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## The Environmental Laws and Policies of Taiwan: A Comparative Law Perspective

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# The Environmental Laws and Policies of Taiwan: A Comparative Law Perspective

Dennis Te-Chung Tang\*

## ABSTRACT

*This Article discusses the development of environmental regulation and preservation in Taiwan in light of United States environmental law. The Article begins with a discussion of how few measures have been enacted to protect the Taiwanese environment. It then illuminates some of the problems with the Taiwanese environmental regulations that do exist. According to the author, some of these problems include: ambiguous and conflicting goals enunciated in the legislation; political pressures on the authorities influencing environmental policies; poor enforcement mechanisms; a legislative bias in favor of regulating new sources of pollution and against enforcing regulations in the case of old sources; and little or no litigation over environmental laws. The author next points out the weaknesses in Taiwan's policy of selective enforcement and its ineffective use of economic instruments to control pollution. The author concludes this Article with some suggestions of how Taiwan could improve its environmental regulation efforts.*

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## I. INTRODUCTION

This Article provides a critical analysis of the environmental laws\*\* and policies of the Republic of China (Taiwan), using United States environmental law as a standard of comparison.<sup>1</sup> After providing some initial background to this comparative approach, this Article in Part II demonstrates *prima facie* evidence that Taiwanese environmental law is still in a primitive stage of development. Part III analyzes further the characteristics of Taiwan's environmental regulations in contrast to these regulations' United States counterparts. Part IV examines the Taiwanese policy and practice of selective enforcement of environmental laws. Part V illustrates how the application of economic incentives in Taiwan's environmental regulatory regime has been distorted. Part VI makes some policy suggestions for improvement of the Republic of China's regulatory efforts.

Although the Republic of China (ROC) generally is perceived to be a member of the Civil (Continental) Law family, many newly developed

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\*\* For the purposes of this Article, the author has translated the Taiwan Statutes and regulations into English.

1. For other ROC-United States comparative environmental law studies see, DENNIS T. TANG, *ON THE FEASIBILITY OF ECONOMIC INCENTIVES IN TAIWAN'S ENVIRONMENTAL REGULATIONS: LESSONS FROM THE AMERICAN EXPERIENCE* (1990).

and more technological fields of law in Taiwan, such as environmental law, substantially follow the examples set by the United States. An explanation for this deviation lies in the fact that since World War II, Taiwan has been influenced predominantly by the United States, both economically and politically. Because attorneys generally lack technical expertise in the new and technological field of environmental law, bureaucrats with environmental engineering backgrounds have drafted all of Taiwan's environmental statutes.<sup>2</sup> Not surprisingly, most influential engineers in Taiwan have been educated in the United States.<sup>3</sup>

## II. A PRIMITIVE REGULATORY REGIME

During the 1970s, the people of the United States witnessed a decade in which numerous significant environmental statutes came into effect. These statutes essentially established an environmental law framework. During this same period, law schools began to offer courses in environmental law. In contrast, the establishment of Taiwan's Environmental Protection Administration (TEPA) in 1987, generally regarded as a milestone for the environmental era in Taiwan, came almost twenty years after the United States enactment of major environmental laws.<sup>4</sup>

Soon after its establishment, the TEPA proposed an ambitious plan to construct a comprehensive environmental law scheme. Due to various internal conflicts,<sup>5</sup> however, the Legislative Yuan (ROC's Congress) has enacted little legislation designed to implement the TEPA's goals.<sup>6</sup> In a

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2. Environmental law was first formally offered as a course in Taiwan's law schools during the 1988 academic year.

3. As a result of the nonlegal background of the drafters, most environmental legislation, as compared with traditional forms of legislation, is noticeably poorer in terms of legislative technique, and is marked by redundant, unintended, and ambiguous phrases. The problem also can be partly attributed to the lack of professional legislative staff available to the members of the Legislative Yuan.

4. TEPA was established on August 22, 1987. The Bureau of Environmental Protection, within the Department of Health, was TEPA's predecessor and was established in 1982. The Administrator of the TEPA has still not achieved formal Cabinet status, although he is entitled to sit in on Cabinet meetings.

5. The members of the Legislative Yuan, a primary power institution under the Constitution, have been much more preoccupied with a struggle for the redistribution of political power in the post Chiang Ching-Kuo era. Since Chiang's death in 1988, the Constitution has been amended twice, in 1991 and 1992. In addition, the prolonged interpellations, ineptly-organized committees, poorly defined rules and procedures, and even violent confrontations among members contribute to unprecedented inefficiency in the legislative process.

