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Economic and Market Incentives as Instruments of Environmental Policy in Brazil and the United States

ANTONIO HERMAN BENJAMIN[†] AND CHARLES WEISS, JR.^{††}

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I. INTRODUCTION

Economic instruments of environmental policy are of special interest in Brazil, not only because they promise to deliver improved environmental quality for a lower regulatory cost than the traditional system of command and control (CAC), but especially because they allegedly minimize the demands of environmental policy on weak governmental structures. It is therefore important to explore whether these promised gains in administrative simplicity are, in fact, borne out in practice and whether economic instruments are a substitute for CAC or a complement to it.

This Article addresses the feasibility, legal constraints, and institutional requirements for the application of economic instruments of environmental policy in Brazil and the United States. Its purpose is to inform the Brazilian environmental and regulatory community regarding the usefulness and the limitations of these policy instruments and, at the same time, to guard against the tendency (apparent in some development assistance circles) to regard economic instruments as a complete substitute for CAC.

The authors set forth selected examples of relatively cost-effective economic instruments in use in both Brazil and the United States in order to compare the formal legal and organizational requirements for economic instruments in the two countries. The Article does not attempt to present a comprehensive account of experience in either country with these instruments of environmental policy, nor to assess their effectiveness.¹ The administrative and legal requirements of economic instruments are illustrated with examples taken mainly from "green" sectors (agriculture, land use, water, fishing, forestry, ecotourism), along with a few examples from "brown" sectors (air pollution, industrial wastes, sanitation).

In principle, the use of the term "institution" encompasses not only formal organizations, but also the economic, legal, and social "rules of the game." This broader usage would encompass such "institutions" as systems for pricing or otherwise allocating scarce common resources, for taxing or subsidizing externalities, for assuring security of land tenure and other property rights, and for creating competitive markets with long time horizons and low transaction costs.² These are lacking in many situations in Brazil. This Article is a first treatment and adopts the narrower meaning of the term (i.e., formal organizations), leaving exploration of the broader interpretation for future work.

The findings in this Article are based not only on an examination of the legal and administrative documentation surrounding each instrument discussed, but also on field research and personal interviews with policy-makers directly involved in their conception,

1. Omissions of economic instruments in use in Brazil include sewerage fees, fees for irrigation and drinking water, and (rarely collected) stumpage fees. A more comprehensive listing can be found in R.S. DA MOTTA & E.J. REIS, *THE APPLICATION OF ECONOMIC INSTRUMENTS IN ENVIRONMENTAL POLICY: THE BRAZILIAN CASE* (1994) (World Bank mimeograph).

2. See generally THEODORE PANAYATOU, *GREEN MARKETS: THE ECONOMICS OF SUSTAINABLE DEVELOPMENT* (1993).

implementation, and enforcement. The authors were surprised to discover how little documentation and awareness exists on the subject in Brazil, despite its extensive coverage in the world economic and environmental literature.

II. GENERAL CONSIDERATIONS

The introduction of market mechanisms of environmental policy constitutes a major public sector innovation. Like innovations in other areas of life—commercial, technological, social, cultural—such innovations take place in a broad political, social, economic, and institutional context that influences the speed and effectiveness with which they are adopted and their impact on society. They are easier and quicker to introduce if they are extensions of familiar concepts and procedures and do not demand major changes in public attitudes, modifications of the legal framework, and new competencies on the part of public institutions.

In the United States, as in Brazil, many economic instruments of environmental policy take the form of extensions of preexisting programs of support to agriculture. This greatly simplifies the political problems involved in securing public support and parliamentary approval and also allows these instruments to be administered by existing organizations and procedures. On the other hand, complicated problems sometimes require complicated solutions. The weakness of Brazilian institutions may make it impossible to implement and enforce instruments, such as tradable development permits,³ that might be well-suited to some environmental goals. We conclude that, while the environmental provisions of the Brazilian Constitution are clearly written with a CAC approach in mind, there are no major constitutional or legal impediments to the adoption of economic instruments of environmental policy. On the other hand, the CAC approach to environmental policy is deeply imbedded in Brazil's public attitudes and bureaucratic habits and practices, just as it was in the United States before environmental regulations were enforced with sufficient vigor that the economic costs of the CAC approach became widely appreciated, at which point the subject of economic instruments became one of broad public discussion, and government and industry were willing to try a new approach.

The Brazilian government and public seem well short of that point today.⁴ High officials of the Brazilian government interviewed during the course of our research were unaware of the concept of economic instruments of environmental policy although they typically voiced general support once it was explained to them.⁵ This is not surprising. Even the subsidies of the PROCOP⁶ program, a rather generous subsidy program to encourage abatement of industrial pollution in the Brazilian state of São Paulo, attracted little attention until it was clear that environmental regulations in São Paulo were going to be enforced, even if it meant shutting down industries.

A proposal to apply the concept of economic instruments of environmental policy to a particular situation in Brazil would stimulate widespread public debate, more or less parallel to the debate that has already taken place in the United States and Europe. This debate

3. See discussion *infra* Part IV.

4. Suffice it to say that COMISSÃO INTERMINISTERIAL PARA PREPARAÇÃO DA CONFERÊNCIA DAS NAÇÕES UNIDAS SOBRE MEIO AMBIENTE E DESENVOLVIMENTO [INTERMINISTERIAL COMMISSION FOR THE PREPARATION FOR THE UNITED NATIONS CONFERENCE ON THE ENVIRONMENT AND DEVELOPMENT], O DESAFIO DO DESENVOLVIMENTO SUSTENTÁVEL [THE CHALLENGE OF SUSTAINABLE DEVELOPMENT] (1991), Brazil's report to the United Nations Conference on the Environment and Development, which was held in 1992 in Rio de Janeiro, does not deal with this issue.

5. When we asked their opinion on this issue, a number of Secretaries of the Environment (the top civil service level in the state government) did not even know what we were talking about.

6. See discussion *infra* Part IV.

would presumably give rise to the changes in institutions and bureaucratic culture necessary for these useful policy instruments to receive proper consideration.

III. ECONOMIC AND MARKET INCENTIVES AS INSTRUMENTS OF ENVIRONMENTAL POLICIES (EMIEP) IN "GREEN" SECTORS IN BRAZIL

A. *Current Status*

Discussion of the possible application of economic and market incentives as instruments of environmental policy (EMIEP) has only started in recent years, more so in the academic field than in the environmental public administration community or even in the National Congress of Brazil.⁷ The principal manuals dealing with environmental law,⁸ as well as the official documents of environmental agencies,⁹ make no reference to this subject. In a broader assessment, it may be said that the country's entire environmental protection system¹⁰ is still based upon CAC mechanisms. The law (especially in terms of penalties) is considered the first, if not the only, instrument to protect the environment. There exists some mistrust, particularly among environmentalists, of the EMIEP, especially with respect to tradable permits.¹¹

In any case, new instruments without the inherent characteristics of CAC are gradually and increasingly being proposed and implemented in Brazil. Although there is not a consistent and organized call for the introduction of EMIEP,¹² nearly all those involved in

7. Another issue that has only recently begun to receive attention is that of economic environmental accounting. See ANTONIO EVALDO COMUNE ET AL., *CONTABILIZAÇÃO ECONÔMICA DO MEIO AMBIENTE* [ECONOMIC ENVIRONMENTAL ACCOUNTING] (1992); VALORANDO A NATUREZA: ANÁLISE ECONÔMICA PARA O DESENVOLVIMENTO SUSTENTÁVEL [ASSESSING THE VALUE OF NATURE: ECONOMIC ANALYSIS FOR SUSTAINABLE DEVELOPMENT] (Peter Herman May & Ronaldo Serôa da Motta eds., 1994).

8. See generally PAULO AFFONSO LEME MACHADO, *DIREITO AMBIENTAL BRASILEIRO* [BRAZILIAN ENVIRONMENTAL LAW] (1995), JOSÉ AFONSO DA SILVA, *DIREITO AMBIENTAL CONSTITUCIONAL* [CONSTITUTIONAL ENVIRONMENTAL LAW] (1994); DANO AMBIENTAL: PREVENÇÃO, REPARAÇÃO E REPRESSÃO [ENVIRONMENTAL DAMAGE: PREVENTION, REDRESS AND REPRESSION] (Antonio Herman V. Benjamin ed., 1993); PAULO DE BESSA ANTUNES, *CURSO DE DIREITO AMBIENTAL* [ENVIRONMENTAL LAW COURSE] (1990).

9. See generally ASSOCIAÇÃO BRASILEIRA DAS ENTIDADES DE MEIO AMBIENTE (ABEMA) [BRAZILIAN ASSOCIATION OF ENVIRONMENTAL AGENCIES] ET AL., *BRASIL '92: PERFIL AMBIENTAL E ESTRATÉGIAS* [BRAZIL '92: PROFILE AND STRATEGIES] 187 (1992) (The conclusions of this document are limited to a call for "specific lines of credit to recover environmental quality" through the "implementation of accounting incentives to compensate for expenses incurred due to the accelerated depreciation of pollution control equipment and to other measures aimed at reducing environmental degradation" by permitting the use of "accounting practices for investments in environmental improvements as expenses.").

10. The expression "system" is certainly inappropriate to describe legal protection of the environment in Brazil. Instead of a complementary set of laws and regulations based on common principles and mechanisms, what actually prevails is a clear lack of organization on this matter. Several factors may be mentioned as the cause of this situation. First, the various environmental laws have been in effect for a varying number of years and have diverse approaches. For example, the Forestry Code, *CÓDIGO FLORESTAL* [C. FLOR.], Lei No. 4.771, de 15 de setembro 1965, D.O. de 28.09.65 (Braz.), *reprinted in* 5 *COLEÇÃO DAS LEIS* 157 (1965), is from 1965; the Wildlife Protection Law, *Lei De Proteção à Fauna*, Lei No. 5.197, de 3 de janeiro de 1967, D.O. de 5.1.67 (Braz.), *reprinted in* 1 *COLEÇÃO DAS LEIS* 581 (1967), and the Mining Code, *CÓDIGO DE MINERAÇÃO* [C. MIN.], Lei No. 227, de 28 de fevereiro de 1967, D.O. de 28.2.67 (Braz.), *reprinted in* 1 *COLEÇÃO DAS LEIS* 327 (1967), are both from 1967; and the National Environmental Policy Law, *Lei Da Política Nacional do Meio Ambiente*, Lei No. 6.938, de 31 de agosto de 1981, D.O. de 02.09.81 (Braz.), *reprinted in* 5 *COLEÇÃO DAS LEIS* 47 (1981), is from 1981. Second, the National Congress has not been concerned about preparing and enacting new environmental laws and making them compatible with other pre-existing laws. As might be expected, this has resulted in conflicting texts, thereby hindering, in certain cases, any and all implementation efforts.

