodity such as plywood, representing seventy percent of all Indonesia's forestry exports, has received very little eco-market pressure. This fact has been justified by the concern of forest managers and forest stakeholders who often assume that certification programs create obstacles to the trade since the firm's additional costs will damage its position in international competition ranking. In addition, the demand for certified timber revealed to be strongest in eco-sensitive countries such as Germany and the Netherlands and virtually non-existent in countries such as Japan and Korea. The latter constitute the main commercial partners of Indonesian forestry products, leaving only a small percentage of exportations for eco-sensitive countries.

[12] Indonesia, Malaysia and China represent 75% of the forest products exports among the developing countries that, in turn, represent 15 % of the world trade of forest products.

6. Some Caveats

This section briefly covers some caveats of the certification and ecolabeling policies that deserve further attention. First, it is important to have a clear definition and limitation of the certification criteria. In this respect, there should be a consensus on the common standard to be adopted for a particular biodiversity product. Too many criteria create confusion for consumers, and in turn it may affect the credibility of the certification policy. Related to this, the questions of which institution should have the authority to set the common standard and at what level (i.e. regional, national, or international) this institution should be are crucial. Finally, and admitting that a common standard will be set at an international level, then there should be a good coordination of certification policy between the institution which sets the standard and WTO. One of the commonly cited issues concerning setting up a common international standard is the feasibility of what is commonly called *cradle to the grave* certification. This type of policy subjects products to a thorough evaluation including production and processing methods (FAO 1995). This type of certification policy is often seen as an intangible barrier to entry to the international market for the developing countries' products. Hence, special attention is required so as to avoid using certification and ecolabeling policy as a barrier to the free-trade policy campaign of WTO.

7. Concluding remarks

This paper provided an economic evaluation of certification and ecolabeling as an important policy instrument for creating markets for biodiversity. It identified where certification stands at present, and discussed some of the important issues concerning the design of an effective and broadly accepted certification policy instrument. The complexity of the range of biodiversity benefits, the wide range of possible policy strategies, and the lack of strong agreement among many of the issues constituted the basis for the proposed comprehensive view on certification and ecolabeling policy. It should be noticed, however, that the perspective of analysis here embraced needs to be interpreted as a first step towards the an international forum of discussion and evaluation of these type of policy instruments, rather than an exhaustive, self-contained analysis on

certification and ecolabeling. In other words, the goal was to provide a common ground for discussion of issues related to alternative policy instruments for biodiversity valuation and management, and in particular for creating markets for biodiversity,.

In the paper we concluded that the success of certification and ecolabeling as a policy instrument for creating markets for biodiversity depends on the nature crucial factors, including the ability of the proposed policy instrument to internalize in the market price the wide range of the nonmarket biodiversity benefits. Such internalization exercise depends, firstly, on the public good nature of nonmarket biodiversity benefits, secondly, on the application of appropriated economic valuation methodologies so as to assess the monetary magnitude of the nonmarket biodiversity benefits, and, finally, on the characteristics of the market supply and demand mechanisms. The latter include, for example, the level of consumer's awareness with respect to environment sounding products and the producer's propensity to embrace certification schemes.

Furthermore, in some cases certification and ecolabeling policy instruments *alone* are not sufficient to guarantee a successful creation of markets for biodiversity. Indeed, mixed policies strategies such as the Dutch system for green certificates, which involves certification and direct government in the supply or demand forces, revealed to be of crucial significance for assuring the emerging of the biodiversity friendly market segment for electricity in the Netherlands. Moreover, and observing closely the Indonesian certification setting, which surely is an isolated experience in the international setting, one realizes that it is imperative to bring national initiative closer together, to encourae an international common ground for certification and ecolabeling, avoinding the use such a policy instrument for the encouragement of an unfair international trade.

Finally, the certification schemes need to be sufficiently flexible to allow mutual recognition among the countries involved, as well as to meet the demand of weak sensitive markets. To achieve that it is important to explore each country's unique environment and cultural characteristics. By mutual understanding and learning with the past, certification and ecolabeling will positively contribute to the creation of markets for biodiversity and thus expected to assist to the development of an effective and broadly accepted sustainable management of such a scarce natural resource.

Acknowledgements

The authors thank the participants of the OECD/World Bank International Workshop On Market Creation for Biodiversity Products and Services, OECD Headquarters Paris, 25-26 January 2001, for their valuable comments on an earlier version of the manuscript. Paulo Nunes acknowledges the Fundação Calouste Gulbenkian for financial support.

References

Akerlof, G., (1970), "The Market for 'Lemons': Qualitative Uncertainty and the Market *Quarterly Journal of Economics*, 89, pp.488-500.

Baharuddin, H.G. (2001) "Timber certification: an overview", available at http://www.fao.org.