11. See discussion *infra* Part IV.

12. Interview with Cleverson Andreolli, former president of ABEMA (Mar. 1995). Mr. Andreolli is one of the most active formulators of public environmental policies and a former president of ABEMA, which brings

environmental problems, particularly the environmental public administration, acknowledge that the legal instruments of CAC alone cannot protect the environment. Criticisms of the country's legal model are no longer disguised. There is frequent, open talk of "laws that don't take hold," "legislative inflation," or even of "failure of the environmental legal systems."¹³

Contrary to what is happening in the United States, in Brazil, the economic instruments that are beginning to make headway and garner public support are concentrated in the area of fiscal or direct financial incentives.¹⁴ On the subject of environmental protection, tradable rights and permits, bounties, netting, transferable development permits, individual quotas, and tradable water rights are practically unheard of nationwide.

Fiscal and credit mechanisms have recently been receiving explicit support from environmentalists and the environmental establishment.¹⁵ For example, Édis Milaré, an environmentalist himself, acknowledges that "through the use of fiscal incentives, we will certainly be able to protect Brazil's environment."¹⁶

B. *The Lack of Insurmountable Constitutional and Legal Obstacles to the EMIEP in Brazil*

In our preliminary, general assessment, there appear to be no absolute constitutional or legal obstacles to Brazil's adoption of the EMIEP. When referring to the environment, the Federal Constitution of Brazil limits itself to dictating that "public authorities and the community must defend and preserve it for present and future generations."¹⁷ Although it goes on to list some of the protection activities to be carried out by public authorities, it certainly does not exclude others. In other words, everything appears to indicate that "the duty of defending and preserving the environment" may be exercised by means of the CAC

together all of the country's official environmental agencies. While recalling the "ethical question" of the EMIEP, he mentions that "we must not forget that our society is regulated very much in terms of market and economic instruments. The EMIEP are very powerful economic instruments in encouraging sustainable development." None of those interviewed for this paper expressed total or unrestricted opposition to economic environmental instruments.

13. ANTUNES, *supra* note 8, at 65. Paulo de Bessa Antunes states that "from a regulatory standpoint, the Brazilian situation is somewhat reasonable, as its basic structure ensures that our country is not totally destroyed. However, we should remember that this right is not restricted to norms but, on the contrary, it is the concrete application of legal texts. In this way Brazilian environmental law is something that has yet to be made, since the degree of efficiency of its norms is, for now, quite small." *Id.*

For Cleverson Andreolli, "legislation is still far ahead of what is being done in the government. Our crisis relates to the application of the law, due to the fragile nature of public agencies and the weakness of the environmental platform. Brazilian legislation is somewhat mysterious since it states that 20% of the country should be forest reserves, but it does not mention how to achieve this percentage." Interview with Cleverson Andreolli, *supra* note 12.

14. Taxation instruments are what Fábio Feldmann, the leading environmental congressman, prefers. According to him, during the 1994 constitutional revision, an attempt was made to introduce into the Federal Constitution a specific provision that would offer different treatment to companies according to the type of production process used. Interview with Fábio Feldmann, Congressman (Mar. 1995). Édis Milaré also proposed progressive taxation of those firms that pollute the most. Interview with Édis Milaré, São Paulo former State Secretary of the Environment (Mar. 1995).

15. An interesting fact in São Paulo is worth mentioning here. While the bill that gave rise to State Law No. 8510/93, analyzed below, was being sent through the Legislature, the mayors of the Vale do Ribeira, a region containing the principal remnants of the Atlantic Forest, and environmental NGOs became strong allies. This was one of the few times that the environmental groups and politicians of the Vale do Ribeira were on the same side. The environmental NGOs and the Vale do Ribeira had been long-time opponents to the politicians' legislative policies.

16. Interview with Édis Milaré, *supra* note 14.

17. See CONSTITUIÇÃO FEDERAL art. 225 (Braz.).

mechanisms listed in the text of the Constitution, as well as by other means that also serve to achieve the same objectives.

In this assessment of the constitutional and legal soundness of the EMIEP in Brazil, two theories merit special attention: (1) the nonexistence of a right to pollute and (2) the impossibility of marketing the environment.

Brazilian legal scholars and judges have stressed the nonexistence of a “right to pollute.” The doctrine consistently rejects the idea that environmental law, through its instruments, can allow the polluter to state, “I pollute, but I pay.”¹⁸ What this basically means is that possible EMIEP may not serve, whether directly or indirectly, as a means of legitimizing the exercise of a right to pollute. This is obviously an important point that must be taken into consideration in any serious attempt to introduce the EMIEP in Brazil. On the one hand, both the Constitution¹⁹ and infraconstitutional legislation²⁰ accept any instrument—whether or not of CAC—whose purpose is to protect the environment. On the other hand, the regulatory framework and case law reject the theory that environmental degradation can be broadly legitimized by any means.²¹ A balance must therefore be sought. The issue is not exactly one of substance but of how the EMIEP will be presented. Instead of instruments that economically “legalize” pollution, the EMIEP should be shown as mechanisms that economically “aid in fighting” pollution.

Moreover, Brazilian specialists in environmental law refer to the environment as a set of “values that cannot be measured economically”²² and “a new projection of the right to life”²³—which, therefore, is a basic constitutional right.²⁴ In other words, it would be difficult to find acceptance, especially in legal terms, of those EMIEP that give the false impression that the environment is being given a price, in advance, thereby encouraging its commercialization.²⁵ In summary, any economic instrument that does not conflict with such principles—the nonexistence of a right to pollute and the impossibility of commercializing the environment—will, in theory, be in accordance with the country’s current legal system. Let us now see how current law may be interpreted in relation to the EMIEP.

1. Federal Constitution of Brazil

As we have already mentioned, in its chapter on the environment, the 1988 Federal Constitution of Brazil makes no mention of the EMIEP.²⁶ On the contrary, a reading of its

18. See MACHADO, *supra* note 8, tit. 4, ch. 1.

19. See CONSTITUIÇÃO FEDERAL art. 145 (Braz.).

20. See Lei da Política Nacional do Meio Ambiente [National Environmental Policy Law], Lei No. 6.938, de 07 de julho de 1981, D.O. de 08.07.81 (Braz.), reprinted in 5 COLEÇÃO DAS LEIS 40 (1981) [hereinafter National Environmental Policy Law].

21. There are very broad exceptions to the issue of the nonexistence of a “right to pollute” in the Brazilian legal system. Within certain limitations, several regulations allow air, soil, and water pollution, as well as forest clearing. Objectively speaking, an environmental license is nothing more than an authorization to pollute, within established limits.

22. ANTUNES, *supra* note 8, at 65.

23. SILVA, *supra* note 8, at 36.

24. See CONSTITUIÇÃO FEDERAL art. 5 (Braz.).

25. In the Brazilian case, the impossibility of placing an economic price on the environment, as well as that of the nonexistence of a right to pollute, is also not absolute. With increasing frequency, the courts are judging environmental “public civil actions,” punishing polluters by making them pay for the damages they have caused—damages that are evidently assessed. This fact, in itself, shows that, once admitted, this impossibility should be understood as being of a “prior” nature, i.e., it is impossible to place a price in advance on an environment that may eventually be affected by an activity; this then opens the doors to its commercialization.

26. See CONSTITUIÇÃO FEDERAL art. 225 (Braz.).

detailed text seems to indicate the option of a CAC system. Expressions such as “prohibition,” “control,” “punitive and administrative sanctions,” and “obligation to repair damages” are used liberally.²⁷ Despite this typical CAC language, no prohibition or general limitation can be drawn on the use of EMIEP.²⁸ In our opinion, possible restrictions on these instruments would arise more from political, economic, and institutional conditions than from the text of the constitution.

2. Infraconstitutional Legislation

The National Environmental Policy Law, the principal Brazilian environmental law, does not emphasize any EMIEP among the instruments of the National Environmental Policy.²⁹ The most that is allowed is a mere reference to “incentives for the production and installation of equipment and the creation or absorption of technology aimed at improving environmental quality.”³⁰

Nevertheless, in infraconstitutional legislation, several instruments may be identified that deviate from a strict CAC model and are similar to the EMIEP: (1) financing for forestry projects with differentiated interest rates and terms, under which official credit establishments must give priority to forestation projects, reforestation, or the procurement of equipment for related services;³¹ (2) tax exemptions in privately-owned areas reforested by public authorities;³² (3) special financing conditions for the relocation of industries and the reduction of environmental pollution, particularly in saturated areas;³³ (4) payment by users for the use of environmental resources for economic purposes;³⁴ (5) prohibition of government financing and incentives to projects without proper environmental licensing or in defiance of the regulations, standards, and criteria issued by CONAMA—the National Environmental Council,³⁵ and (6) incentives for research and technological processes aimed at reducing environmental degradation, as well as the manufacture of antipollution equipment.³⁶

3. Who Can Legislate the EMIEP?

Under the current constitutional system, based on the 1988 Federal Constitution of Brazil, the federal government and the states may legislate on “forests, game, fish, fauna, conservation of nature, defense of soil and natural resources, protection of the environment and control of pollution,” as well as on “liability for damage to the environment, consumers’

27. *See id.*

28. This is also the opinion of Édis Milaré. Interview with Édis Milaré, *supra* note 14.

29. The instruments listed include the establishment of environmental quality standards, environmental zoning, environmental impact statements, licensing, creation of conservation units. *See* National Environmental Policy Law 20 *supra* note 20, art. 9.

30. *Id.* art. 9, cl. 5.

31. *See* CODIGO FLORESTAL [C. FLOR.] [Forestry Code], Lei No. 4.771, de 15 de setembro de 1965, D.O. de 28.09.65 (Braz.), *reprinted in* 5 COLEÇÃO DAS LEIS 157 (1965).

32. *See id.*, art. 18, cl. 2.

33. *See* Lei No. 6803, art. 12, § 1, de 2 de julho de 1980, D.O. de 3.7.80 (Braz.), *reprinted in* 5 COLEÇÃO DAS LEIS 37 (1980). This law deals with industrial zoning in critical pollution areas.

34. *See* National Environmental Policy Law, *supra* note 29, art. 4, cl. 7.

35. *See id.*

36. *See id.*

property and rights of artistic, esthetic, historic, touristic and scenic value.”³⁷ In the Brazilian constitutional system, it is generally understood that the municipality may also legislate on environmental matters “of local interest.”³⁸ In these matters the federal government may only “establish general rules.”³⁹ In the absence of federal law concerning general norms, the states exercise “full legislative powers,”⁴⁰ while possible intervention by federal law “suspends the effectiveness of a State law, to the extent that it is contrary to Federal Law.”⁴¹

Hence, the federal, state, and municipal governments are constitutionally authorized to legislate on the EMIEP. However, as we will see below, by law the states must take the initiative of introducing the initial economic instruments for environmental protection.

IV. EXPERIENCE WITH EMIEP IN BRAZIL

There are very few examples of, provisions for, or use of, EMIEP in Brazil. Therefore, among the cases described in this Article, some do not fit exactly into a strict definition of the EMIEP, nor are they typical CAC instruments. In general terms, Brazil uses five regulatory tools to encourage or require compliance with pollution control standards: (1) special financing for acquisition of control equipment and for relocation of plants away from critical areas of pollution, (2) fines, (3) suspension of operations, (4) denial of tax incentives and other public benefits usually available to business enterprises, and (5) denial of financing from government-related lending institutions.⁴² More recently, “green tax incentive”-type mechanisms have emerged.

A. *Two Successful Cases of Tax Incentives in the “Green” Sector*

1. Introduction: The Township in the Tax System

Brazilian townships (*municípios*) enjoy an importance that is unknown in other federated government systems, such as the United States. Although in practical terms environmental implementation is basically done by the Brazilian federal and state governments, the 1988 Federal Constitution of Brazil (modifying the provisions on this matter that were contained in the previous constitution) gave townships, together with federal and state agencies, environmental enforcement authority, under which federal, state, and municipal legislation could be applied to “protect the environment and combat pollution in any of its forms.”⁴³

In general, especially in the richest parts of the country, townships are beginning to exercise their constitutional powers dealing with environmental management. Several cities have already set up “Municipal Environmental Councils” with the authority to analyze and approve environmental impact statements dealing with projects that have local impact.

37. CONSTITUIÇÃO FEDERAL art. 24, cl. 6, 8 (Braz.).

38. This is also based on the Federal Constitution, which states: “Art. 30: Municipalities have the power to: I: legislate on matters of local interest.” *Id.* art. 30.

39. *Id.* art. 24, cl. 16, § 1.

40. *Id.* art. 24, cl. 16, § 3.

41. *Id.* art. 24, cl. 16, § 4.

42. See Roger W. Findley, *Pollution Control in Brazil*, 15 *ECOLOGY L.Q.* 37 (1988).

43. See CONSTITUIÇÃO FEDERAL art. 23, cl. 3 (Braz.).

One of the townships' major sources of financing is taxes, of course. First, the township has its own tax revenue (such as that received from the "urban real estate tax").⁴⁴ Second, townships also receive so-called tax "allocations," i.e., they benefit from the partial redistribution of taxes collected by the federal or state governments (such as the ICMS, a tax on the circulation of goods and services).⁴⁵

The federated state has the power to institute the ICMS.⁴⁶ Out of the total collected, only 25% belongs to municipalities (the so-called "Municipal Participation Fund").⁴⁷ Out of this municipal percentage, at least three-fourths is distributed in proportion to the quantity of taxable operations that take place in the municipalities; up to one-fourth may be distributed according to other criteria established in state law.⁴⁸ The "ecological ICMS," which we will analyze below, is drawn from this portion, subject to specific allocations under special law.

2. The Case of the State of Paraná (Supplementary Law No. 59/91)

(a) Objectives

With the "Ecological Royalties Law" or "Beraldin Law,"⁴⁹ Paraná became the first Brazilian State to use, on a large scale, an economic instrument for environmental protection in green sectors, "promoting balance among townships that preserve the environment and industrialized townships."⁵⁰

Initially, the "ecological ICMS" is noteworthy because it does not deal with economic incentives given to individuals to protect the environment but rather to the township.⁵¹ However, it is still an important instrument because the Brazilian township is traditionally a powerful force in resisting environmental measures—the mayor is usually the first to be pressured by groups that are displeased with possible restrictions on the free use of private property. The federal and state governments must therefore counterbalance these local anti-environmental pressures by providing municipal treasuries with funds that are justified by the existence of environmental resources within those townships' boundaries.

According to Beraldin, the author of this law, it meets two primary objectives. First, it provides financial compensation to townships which were forced to forego other economic activities because they have significant environmental resources (water sources and green areas) that are used by neighboring townships. Second, it encourages environmental preservation because it calls for excluding some townships from its list while including others, provided that there is a change in the quantity and quality of protected environmental resources.⁵² In his words, "this law directly links ecology to municipal treasuries."⁵³ These

44. *See id.* art. 156, cl. 1.

45. *See id.* art. 155, cl. 1(b).

46. *See id.* art. 155, cl. 1(b).

47. *See id.* art. 158, cl. 4.

48. *See id.* art. 158 § 1.

49. Lei Complementar No. 59 do Estado do Paraná, de 01 de dezembro de 1991 (Paraná Braz.) [hereinafter Paraná Supplementary Law No. 59]. This law was regulated by Decreto Estadual No. 974 do Estado do Paraná, de 09 de dezembro de 1991 (Paraná, Braz.). *See also* Portaria No. 67, de 25 de maio de 1994 (Instituto Ambiental do Paraná [Paraná Environmental Institute], Braz.), which, in terms of the "criteria for environmental conservation units," defines concepts, parameters, and procedures for calculating the Territorial Restriction Coefficient and the Fiscal Compensation Indices for Environmental Conservation; *id.*, annex I, as well as Portaria No. 102, de 29 de agosto de 1994 (Instituto Ambiental do Paraná, Braz.), which deals with "criteria for sources of public supply."

50. Interview with Neivo Beraldin, State Legislator (Mar. 1995).

51. *See* Paraná Supplementary Law No. 59, *supra* note 49, art. 1.

52. Interview with Neivo Beraldin, *supra* note 50.

funds are not drawn from the Paraná state treasury, but rather from other cities that lack green areas or water sources and use water from neighboring localities.⁵⁴ The share of allocations from the ICMS is increased for those townships participating in this program in proportion to their respective environmental resources (an “environmental factor” is used for this calculation).⁵⁵

(b) Constitutional Basis

The ecological ICMS, instituted by Supplementary Law No. 59/91, stems from the express determination of the Paraná State Constitution, which declares:

Art. 132 - Disbursement of State tax revenue is subject to Federal Constitution provisions on this matter.

First paragraph - The State shall assure by law that those municipalities, part of whose territory includes environmental conservation units or which are directly influenced by them, or those having public water supply sources, receive special treatment with respect to credit from revenue mentioned in art. 158, first paragraph, II, of the Federal Constitution.⁵⁶

(c) Coverage of Supplementary Law No. 59/91

Using the criteria in the State Constitution, the law benefits those townships: (1) with environmental conservation units within their borders or which are under their direct influence or (2) with public water supply sources.⁵⁷ The environmental conservation unit category includes the following: parks, environmental conservation areas, ecological stations, forest reserves, forests, tree nurseries, natural monuments, and wildlife refuges. These areas may be publicly or privately owned.⁵⁸ The “water sources category” includes those townships whose territory contains “part or all of a watershed used as a water supply source for neighboring townships.”⁵⁹

(d) Resource Allocation

We have already seen that the state allocates 25% of its ICMS revenue to townships.⁶⁰ Of this, at least three-fourths is distributed to townships in proportion to the taxable operations carried out in their respective territories.⁶¹ State law may establish other criteria

53. *Id.*

54. *Id.*

55. *Id.*

56. CONSTITUIÇÃO DO ESTADO DO PARANÁ [State Constitution of Paraná] art. 132, § 1 (Paraná, Braz.); reprinted in João Lech Samek, et al. *Tributos Ecológicos e Compensação para Areas de Mananciais e Unidades de Conservação* [Ecological taxes and compensation for water supply areas and conservation units] 8 (unpublished on file with author).

57. See Paraná Supplementary Law No. 59, *supra* note 49, art. 3.

58. See *id.* art. 2; see also Decreto Estadual No. 974 do Estado do Paraná, art. 3, para. 1, de 09 de dezembro de 1991 (Paraná, Braz.).

59. Paraná Supplementary Law No. 59, *supra* note 49, art. 3.

60. See *supra* Part IV.A.1.

61. Paraná Supplementary Law No. 59, *supra* note 49, art. 3.

for distributing up to one-fourth of the 25% from the ICMS belonging to townships.⁶² Paraná state's "ecological ICMS," amounting to 5%, is derived from the aforementioned one-fourth."⁶³ This 5% is equivalent to 1.25% of the overall ICMS total. Of the 5% of the ICMS available for ecological purposes, 50% is allocated for the "environmental conservation unit category," and the other 50% is allocated for the "water supply source category."⁶⁴

The system uses the following parameters: (1) only environmental variables are considered (i.e., those dealing with protected areas, township areas, and conservation factors); (2) the attributed environmental index is linked to management plans, enforcement structure, and area use planning; and (3) conservation units (federal, state, municipal, or privately owned) should be registered, subject to a technical inspection.⁶⁵

(e) Annual Review of Benefits

The percentages of the ecological ICMS are not permanently established for each township. They vary annually through a review made by state agencies responsible for protecting the environment and water resources.⁶⁶ Thus, in the case of water quality deterioration (water quality index) or reduction in environmental conservation areas (environmental index), the township loses revenue. Moreover, townships that create environmental conservation units or water supply sources, or expand existing ones, may be included in the program or their quota may be raised proportionately.⁶⁷

(f) A Concrete Example: Guaraqueçaba

The small town of Guaraqueçaba, with 1915 square kilometers and 8000 inhabitants, is considered an ecological sanctuary in Paraná. Surrounded by the Serra do Mar, it is the world's fifth largest estuary and third largest bay. Prior to Supplementary Law No. 59/91, Guaraqueçaba ranked 273rd among all Paraná towns in the overall distribution of the ICMS. Its economy was totally stagnated due to the mandatory preservation of both the Serra do Mar [Atlantic Forest] and its beaches, mangroves, and islands. With the new law, the town jumped to 57th place in ICMS allocations with a real increase of 557% in its revenue.

(g) Evaluation

Paraná state's ecological ICMS program, which began in January 1992, had national repercussions and appears to be a successful experience that deserves more in-depth study.⁶⁸

62. *Id.*

63. *Id.* art. 4.

64. *Id.*

65. *See generally id.*

66. *Id.* art. 6.

67. *Id.* art. 4, § 1.

68. For Milaré, "this seems to be the right way, inasmuch as we are encouraging townships to assist in environmental protection, so that during the dead of night, if they do not have the aid of such instruments, they do not become anti-environmental agents." Interview with Édís Milaré, *supra* note 14.

Feldmann considers the program "interesting, a first step albeit a small one, since it does not encourage individuals but rather is limited to townships." Interview with Fábio Feldmann, *supra* note 14.