Barron, D.E. (1994) "Sustainable forest certification", paper presented at the 75th Anniversary Annual Meeting of the Woodlands Section, Canadian Pulp and Paper Association, Alberta Canada.

Baumol, W.J. and W.E. Oates 1988. The Theory of Environmental Policy, Cambridge University Press, Cambridge, UK.

Biller, D. (2001) "Creating Markets for Biodiversity: Conceptual Framework and Structure of the Workshop", paper presented at the International Workshop on Market Creation for Biodiversity Products and Services, OECD Headquarters, January 25-26.

Bourke, I.J. (2000a) *Certification and labeling of paper and other forest products: where are we heading?*, FAO Committee on Paper and Wood Products, 41st Session, May, Rotorua, New Zealand.

Bourke, I.J. (2000b) Trade and Forestry: agreement on the application of Sanitary and Phytosanitary Measures and agreement on technical barriers to trade, FAO discussion paper, Rome, Italy.

Braden, J. B. and C. D. Kolstad (eds) (1991) "Measuring the Demand for Environment Quality", Elsevier Science Publishers, North-Holland.

van Bellegem, T., Beijerman, A.M. and A. Eijs (1999) "Green Investment Funds: Organic Farming in the Netherlands", in *Handbook of Incentive Measures for Biodiversity: Design and Implementation*, OECD, Paris, France.

Carson, R. T., R. C. Mitchell, W. M. Hanemann, R. J. Kopp, S. Presser and P. A. Ruud (1992) "A Contingent Valuation Study of Lost Passive Use Values Resulting from the *Report prepared for the Attorney General of the State of Alaska*, Washington.

Dosi, C. and Moretto, M., (1998), "Is Ecolabeling a Reliable Environmental Policy Measure?" University of Padova, Department of Economics, *mimeo*, 22pp.

Emil S., Djalins, U. and A. Suntana (1997) "Trade and timber certification: international setting and Indonesian experience", paper presented at the *XI World Forestry Congress*, Antalya, Turkey, October 13-22.

EPA (1993) *Status report on the use of environmental labels worldwide*, Office of Pollution Prevention and Toxic, Environmental protection Agency, Washington DC.

Forest Stewardship Council - FSC (2000) *Forest Stewardship Council Web Site*, http://www.fscoax.org/principal.htm

Garrod, G. and K.G. Willis 1999. Economic Valuation of the Environment: Methods and Case Studies, Edward Elgar, UK.

van der Grijp, N.M. and F. den Hond (1999) *Green supply chain initiatives in the European food and retailing industry*, Institute for Environmental Studies, Vrije Universiteit Amsterdam, Amsterdam.

FAO - Committee on Commodity Problems (1995) "Developments in International Protection Legislation and ecolabeling", CCP: JU 95/7, Rome.

IFOAM (2000) *Basic Standards for Organic Production and Processing*, International Federation of Organic Agriculture Movements, General Assembly, September, Basel, Switzerland.

Mattoo, A. and Singh, H., (1994), "Ecolabeling: Policy Considerations," *Kyklos*, 47, pp.53-65.

Milgrom, P., (1988), "Employment Contracts, Influence Activity, and Efficient *Journal of Political Economy*, 96, pp.42-60.

Nielsen, L. and Jeppesen, T., (2000), "Green Electricity Certificates – A Supplement to the Flexible Mechanisms of the Kyoto Protocol", University of Southern Denmark-Odense, Department of Economics, *mimeo*, 27pp.

NOAA - National Oceanic and Atmospheric Administration (1993) "Report of the NOAA Panel on Contingent Valuation", *Federal Register*, 58(10), pp. 4601-4614, US.

Nunes, P.A. (2000) "Contingent valuation of the benefits of natural areas and its warm *Ph.D. thesis*, n. 133, Katholieke Universiteit Leuven, Leuven, Belgium.

Nunes, P.A. and J.C.J.M. van den Bergh (2001) Economic Valuation of Biodiversity: Sense or Nonsense?", *Ecological Economics*, forthcoming.

Nunes, P.A., van den Bergh, J.C.J.M. and P. Nijkamp (2001) "Integration of Economic and Ecological Indicators of Biodiversity", OECD publication, forthcoming.

van Ravenswaay, E., (1995), "Public Perceptions of Agrochemicals, Ames, IA: Council on Agricultural Science and Technology, *Task Force Report*, No.123.

van Ravenswaay, E., (1996), "Emerging Demands on Our Food and Agricultural System: Developments in Ecolabeling," Michigan State University, Department of Agricultural Economics, *mimeo*.

van Ravenswaay, E. and Blend, J., (1997), "Using Ecolabeling to Encourage Adoption of Innovative Environmental Technologies in Agriculture," Michigan State University, Department of Agricultural Economics, *mimeo*, 44pp.