Veja, Brazil's most important weekly magazine, recently dedicated an entire page to this subject.⁶⁹ The volume of resource turnover is not insignificant: in U.S. dollars, between \$2 and \$2.5 million per month is channeled weekly. Compliance with the law has increased in the following years. The reasons for this improvement are flexibility, gradualness, and progressiveness. It is understood that, to calculate indices relating to 1994 (1993 base year), the law entered a consolidation phase.⁷⁰

Paraná has more than 300 townships, over 100 of which have been registered with the Land, Cartography and Forest Institute (ITCF) and the Bureau of Water Resources and the Environment (SUREHMA) and are now part of the program, receiving allocations from the ecological ICMS. As noted above, in some cases, the share in the ICMS increased by as much as 557%. Other townships, however, experienced losses. "The law changed the situation of some townships with the planting of thousands of trees and the relocation of families who lived in preserved areas."⁷¹ It appears that the problems that occurred early in the program have been gradually resolved.⁷²

3. The Case of São Paulo (State Law No. 8.510/93)

(a) Legislative Processing and Distribution Criteria

São Paulo also has legislation, similar to that of Paraná state, anticipating the environmental variable in the indices of participation by townships in the resources collected under the ICMS.⁷³ The original bill, drafted by State Legislator Barroz Munhoz, who represents São Paulo's agricultural interests, did not envision the environmental factor in ICMS distribution. It gave those municipalities with "cultivable areas" a 5% increase in their share of the tax. An amendment by environmental State Legislator Ricardo Tripoli sought to add 5% to the environmental variable. Through an agreement, agriculture received 3% and the environment 1% (0.5% of conservation units and 0.5% of water reservoirs for hydropower generation).⁷⁴

Some points of State Law No. 8.510/93 differ from Supplementary Law No. 59/91. The main difference is the share of the environmental factor in the channeling of the ICMS,

69. *See A Força do Imposto Verde [The Strength of the Green Tax]*, VEJA, May 18, 1994, at 54. According to the magazine:

An old conflict turned into friendship in the field of ecology in recent months in two Brazilian states: Paraná and São Paulo. The new friends are ecologists and mayors of towns located in environmental conservation areas. Longtime enemies, they have become allies due to a new idea called ecological royalties. This new tax distribution system on the circulation of goods and services, the ICMS, allows townships which have areas of ecological interest to receive a proportionately higher portion of tax than other townships. Hence, the mayors hit upon a good argument in favor of the environment which stopped the cursing of the ecologists who were once considered adversaries to progress.

Id.

70. *See* Samek, *supra* note 56, at 8.

71. Interview with Neivo Beraldin, *supra* note 50.

72. According to Andreolli, an admirer of the Paraná model, "at first, the program generated a mountain of paper parks, meaning that the mayors defined certain preservation areas in order to justify the ecological ICMS." Interview with Cleverson Andreolli, *supra* note 12.

73. Lei Estadual No. 8.510 do Estado de São Paulo, de 29 dezembro de 1993 (São Paulo, Braz.) [hereinafter São Paulo State Law 8.510].

74. *Id.* art. 1.

which, under the São Paulo model, is 0.5% for water reservoirs used for hydropower generation and only 0.5% for specially protected areas.⁷⁵

(b) Criticism of State Law No. 8510/93

The first criticism one might make of the São Paulo system is that it does not grant the environmental factor (1% in total) the same weight given to agriculture (3%).⁷⁶ Hence, the township is still encouraged to expand its farmable land, which provides a greater volume of resources than the maintenance of green areas. The second criticism deals with the fact that, unlike the Paraná legislation, no provision was made for public water supply sources.

B. *An Example of Financial Compensation: São Paulo State Law No. 9.146/95*

Besides the environmental factor envisioned in State Law No. 8510/93 (which established a greater share of townships in ICMS quotas), the State of São Paulo, based on art. 200 of the State Constitution,⁷⁷ also approved Law No. 9.146/95,⁷⁸ which creates financial compensation mechanisms for townships that contain conservation units and water source protection areas. The difference between the system of State Law No. 8.510/93 and that of State Law No. 9.146/95 is that, under the former, resources that already belonged to the townships are redistributed, subject to environmental conditions.⁷⁹ Financial compensation comes from the state budget, not from the municipalities' share of ICMS. Thus, under both laws, townships with environmental resources receive double benefits.⁸⁰

State Law No. 9.146/95 was prepared by the Secretariat of the Environment with the support of the Vale do Ribeira Intermunicipal Development Consortium (CORDIVAR). This agency brings together the mayors of the Vale do Ribeira, the least developed region of the State of São Paulo in which most remnants of the Atlantic Forest are concentrated.

According to the justification which accompanied the Draft Law, prepared by the Secretariat of the Environment, the institution of a specially protected area in a township results in fewer possibilities for this area to be used for productive purposes.⁸¹ Consequently, the township's potential tax revenues are reduced in proportion to the amount of land made unavailable for economic use.

75. *Id.*

76. *See supra* Part IV.A.1.

77. CONSTITUIÇÃO DO ESTADO DE SÃO PAULO [STATE CONSTITUTION OF SÃO PAULO] art. 200 (São Paulo, Braz.), *reprinted in* ANTUNES, *supra* note 8, at 301, 306. It declares: "Art. 200 - The State Public Authority, by law, shall create financial compensation mechanisms for municipalities that suffer restrictions due to the institution by the state of specially protected areas."

Art. 200, says Milaré, "compensates townships for loss of tax or other revenue caused by a decrease in their productive base, since in specially protected areas economic activity is prohibited or is restricted. In such townships, the agricultural, real estate, industrial and tourism sectors are restricted in order to protect the townships' environmental resources." Interview with Édís Milaré, *supra* note 14.

78. Lei Estadual No. 9.146 do Estado de São Paulo, de 09 de março de 1995 (São Paulo, Braz.) [hereinafter São Paulo State Law 9.146].

79. São Paulo State Law 8.510, *supra* note 73.

80. A strictly economic analysis of the regulation of art. 220 of the São Paulo State Constitution may be found in Carlos R. Assoni and João Yo Isai, *Custo da proteção de áreas com interesse ambiental no Estado de São Paulo* (Cost of protecting areas of environmental interest in São Paulo State) (unpublished on file with São Paulo State Secretary of the Environment).

81. São Paulo State Law 9.146, *supra* note 78, art. 4.

Financial compensation will take into account two basic elements: (1) total municipal area considered as a specially protected area; and (2) the degree of restriction imposed by legislation on the productive use of such area (art. 4). For instance, "ecological stations" and "biological reserves," the strictest types of protected areas in Brazil, have weight 1.0, whereas "environmental protected areas," in which a number of economic activities is permitted, have weight 0.1 (art. 6).

The general budget of the State, after the annual assessment of the "index of participation" of each municipality, will provide for the appropriate resources to compensate the townships which are included in the program (art. 10).

Law No. 9.146/95 also requires each municipality to annually report the measures it has taken to defend the protected areas and native populations which live within their boundaries, to maintain the biodiversity of the different ecosystems, to conduct environmental education programs and to financially support environmental NGOs (art. 3).

C. *The Money-for-Trees Project (Amazonas State)*

The Money-for-Trees Project, presented by the Amazonas state government, has the objective of settling a person in one place and providing him the means to replant trees of the same species as those felled, as a self-sustainable forestry management formula.⁸² Under the terms of the project, the state supplies riverbank dwellers with seedlings of economically attractive plant species in quantities that are compatible with the size of their properties and gives them "certificates" that grant them the right to fell one forest tree for each lot of ten planted. Priority is given to floodplain (*várzeas*) areas due to transport facilities, logging, and planting, since no special treatment is needed for seedlings or soil.⁸³ Certificates will only be granted following an on-site confirmation of actual planting. These certificates may be sold by riverbank dwellers to logging companies or serve as collateral for bank loans.⁸⁴

According to Governor Mestrinho, the Project, "besides legalizing logging, allows constant, indefinite forest management without jeopardizing the ecosystem. Mandatory replanting also allows more dense growth of forest hardwoods and thereby facilitates logging."⁸⁵

If successful, the Project's economic impact would be extraordinary. For example, in the case of the "samaxina," a native species that has an average of ten cubic meters of usable wood at a price of \$20 (U.S.) per cubic meter at the source, one certificate (ten trees planted, one cut down) would be worth \$200.⁸⁶ According to Governor Mestrinho, "at the end of ten years this man's forest resources would be very large: considering the estimates made for the samaxina, if he had planted 1000 trees, they would be worth \$20,000. He would be rich in no time!"⁸⁷

82. Governo do Estado do Amazonas, Secretaria de Estado do Meio Ambiente, Ciência e Tecnologia [Amazonas State Government, State Secretariat of the Environment, Science and Technology], *Projecto Moeda Madeira* [Money for Trees Project], 1.0, intro. (1993) (unpublished on file with author) [hereinafter *Money for Trees*].

83. The Project selected the Rio Madeira region as a pilot area because "its land tenure situation [is] nearly resolved" and because this region "produces wood for industry and there is no indication of any type of reforestation in logging areas." *Id.* at 2.0, *Área Piloto* [Pilot Area].

84. *Id.* at 1.0, intro.

85. Interview with Governor Gilberto Mestrinho (Nov. 1994).

86. *Id.*

87. *Id.*

The Secretariat of the Environment anticipated an initial production of 700,000 seedlings; 700 families would be selected, each of whom would plant 1000 seedlings at a rate of 250 per year for the first four years.⁸⁸ The authors of this Article were unable to make a detailed assessment of the current progress of the project which appears, by all accounts, to still be in its early stages.

D. *A Case of Direct Financial Incentives in the Brown Sector: São Paulo State Industrial Pollution Control Program (PROCOP)*⁸⁹

To date, Brazil has had only one successful environmentally-oriented credit program—the São Paulo State Industrial Pollution Control Program (PROCOP). It is possible to foresee it being expanded to green sectors, especially through the introduction of the environmental component in agricultural credit.⁹⁰

1. Origin and Objective

Created in 1980,⁹¹ PROCOP is, in summary, a revolving fund with initial funding from the state government and the World Bank.⁹² São Paulo's state pollution control agency (CETESB) acted as executive secretary and technical agent.⁹³ The program was basically aimed at industrial pollution control and concentrated on the São Paulo metropolitan area, affecting approximately 500 dischargers of water pollutants into streams and 300 air polluters responsible for 97% of particulate emissions in that area. The program was later extended throughout the state.⁹⁴

PROCOP's original design had two components: (1) financing for pollution control and (2) technical assistance.⁹⁵ For purposes of evaluating the prospects of using the EMIEP, the finance system is more important, since its objective is to make the pretreatment process less burdensome for polluters, without the need for the State to use stricter command and control (CAC) measures.

2. Evaluation

As of April 1983, out of a total \$180 million slated for financing to polluting companies, only \$2,634,398 (1.4%) had been committed—a very low rate of usage.⁹⁶ From June 1983 to June 1986, over 120 projects had been assisted, with total resources of over \$50 million.⁹⁷

88. See *Money for Trees*, *supra* note 82, at 3.2, Modelo Operacional [Operational Model].

89. For an in-depth study of this subject, see Arlindo Philippi, Jr., *Controle de Poluição Ambiental: Implantação de Sistema de Financiamento* [Environmental Pollution Control: Implementation of Finance System] (1987) (unpublished doctoral dissertation, University of São Paulo) (on file with Author).

90. Interview with Fábio Feldmann, *supra* note 14.

91. See Decreto Estadual No. 14.806 do Estado de São Paulo, de 4 de março do 1980 (São Paulo, Braz.).

92. The contract that made these contributions possible was signed on April 14, 1980.

93. See Decreto Estadual No. 14.806, art. 1, cl. 10.

94. See Philippi, *supra* note 90, at 65, 88.

95. *Id.*

96. *Id.* at 62.

97. *Id.*

PROCOP played an important role in improving environmental quality in São Paulo. Hence, one of the specialists who followed the program closely states that its implementation and development provided positive results in physical, environmental, and socioeconomic terms (following adjustments and changes in direction) and credits PROCOP for having encouraged environmental pollution control activities.⁹⁸

E. EMIEP and Ecotourism

Ecotourism, as a concept of sustainable development, is still in its earliest stages in Brazil. Despite progress made in the past five years with the implementation of this type of project throughout Brazil⁹⁹ (particularly in the Amazon¹⁰⁰ and Pantanal regions), the truth is that very little of Brazil's tourism potential is being used for this purpose. This activity shows promise in Brazil: "ecotourism has an amazing potential."¹⁰¹

Despite the risks,¹⁰² there are undeniable economic, social, and environmental benefits from ecotourism—especially for a region such as the Amazon, which is threatened by highly detrimental economic activities such as mining and logging. Ecotourism plays an important role in "generating revenue in association with environmental preservation."¹⁰³ According to Governor Mestrinho, "the advantage of this activity is that tourism is highly civilizing. Even dictatorships cannot resist tourism. Ecotourism is a qualified type of tourism that brings new and healthy habits to local people and considerable improvements to areas around hotels. Society as a whole improves."¹⁰⁴

98. *Id.* at 143.

99. In São Paulo, ecotourism was considered a "priority program." *Cf.* GOVERNO DO ESTADO DE SÃO PAULO, SECRETARIA DO MEIO AMBIENTE [São Paulo State Government, State Secretariat of the Environment], DIRETRIZES PARA A POLÍTICA AMBIENTAL DO ESTADO DE SÃO PAULO [Guidelines for São Paulo's State Environmental Policy] 14 (1993) (encouraging ecotourism in the State of São Paulo but cautioning against the economic and cultural dangers of unrestrained tourism).

100. According to Governor Mestrinho, when he took office in 1991 there were only about a half-dozen hotels in the rainforest. Today, approximately 40 are in operation or under construction. Interview with Governor Mestrinho, *supra* note 85.

101. *Id.*

102. Ecotourism can have a negative effect on local people and the environment. In the Amazon region, although ecotourism is still in its infancy, negative changes are being observed; it is "changing customs, introducing new habits, and causing possibly irreversible damage." Silvio Magalhães Barros II, *Ecoturismo: Uma Alternativa ou um Complemento? (Ecotourism: an alternative or a complement?)*, in ANAIS DO SEMINÁRIO INTERNACIONAL SOBRE MEIO AMBIENTE, POBREZA E DESENVOLVIMENTO DA AMAZÔNIA [Annals of the International Seminar on the Environment, Poverty and Development in the Amazon Region] 141 (Governo do Estado do Pará, Secretaria de Estado de Ciência, Tecnologia e Meio Ambiente [Pará State Government, State Secretariat of Science, Technology and the Environment] ed., 1992).

Germano Seara Filho, Executive Secretary of the Environmental Council of the State of São Paulo, suggests that ecotourism should be encouraged, reducing the impact of tourism on natural areas. He points out "that tourism is commonly regarded as a source of pollution. This is because the occupation of space, even temporarily, ends up changing the face of the landscape and places environmental balance at risk. In the medium and long-term, tourist demands bring economic pressures which turn into property speculation. This frequently results in the illegal sale of plots of land, often in areas of uncertain ownership and purpose, a process which at last claims a series of investments on the part of the public authorities." *Turismo e Ecoturismo: Riscos e Potencialidades [Tourism and Ecotourism: Potential and Risk]*, in DESENVOLVIMENTO SUSTENTADO 39, 39 (Governo do Estado do São Paulo, Secretaria do Meio Ambiente [São Paulo State Government, State Secretariat of the Environment] ed., 1991).

103. Interview with Fábio Feldmann, *supra* note 14.

104. Interview with Governor Mestrinho, *supra* note 85.

Ecotourism is being encouraged in two different ways: (1) through state and municipal tax exemption; and (2) through credit benefits.¹⁰⁵ With tax exemptions, the state treasury receives no direct income from ecotourism. The indirect benefits are substantial and include: more jobs, greater consumption of goods and services (which are subject to other taxes), and improved public services.

The draft version of the "Integrated North Program," part of the National Bank for Economic and Social Development (BNDES) System's Operational Policies and dedicated exclusively to the Amazon region, includes tourism among those activities that would enjoy privileged positions under the Program;¹⁰⁶ in general, resources amounting to around \$1 billion are expected to be spent over a three-year period.¹⁰⁷

In summary, then, the major uses of economic instruments of environmental policy in Brazil include: (1) two instances in São Paulo and Paraná states of innovative reallocation of tax revenues to reward townships performing "green sector" environmental services at the expense of the townships for whose benefit those services are performed; (2) a sort of "banking" or "tradable permit" scheme by which a person who plants ten trees in the state of Amazonas can receive a certificate entitling her or him to cut one tree; (3) subsidized funds for measures to mitigate industrial pollution in São Paulo and Rio de Janeiro; and (4) federal tax exemptions and subsidized credit for investments in ecotourism.

V. ECONOMIC AND MARKET INCENTIVES FOR ENVIRONMENTAL POLICY IN "GREEN" SECTORS IN THE UNITED STATES

Subsidies and tax incentives are also employed as economic and market instruments of environmental policy (EMIEP) in the United States. Their use may shed light on the problems likely to be encountered in analogous situations in Brazil. A more far-reaching innovation, the tradable development permit, has sometimes been suggested for use in Brazil. Experience with this instrument in the United States is therefore of direct interest to Brazil and will be explored in some detail.

A. *Economic Instruments vs. Command and Control*

The change in the role of government, resulting from the introduction of economic instruments of environmental policy, depends on the system of environmental policy management which they replace. In some cases, these instruments may greatly simplify the role of government; in others, they may introduce little change.

In brown sectors in the United States, pollution regulations based on a system of command and control (CAC) often instruct industrial plants to install a "best available technology" (BAT) specified by the regulator. This version of CAC requires the regulatory authority to have sufficient technical capacity to choose the BAT from other available alternatives and to keep that choice up-to-date. Once the BAT is chosen, however, inspectors need only verify that it has been installed in a given plant.

105. The Bank of the State of Amazonas, for example, has a small financing facility for such projects. Interview with Governor Mestrinho, *supra* note 85.

106. See generally Banco Nacional de Desenvolvimento Econômico e Social (BNDES) [National Bank for Economic and Social Development], Políticas Operacionais do Sistema BNDES: Programa Norte Integrado [BNDES System Operational Policy: Integrated North Program] (1994) (unpublished preliminary draft on file with author).

107. See *id.*

This is not, however, the only version of CAC regime, even in brown sectors. Rather than (or in addition to) the installation of a BAT, regulators may specify that the effluent of a given plant may not exceed a given level of a particular pollutant, or even that downstream ambient conditions must meet a specific standard. Such a CAC regime would demand that firms monitor, and regulators inspect, not just whether equipment representing BAT has been installed, but also whether a given level of emissions or a given standard of ambient conditions is actually being achieved.

B. Subsidies and Favorable Tax Treatment

Subsidies affecting investment patterns are widespread in the industrial and agricultural sectors in Brazil and in the U.S. agricultural sector. Both countries have extended existing subsidy programs as part of their effort to achieve environmental objectives. One of the most important uses of direct subsidies for environmental purposes in "green" sectors in the United States is the Conservation Reserve Program, which enables farmers to receive "rental" payments in exchange for long-term removal from production of land that is highly erodible or contributing to a serious water quality problem.¹⁰⁸ A similar program, the Wetlands Reserve Program, subsidizes the restoration of wetlands (swamps).¹⁰⁹ In effect, the government pays a subsidy to remove marginal land from intensive production. (The analogous subsidy in the industrial sector would be a subsidy to take a polluting industrial installation out of production or to junk a polluting vehicle.) The Program incorporates cost-effectiveness criteria by selecting lands to be "rented" from competitive bids submitted by landowners or farmers.¹¹⁰ These are evaluated according to their scores on a seven-factor Environmental Benefits Index, divided by the rental rate proposed by the bidder.¹¹¹

This subsidy is an extension, for environmental purposes, of the long-standing programs whereby the federal government subsidizes farmers to remove agricultural land from production in order to limit the supply and control the price of a variety of agricultural commodities. Its administration relies on existing government records regarding ownership, land use and soil classification. Compliance and enforcement is further facilitated by the fact that neighbors are very likely to tattle on any flagrant cheaters.

Another aspect of the Conservation Reserve Program provides low cost-sharing assistance to help farmers to establish permanent vegetative cover for these lands, or to convert this cover into wetlands or into "hardwood trees, windbreaks, shelterbelts, or wildlife corridors."¹¹² These conservation subsidies are extensions of long-standing federal subsidies dating from the "dust bowl" days of the 1930s.¹¹³ Like the subsidies discussed above,¹¹⁴ for investments to control industrial pollution in the Brazilian State of São Paulo, they are environmentally oriented extensions of well-established investment subsidy programs and present no particular administrative or political difficulty. On the other hand,

108. See C. Tim Osborn, et al., *The Conservation Reserve Program*, United States Department of Agriculture, Bull. No. 843, Nov. 1992, at 2.

109. See *id.* at 4.

110. See *Agricultural Stabilization and Conservation Service Background Information, Conservation/Environmental Protection Programs*, USDA, Bull. No. 5, Oct. 1991, at 2.

111. See *id.* at 5.

112. *Agricultural Conservation Program, Agricultural Stabilization and Conservation Service Fact Sheet*, USDA, April 1992, at 3.

113. See *id.*

114. See *supra* Part III.

they are both subject to the criticism that they, in effect, pile subsidy on subsidy, perpetuating and propagating the consequent economic distortions.

An interesting example of a subsidy from private sources in the United States to encourage environmentally benign production, even if it means accepting financial losses, is a bounty offered by nongovernmental conservation organizations to landowners for not killing wolves.¹¹⁵ The bounty is keyed to the number of litters reared by wild wolves living on private property.¹¹⁶ Its analogy in brown sectors would be a subsidy to industry calculated in proportion to the abatement of a particular pollutant.

A more sophisticated use of market-based instruments in the United States is the application of "compensatory mitigation" and "no net loss" in wetlands conservation.¹¹⁷ Real estate developers have been allowed to destroy a wetland if they commit themselves to create a wetland of comparable size and quality elsewhere.¹¹⁸ Such mitigation plans have had disappointing results for scientific rather than institutional reasons; the state of the scientific understanding of wetland ecology does not enable even honest efforts by developers to reproduce the quality of a natural wetland.¹¹⁹ This program is directly analogous to the program in the state of Amazonas, which allows one tree to be cut for every ten replanted.¹²⁰ The Amazonas reforestation program may encounter problems analogous to those of the wetlands mitigation bank, since the reforestation it promises to provide is unlikely to reproduce the biodiversity of the original rain forest.

Turning now to tax advantaged investments, there is not to our knowledge a current U.S. instrument of environmental policy analogous to the favorable treatment under the Brazilian tax system of investments in ecotourism (i.e., a favorable tax treatment to an investment in land use thought to be inherently environment advantageous). Perhaps the nearest equivalent might be the federal and state subsidies to investments in wind and solar energy in the U.S. in the 1970s. In the broader sense, the subsidies to ecotourism might be thought analogous to the investments by the U.S. government in the early twentieth century for the establishment of tourist facilities on national parks. These were intended to build public interest in the country's unique natural heritage as something to be valued and enjoyed.

C. *U.S. Experience with Tradable Permits*¹²¹

The most powerful and sophisticated application of economic instruments of environmental policy in the United States to date has been the use of tradable permits as an element of an overall management regime for resources that are under pressure from intensive development. While the best known applications of such permits in the United States are in "brown" sectors, especially air pollution by lead and sulfur dioxide, tradable permits have had important applications in "green" sectors as well, especially in surface water allocation, fisheries, and urban and suburban land use planning.

115. See John A. Baden, *Creating Positive Rewards for Species Preservation*, THE SEATTLE TIMES, Oct. 20, 1993, at B7.

116. See *id.*

117. See Leslie Roberts, *Wetlands Trading is a Loser's Game*, *Say Ecologists*, SCIENCE, June 25, 1993, at 1890-92.

118. See *id.*

119. See *id.*

120. See *supra* Part IV.C.

121. This section is based on interviews with Richard Osborne and John Stokes of the staff of the Pinelands Commission and on materials supplied by the Commission, Oct. 1994. See also Rick Pruetz, *PUTTING TRANSFER OF DEVELOPMENT RIGHTS TO WORK IN CALIFORNIA* (1993).

In “green” sectors, the major examples of tradable permits in the United States are: (1) transferable development permits for real estate development, (2) transferable individual quotas for fish, and (3) tradable water rights. Transferable development permits have been used in both the United States and Brazil to facilitate the preservation of historic buildings and to encourage the provision of parks and other social amenities in New York, São Paulo, and other urban settings. Two of the most instructive applications of these instruments in the United States—in the New Jersey Pinelands, and in the MidAtlantic and North Pacific fisheries—are described in this Article’s Annex. Transferable permits for fish and water have been proposed in specific settings in Brazil, but never implemented, to the authors’ knowledge.

The introduction of tradable development permits in the context of an overall development plan for a scarce resource requires a much more elaborate political and administrative structure than any of the relatively simple economic mechanisms discussed to this point. It is worth setting these forth in some detail, to show the degree of institutional sophistication these instruments have required in the United States and the length of time required to achieve the necessary political consensus for their introduction. We may distinguish the following stages in the institutional development underlying the introduction of these instruments:

1. *Enunciation of broad strategy and policies.* In the cases treated in the Annex to this Article, tradable permits were introduced into regions which had a long history of competent administration and clearly delineated property rights and which had already benefitted from extensive research and analysis. Even so, the introduction of tradable permits was not a quick or easy process in the examples cited. On the contrary, it was preceded by many years of public debate, which finally reached a consensus that these instruments were needed to deal with an actual or potential environmental crisis. Brazil is still well short of such a broad consensus on environmental matters in any area of environmental policy to which transferable permits might be applied.

2. *Creating institutions and a legal framework to implement broad policy (legislação).* In both the Pinelands and the fisheries cases under discussion in the Annex, new laws and institutions were required in order to create regulatory agencies with broad enough authority to achieve a comprehensive regulatory overview of a complex environmental problem: the Pinelands Commission, and the North Pacific and Mid-Atlantic Fishery Management Councils, respectively.

The overview, made possible by the broad authority and competence of these institutions, led them to introduce economic instruments, partly to reduce the social costs of environmental improvements and partly to satisfy the provisions of the U.S. Constitution, which requires the government to compensate its citizens if its actions cause their property to lose its economic value. In the case of transferable development permits, the loss of the right to develop one’s property does not legally qualify as a “taking” under a due process analysis because these development rights can be sold and their monetary value realized.¹²² The same general legal issue remains to be resolved in Brazil, where a billion-dollar judgment has been rendered but not yet carried out against the State of São Paulo to compensate landowners for the effects of state environmental regulations on property values.

3. *Developing and applying a model which translates this strategy and these policies into an overall plan*—expressed as a map or, in the case of fish, as a model of biomass

122. *But see* Pruetz, *supra* note 121, at 15, *et seq.* where certain zoning and other property regulations have been held to be takings. The section then sets out guidelines to avoid such a potential challenge to a proposed TDR scheme.

growth and of permissible harvest. Both tradable permit regimes under discussion were based on sophisticated development models (for regional development and fish population dynamics, respectively), based on the considerable research capability and accumulated data regarding natural and social systems in the region. This is a technical process involving the skills of environmental scientists and engineers of various specialties (forestry, fish, agriculture, land use planning, ecology, hydrology, mathematics, etc.), along with law, economics and other social sciences. These models are discussed with and reviewed by experts in professional organizations and environmental NGOs, whose comments are not limited to strictly technical matters, but typically also point out unstated assumptions or value judgments. Brazil has few if any such models to use as the basis of environmental policy-making, and indeed lacks many kinds of basic environmental data.

4. *Implementing the policy by drafting procedures and regulations (regulamentação).*¹²³ This begins as a legal task to ensure that the rights conveyed by a permit (whether tradable or nontradable) are clearly spelled out, but also involves substantial public consultation and negotiation with private interest groups and (in the United States and Europe) NGOs. In both cases under discussion, the drafting of regulations to implement the agreed policies required a new cycle of explanations and consultations with the public, setting off vigorous public debate and extensive correspondence with the regulatory authority, which by U.S. law required a formal response.

5. *Implementation of these regulations* by issuing permits, facilitating and overseeing the market for them, and keeping records (*implementando as normas ambientais*). This requires administrative capacity, plus clear public records regarding conditions that must be met before the permits can be issued, transferred, or used (possession of fishing boats or building permits, ownership of urban, forest, or agricultural property, etc.). Given the models discussed above, and given consensus on the permissible level of pollution, desired fish population, or pattern of land use, regulators set limits based on a model connecting allowable levels of ambient pollution with allowable levels of emission—a considerable technical challenge. In the Pinelands case, the innovative aspects of a tradable permit scheme justified setting up a special implementation institution, the Pinelands Development Bank, to facilitate the running of the system and to explain its features to the public. The administrative and technical requirements of implementing and operating tradable permits in these cases' regimes thus parallel those of CAC.

6. *Monitoring compliance (fiscalização)* by checking records and/or on-site performance. This requires sufficient technical capacity to be able to recognize a violation, plus administrative competence and honesty.¹²⁴ With both market and CAC instruments, regulators must keep track of who has the permit to do what and make sure that the owner of a given permit has the necessary prerequisites (property ownership, building permits, etc.). In the case of tradable permits, the regulators must also administer auctions, monitor trades and ensure that they are carried out according to regulations. The main difference between market and CAC instruments lies in the fact that in addition to overseeing the activities of individual permit holders, regulators in a market system must also oversee the

123. The distinctions spelled out in this section are difficult to make in legal Portuguese. What is more, certain technical words in the two languages are similar but have different meanings. In particular, the Portuguese word *implementação* encompasses both compliance and enforcement, while the English term compliance may be rendered *respeitar a lei* and implementation of policies is best translated as *regulamentação*. As is evident from the discussion in the main text, the meaning of the term "implementation" varies depending on what is being implemented.

124. Honesty in the implementation of economic incentives and subsidies is a problem in both countries, but especially in Brazil, where a billion-dollar scandal in the sugar industry is presently making its way through the federal courts in Ribeirão Preto. (Processos Nos. 950310032-1 & 950305993-3).

workings of a market in tradable permits and, in some cases, must deal with increased incentives to cheat.

7. *Ensuring compliance (assegurando a execução)* by identifying violators of permit conditions and negotiating a plan to bring them into compliance under threat of formal enforcement procedures. This is a major problem in Brazil.

8. *Enforcing the laws (implementando o direito)* through administrative punishments or through the formal court system. This, too, is a major problem in Brazil, and the absence of enforcement is a major obstacle to an effective system of environmental management in Brazil.

9. *Monitoring ambient conditions* through regular measurement of environmental parameters, such as air and water quality, forest health and acreage, and the health of a fishery.

10. *Assessing the effectiveness* of the overall program in achieving its environmental and other objectives (*avaliando a eficácia do programa*). This assessment is a technical matter involving professional evaluators, as well as the skills involved in developing the original model.

These last four stages present similar administrative problems in systems based on either CAC or market instruments. Judging from the two examples described in the Annex, tradable permit schemes are substantial innovations that may require years of public debate and discussion before they can be introduced and may require new institutions to facilitate their introduction and operation. These schemes are typically conceived by agencies that have an unusually broad view of the natural resources they are charged with regulating.

In the case of the substitution of tradable permits for uncoordinated zoning regulations in different communities of the New Jersey Pinelands, the administrative and technical requirements of tradable instruments were superimposed on those of CAC and did not pose much of an administrative or technical burden. In the fisheries cases, on the other hand, they changed the focus of compliance measures away from overflights to ensure that species were not being taken on closed days (which was the major focus under the CAC system) to a much more burdensome effort to detect cheating at landing ports (which is expected to be the major compliance and enforcement problem under the system of tradable permits).

The implementation of a system of tradable permits may therefore be more demanding in the sense that it requires much more detailed administration and technical knowledge. These requirements do not seem to be major impediments to adopting other economic measures, but certainly dispel the notion that all economic measures of environmental policy are self-enforcing.

VI. CONCLUSIONS AND RECOMMENDATIONS

The major application of economic instruments of environmental policy in Brazil has been the use of a variety of direct tax incentives, of which the most important is to reward townships (*municípios*) that engage in such environmental services as protecting watersheds or establishing wildlife preserves with an increase in their regular share of state taxes. This is an innovative extension of a well-established system of allocation of tax resources among the different levels of government and, in effect, creates a quasi-market which transfers financial resources to townships providing environmental services at the expense of other governmental units which benefit from these services. This is an idea that has also been applied in the United States, where there are many examples of tax funds partitioned between the federal and state government, or between states and counties. The state of New Jersey, for example, collects a tonnage tax on waste materials delivered to landfills within

the state, and remits a portion of the moneys collected to the municipalities in accordance to the amount they recycle. The administrative requirements of this scheme are relatively simple: a weighing site at landfills and recycling facilities and a means of collecting the tax. It does, however, pre-suppose that most solid waste is deposited at landfills and that recycling is carried out at large, centralized facilities—neither of which is true in Brazil.¹²⁵

Brazilian emphasis on tax incentives has owed much to their convenience. These measures operate through the existing Brazilian tax system, and have required little policy analysis or public debate. They are also consistent with the Brazilian Federal Constitution, which implies that no law may create or imply a “right to pollute” or may establish a price for the “commercialization” of environmental resources.¹²⁶ (The latter structure has not prevented the imposition of environmentally oriented user fees and, hence, may not pose much of a practical obstacle to the application of economic instruments of environmental policy in Brazil).

Transferable development rights, and the other members of the new generation of more sophisticated market mechanisms now being discussed and implemented in the United States (for example bubbles and netting), are entirely new concepts in Brazil, and have never been seriously discussed as alternatives to the prevailing approach of command and control. On the other hand, even our limited review makes it hard to avoid the conclusion that the implementation of such more advanced market mechanisms in the context of an overall management plan would require extensive public discussion and important institutional strengthening even in the Brazilian states of São Paulo, Paraná, Rio de Janeiro, Rio Grande do Sul, and Minas Gerais (i.e., even in the most advanced states of Brazil).

In both the Pinelands and the marine fisheries cases in the United States, the system of transferable rights was managed by an independent authority which had both the analytic and the political power to cut across bureaucratic and disciplinary lines to develop, implement, ensure compliance with, and enforce an integrated policy for the management of the resource under its jurisdiction. Even so, in both cases, the introduction of transferable development rights constituted a major institutional innovation and had to be preceded by six to ten years of policy analysis, institutional design, and public debate involving a variety of powerful constituencies, on both the overall policy and the detailed regulations by which it was to be implemented. In the fisheries case, a major reorientation of the operational monitoring system was also required.

Given the novelty of these mechanisms and the weakness of Brazilian federal, state and municipal agencies charged with the management of environment and “green” natural resources, it is hard to imagine that they could be quickly or easily put in place in Brazil. In short, transferable development permits—and by extension other market mechanisms not well understood by the public and not directly connected to existing administrative systems—are not quick cures for Brazilian environmental policy ills. Indeed, it is doubtful that they would be effective, except in special circumstances.

On the contrary, experience in the United States, an advanced country with an extremely high level of popular environmental consciousness, indicates that the introduction

125. The account of the New Jersey tonnage tax is based on interviews with Messrs. Robert Confer and Guy Watson of the government of the state of New Jersey. Interview with Messrs. Robert Confer & Guy Watson, Oct.–Nov. 1994.

126. MOTTA AND REIS, *supra* note 1, suggest that the prohibition on double taxation in the Brazilian Constitution also restricts the use of economic instruments of environmental policy. This view is in error. The Brazilian Constitution prohibits double taxation only if both taxes are imposed upon the same *fato gerador* (taxable activity). See CONSTITUÇÃO FEDERAL art. 154, cl. 1 (Braz.). In the case on environmental taxation, any possible environmental tax would be based on a new *fato gerador*, i.e., on the environmental impact of the activity rather than on the activity itself.

of these mechanisms requires years of technical and political preparation. Small wonder, then, that Brazil—a developing country in which environmental issues were until recently kept off the political agenda—has up to now opted for direct incentives that require much less institutional capacity and give immediate, visible results to the affected parties. Now, however, the crisis of the command and control system in Brazil certainly does make it possible to discuss or even to introduce economic instruments of environmental policy, not as an alternative to command and control model, but as a complement to it for use in special situations.¹²⁷

In assessing the possibility or feasibility of introducing economic instruments of environmental policy in Brazil, several tasks must first be undertaken: (1) complete a more in-depth study of the current status of the command and control model in Brazil, weighing the causes of the undeniable failures in implementation;¹²⁸ (2) explain to Brazilian society and environmental NGOs that economic measures do not represent either the institution of a “right to pollute” or the possibility of “marketing the environment”, (3) identify the most promising sectors (air, water, mining, logging, etc.) for the success of economic instruments, either because they have been tested in other countries or because the command and control system simply does not work.¹²⁹ (It is hoped that what has happened with Brazilian environmental legislation, part of which was imported directly without being adapted to the Brazilian situations,¹³⁰ does not happen with economic instruments); (4) choose the governmental level (federal, state or municipal) at which legislation implementing economic instruments is to be introduced, according to the size of the program and to the degree of difficulty anticipated in obtaining acceptance, in technical and administrative feasibility, and in legislative approval; (5) make the current command and control system compatible with any economic instruments that may be introduced, so that both types of instrument can work in harmony.

It is useless to imagine that the adoption of economic instruments of environmental policy in Brazil will, in itself, resolve the problem of environmental degradation or even achieve everything that the command and control model was unable to deliver. Some of the problems that accompany and impede command and control instruments will also affect economic instruments. The Brazilian situation, in which economic instruments will operate, is complex and diverse, with enormous social, economic and cultural contrasts. One economic instrument may be efficient in a certain region and absolutely useless in another. This is true of the green ICMS which, as designed in São Paulo and Paraná, is not viable in the state of Amazonas, since most of the territory belonging to all, or nearly all townships (with the exception of Manaus) is under forest cover with no relevant industrial area. Under such circumstances, it is impossible to use a tax system to redistribute resources among several townships that have the same amount of vegetation cover and water resources.¹³¹

It is also wrong to exclude a role for such instruments as complements to the command and control model that already exists. In either system, cultural¹³² and implementation

127. Milaré understands that “this is certainly the right time at least to bring this issue up for discussion.” Interview with Édis Milaré, *supra* note 14.

128. Governor Mestrinho is correct in warning that “well-intended legal measures end up being highly detrimental because the reactions of the area in which they are to be implemented are unknown.” Interview with Governor Mestrinho, *supra* note 85.

129. Wildcat mining (*garimpo*) and logging, especially in the Amazon region, are two areas where the situation on the ground shows a total failure of the command and control system with no short-term prospects for improvement. This might be an ideal situation for testing economic instruments.

130. Governor Mestrinho does not hide his sense of resentment when he speaks of “laws imposed by outside forces.” Interview with Governor Mestrinho, *supra* note 85.

131. *Id.*

132. Cultural differences are enormous. Brazil has no tradition of environmental protection. A command

difficulties remain.¹³³ There appears to be more receptiveness to fiscal and credit instruments. The adoption of tradable permits, particularly for pollution control, could face constitutional and public opinion problems.¹³⁴ There may be less opposition to this mechanism for forestry and mining. A more concrete assessment, however, depends on specific studies aimed at these two sectors.

and control model cannot change long-standing practices overnight. Herein lies the appeal of economic instruments, since behind the large-scale transformations that Brazil has undergone throughout its history lies the economic component: various crop cycles, urbanization, etc.

133. Although Governor Mestrinho is obviously optimistic when he states that enforcement of possible economic measures “would not be a problem, since our rural farmers readily accept change,” implementation is in fact the Achilles heel of the Brazilian environmental protection system. Interview with Governor Mestrinho, *supra* note 85. Andreolli, with many years of experience in environmental implementation, acknowledges that “there are technical and administrative difficulties” in making such economic instruments work in Brazil. Interview with Cleverson Andreolli, *supra* note 12.

Findley, having studied the Brazilian situation in depth, acknowledges that “[i]n general, administrative enforcement of environmental standards appears to have been rather lax. This can be attributed partly to gaps and uncertainties in legal standards, to shortages of enforcement personnel and resources, and to the difficulties inherent in applying ambient standards to multiple polluters.” Findley, *supra* note 42, at 30.

Similarly, compare Friends of the Earth, *Sound Public Policies for the Amazon Region: Harmonizing Public Policies with the Objectives of the Pilot Program for the Brazilian Rainforest* 32 (Discussion Paper).

It is doubtful whether the performance of environmental agencies would be radically different if they were to implement and enforce economic instruments.

134. Feldmann says he is “in favor—in principle; but government reformulation is needed first in terms of having public policies and environmental pollution reduction strategies.” Interview with Fábio Feldmann, *supra* note 14.

VII. ANNEX: APPLICATIONS OF MARKET MECHANISMS TO "GREEN" ENVIRONMENTAL PROBLEMS IN THE UNITED STATES

A. *The New Jersey Pinelands: Transferable Development Credits*

The New Jersey Pinelands (formerly known as the Pine Barrens), an area of dwarf pine trees with a unique ecology and local culture, is threatened by encroachment by expanding suburbs of the nearby cities of Philadelphia and Atlantic City. There was a clear need to guide the inevitable development of the area into patterns compatible with the sustainability of this unique resource.

Enunciation of Broad Policy. In response to a local consensus, the U.S. Congress designated the Pinelands as a "national reserve"¹³⁵ (as distinct from a national park)—a cooperative effort of the federal, state, and local governments to conserve an area of a million acres without putting it under public ownership. The same Act "invited" the state of New Jersey to draw up and implement a comprehensive plan, and provided money for technical assistance and research and for public acquisition of critical parts of the area.¹³⁶

Creating institutions to implement broad policy. The state of New Jersey responded by passing the Pinelands Protection Act,¹³⁷ creating the Pinelands Commission, a state agency which consists of fifteen members: one from each of the seven pineland counties, seven appointed by the state governor, and one appointed by the U.S. Secretary of the Interior.¹³⁸

Developing and applying a model and plan. The commission collected and analyzed existing information regarding cultural attributes of the area, its natural resources, and the existing state of infrastructure and development.¹³⁹ Working rapidly (nine months to publish, six months for public review), its staff produced a land use map which distinguished nine "land use management areas," each with its own set of allowable uses: preservation areas, in which only forestry and agriculture of native species is allowed; forested areas, in which slightly more development is permitted; agricultural production areas; "special" agricultural production areas; rural development areas in which low-density development is permissible; pinelands villages, existing settlements in which residential development may continue; pinelands towns, larger and denser existing communities; regional growth areas, where substantial development is expected and permitted; and military and federal installations.¹⁴⁰ The plan was a multidisciplinary effort involving hydrologists, botanists, zoologists, foresters, and environmental scientists. Its general policy was to take advantage of existing investment unless the results of that investment are actually harmful to sustainability.

Implementing policies. The state developed a scheme for issuing a transferable development credit, called a "pinelands development credit,"¹⁴¹ to the owners of land whose use was to be restricted in order to comply with the new zoning and land use

135. National Parks and Recreation Act of 1978, Pub. L. No. 95-625, § 502.

136. *Id.*

137. Pinelands Protection Act, N.J. STAT. ANN. § 13:18A-11 (West 1991) [hereinafter Pinelands Protection Act].

138. *Id.*

139. NEW JERSEY PINELANDS COMMISSION, NEW JERSEY PINELANDS COMPREHENSIVE MANAGEMENT PLAN, THE SECOND PROGRESS REPORT ON PLAN IMPLEMENTATION (1981) [hereinafter SECOND PROGRESS REPORT].

140. THE PINELANDS COMMISSION, PINELANDS MANAGEMENT AREA (1992).

141. Pinelands Protection Act, *supra* note 137, § 13:18A-32(h).

requirements.¹⁴² These credits may be “severed” from the land on which they are based and sold to developers who plan to build in land management areas in which residential development is permitted.¹⁴³ The seller of these rights must file and record a restriction on the deed to his or her property on municipal records, restricting the use for that property.¹⁴⁴ If the property is mortgaged, the sale of development rights requires the agreement of the holder of the mortgage. A developer who buys a pinelands development credit has the right, subject to municipal zoning laws, to build at a higher density and thus to reap more profit from the same investment in infrastructure (roads, sewers, etc.). The system is analogous to the transferable development credits used in many U.S. cities to facilitate the preservation of historical buildings or to preserve open space.

Implementing regulations. The state created a Pinelands Development Bank, whose job is to operate the system.¹⁴⁵ The Bank issues development certificates, monitors the program by maintaining records of all transactions involving the sale of transferable permits, and educates the public regarding the workings of the development credit system. In some cases the Bank itself buys and sells development certificates.¹⁴⁶

The fifty-three municipalities (villages and towns) that form part of the pinelands revised their zoning requirements to be consistent with the overall plan, and adjusted their system of property taxes to recognize the lowered value of a property whose development rights had been severed and sold.¹⁴⁷ A dispute resolution system was provided. Remarkably, development in the region was still at an early enough stage when the legislation was passed that there were relatively few disputes to resolve.

Monitoring and ensuring compliance. The Pinelands Commission monitors the system by reviewing all applications for building permits to check that they are consistent with land use restrictions, and that builders who wish to take advantage of the program are in possession of the necessary development permits.¹⁴⁸ This review is in addition to the normal zoning review by the municipality to ensure that the proposed construction is consistent with local zoning regulations. The Commission ensures compliance with the restrictions and in extreme cases, enforces it against persistent violators mostly by responding to complaints, typically from aggrieved neighbors or other citizens.¹⁴⁹ The Commission also notifies the municipalities when a deed restriction is recorded as the result of the severance and sale of development rights, or when a development certificate is redeemed to enable a developer to build at higher than ordinary density.¹⁵⁰

General comments. The pinelands development credit system augments existing zoning systems and does not replace them. The market for permits improves resource allocation by enabling builders to increase housing density in areas where development is desirable, and at the same time compensate property owners whose land use is being restricted. The administration of the program does not seem to have presented special difficulties, given the extensive research already available on the environmental and cultural characteristics of the area, the wealth of human resources, the well developed system of zoning, land records and titling, and the closely knit social structure of the area.

142. See SECOND PROGRESS REPORT, *supra* note 139, at IV-1.

143. See STATE OF NEW JERSEY PINELANDS DEVELOPMENT CREDIT BANK, ANNUAL REPORT 2 (1992) [hereinafter 1992 ANNUAL REPORT].

144. Pinelands Protection Act, *supra* note 137, § 13:18A-35.

145. See 1992 ANNUAL REPORT, *supra* note 143, at 3.

146. See *id.*

147. See SECOND PROGRESS REPORT, *supra* note 139.

148. See *id.*

149. See *id.*

150. See *id.*

Even so, the pinelands development bank has had a substantial job explaining the workings of the system to the people of the area, especially to home builders.¹⁵¹ The passage of time has helped. At first, the home builders looked on the program as one which took away their right to build in restricted areas—now they are coming to regard it as a ticket to extra profits from permission to exceed local zoning limits.

B. The North Pacific Fisheries: Transferable Individual Quotas

The Pacific halibut and sablefish marine fisheries off Alaska have declined due to over-fishing. The permissible fish harvest has gotten so low that the fishing season has had to be reduced to as little as one day. In these “derby fisheries,” the few fish remaining went to the fishing boats that got there first. In the rush, safety, sanitation, and economy in the use of fishing gear were given little consideration.

In response to this situation, the Northern Pacific Fisheries Management Council has just instituted a system of transferable individual quotas. The quotas are specific for species, for geographic area, and for class of vessel.¹⁵² The system covers a total fish catch of 100 million pounds by some 6,000–7,000 vessels, making it the largest U.S. fishery ever covered by a transferable quota regime. A similar system for surf clams and ocean quahogs (local varieties of shellfish) has been instituted by the Mid-Atlantic Fisheries Council, which regulates fishing off much of the U.S. East Coast.¹⁵³

Enunciation of broad strategy and policies and creating institutions to implement policy. The transferable credit system was instituted under the provisions of the Fisheries Management Act, a federal law known as the Magnuson Act after the senator who sponsored it. The fisheries management council that instituted the system is a joint federal-state body created by that Act and charged with overall management of the fishery.

Developing a model and plan. The total quotas for each species and area are set each year in response to annual or quarterly surveys of fish populations by the National Oceanographic and Atmospheric Agency, with the aid of elaborate surveys and models. Individual quotas are then set in proportion to the overall quota. The owner of a quota may then take as long as (s)he likes to harvest the fish (s)he is allowed. (Under the previous “derby” system, the overall quota for each species and locality was translated into time allowed for fishing the species in that particular locality by means of an estimate of the number of fish that could be caught in a given time period.)

In Alaska, initial quotas were distributed in proportion to historic catch rates, with special consideration for smaller fishing boats.¹⁵⁴ The quotas may be sold to anyone with a legally specified minimum of operational experience in fish harvesting. There is no compensation if a quota is reduced; quota shares are considered to be a “harvest privilege” that may be modified or revoked at any time without compensation.

Implementing the policy. The regime was instituted after a six-year period of planning and vigorous public discussion, during which time industry and government reached a mutually acceptable arrangement and various administrative and logistic aspects of its

151. See NEW JERSEY PINELANDS DEVELOPMENT CREDIT BANK, BUILDERS-DEVELOPERS: YOU CAN MAKE MONEY USING PINELANDS DEVELOPMENT CREDITS (undated memorandum).

152. See STEPHEN PENNOYER, ENVIRONMENTAL IMPACT STATEMENT FOR THE INDIVIDUAL FISHING QUOTA MANAGEMENT ALTERNATIVE FOR FIXED GEAR SABLEFISH AND HALIBUT FISHERIES: GULF OF ALASKA AND BERING SEA/ALEUTIAN ISLANDS 1–7 (1992).

153. See BEN MUSE, SURVEY OF INDIVIDUAL QUOTA PROGRAMS, ALASKA COMMERCIAL FISHERIES ENTRY COMMISSION 1 (1991).

154. See *IFQS Off the Port Bow*, TRUE NORTH, Oct. 1992, at 3.

implementation could be worked out.¹⁵⁵ This prolonged negotiation was probably the most difficult part of the process; the actual administration of the program will probably be straightforward.

Implementing the regulations. The main task in implementing the system (i.e., of issuing the transferable permits and supervising the markets) is to insure that the purchasers of permits have the necessary practical fishing experience.

Monitoring, ensuring compliance, and enforcement. Monitoring of the system is done at specified landing points. There are fulltime inspectors at each of sixteen main ports, and others are on call on six hours notice.¹⁵⁶ The landed catch is measured and recorded on a computer network that compares the recorded landings with the unused balance remaining in the permits owned by the particular fisherman.

A major problem anticipated by the regulators is that of “high-grading”—dumping low-value fish at sea so that higher value fish may be landed and recorded without exceeding the quota.¹⁵⁷ Monitoring of discarded by-catch¹⁵⁸ is carried out by observers on board the fishing vessel. These were originally put on board to measure by-catch so that it would be figured into the total allowable quota. However, this information has become increasingly important for enforcement, and the observers have become subject to more or less subtle psychological pressure and sometimes to offers of bribes.

Under the older derby fishery, the major monitoring and enforcement problems were fishing in closed areas, fishing with forbidden gear, and fishing for “closed” (i.e., not permitted) species. The Coast Guard monitors for forbidden gear and closed areas by overflights and by boarding. There are also observers on board, whose main historic function has been to measure the by-catch to obtain the data used in calculating catch limits. However, the observers are taking on an increasing role in enforcement. The Marine Fisheries Council supplements these procedures by monitoring the fish delivered to processing plants and by audits that compare the internal records of the processing plants to the officially recorded landings.

From the monitoring and enforcement point of view, the main difference between derby fisheries and transferable individual quotas is that under the derby fishery, there was no impediment to taking as much fish as you could, as long as you were in the right place at the right time. Under transferable quotas, there is no rush, but there is a considerable incentive to exceed your quotas if you can get away with it. The number of inspectors is therefore being considerably increased. On the other hand, the fisheries councils hope that the new system will reduce the number of fishing vessels at sea by giving the owners of smaller boats the opportunity to convert their quotas into cash. If this is borne out in practice, the monitoring and enforcement problem will be eased.

155. *See id.* at 17.

156. *See id.* at 9.

157. *See* BEN MUSE & KURT SCHELLE, *INDIVIDUAL FISHERMAN'S QUOTAS: A PRELIMINARY REVIEW OF SOME RECENT PROGRAMS* 113 (Alaska Commercial Fisheries Entry Commission Series No. 89-1, 1989).

158. “By-catch” consists of non-marketable fish or fish other than the species a particular vessel intends to market.