6. Besides two organizational statutes, the Legislative Yuan has enacted only two environmental statutes: the Statute for Settling Public Nuisance Disputes of 1992 and the

strict sense, no more than a dozen statutes primarily aimed at environmental protection exist. Table 1 illustrates the sharp contrast between the volume of ROC and United States environmental laws.<sup>7</sup>

In terms of traditional command-and-control regulations, the Water Pollution Control Act (WPCA) and the Air Pollution Control Act (APCA) represent Taiwan's most advanced environmental statutes. Enacted in 1974 and amended in 1983 and 1991, the WPCA consists of sixty-three articles. The APCA, first enacted in 1975 and amended in 1982 and 1992, consists of fifty-five articles. Due to the differences in legislative techniques, a *gesetz* or *loi* in a Civil (Continental) Law state typically is more concise than a statute or an act in an Anglo-American (Common) Law state. Nevertheless, it is still evident that the WPCA and the APCA are woefully incomplete and inadequate when compared to their grander United States counterparts, the Clean Water Act (CWA)<sup>8</sup> and the Clean Air Act (CAA).<sup>9</sup> The contrast between the Taiwanese WPCA and the APCA, on one hand, and the United States CWA and CAA, on the other, serves as an illustration of the primitive status of the environmental regulatory law regime in Taiwan.

### III. CHARACTERISTICS OF POLLUTION REGULATIONS

A closer examination of the WPCA and APCA reveals that their weaknesses are common features of, and, to various degrees, shared by, all pollution-combating statutes in Taiwan.

#### A. *Ambiguous Statutory Goals with Loose Connections to Pollution Control Mechanisms*

The United States Clean Air Act mandates that the federal regulatory agency, the Environmental Protection Agency (EPA), set up nationally

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Wildlife Conservation Act of 1988. The latter does not fall under TEPA's jurisdiction. The Legislative Yuan also has substantially revised three major laws: the Air Pollution Control Act Amendments of 1992, the Noise Control Act Amendments of 1992, and the Water Pollution Control Act Amendments of 1991. It also has enacted minor revisions to two acts: the Waste Disposal Act Amendments of 1988, and the Toxic Chemicals Control Act Amendments of 1988.

7. The United States laws appear in regular type, while those of the ROC have been indicated in bold type.

8. The Clean Water Act is composed of the Federal Water Pollution Control Act and accompanying amendments. See 33 U.S.C. §§ 1251-1376 (1988 & Supp. 1991) [hereinafter CWA].

9. The Clean Air Act is composed of the Air Pollution Prevention and Control Act and accompanying amendments. See 42 U.S.C. §§ 7401-7671q (1988 & Supp. 1991) [hereinafter CAA].

uniform legal ceilings, known as national ambient air quality standards (NAAQS), a goal to be achieved by each of the 247 air quality control regions (AQCR) covering the entire United States within specific deadlines.<sup>10</sup> In addition to the four types of federal uniform emission standards<sup>11</sup> set by the EPA, the states have primary responsibility for attaining the legislative goals by designing and implementing their own individual state implementation plans (SIPs).<sup>12</sup>

In contrast, before 1992, Taiwan's APCA only mandated emissions standards, without establishing any ambient standards. Moreover, although there were in practice "Environmental Air Quality Standards for the Taiwan Area, Republic of China,"<sup>13</sup> these standards only served as reference points with no binding legal authority.<sup>14</sup> Nor did the APCA contain SIPs or functional equivalents. Even if one believed in the desirability of these air quality standards, it was unclear how these standards possibly could be implemented on a system-wide basis.

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10. The CAA of 1970 provided that the air quality in each AQCR meet the primary NAAQS by May 31, 1975. See 42 U.S.C. § 1857c5(a)(A)(i) (1976).

The 1977 Amendments first distinguished the "clean" air areas, also known as "attainment areas" [or "PSD areas"], from the "dirty" areas, also known as "nonattainment areas" [hereinafter NA areas], on a pollutant-by-pollutant basis. It then set a new deadline of December 31, 1982, for the latter areas to meet the primary NAAQS. See 42 U.S.C. § 7502(a)(1)-(2) (1988).

The 1990 Amendments provided no less than 16 new and improved deadlines by subdividing the ozone NA areas into five different classifications (marginal, moderate, serious, severe, and extreme), and the carbon monoxide NA areas, as well as PM-10 NA areas, into two classifications (moderate and serious) with distant compliance dates up to 2001. See 42 U.S.C. §§ 7511-13 (1988 & Supp. 1991).

11. There are emission standards for new motor vehicles, new (stationary) sources performance standards (NSPS), national emission standards for hazardous air pollutants (NESHAP), and reasonably available control technology (RACT) applicable to the existing stationary sources in the nonattainment areas. *Id.*

12. The SIP is a final catch-all device in the CAA. The state regulatory agency has to estimate and determine the extent to which ambient air standards are exceeded, before they allocate the reduction burdens among the regulated sources. The state evaluations include consideration of the emission reduction that will result from the application of federal emission standards. 40 C.F.R. §§ 51-52 (1991).

13. The standards first were promulgated by the Health Administration, Executive Yuan, in 1975. In 1984 the Bureau of Environmental Protection within the Health Administration proposed, but did not formally make public, another set of air quality standards for the period from 1989 to 1993, and the period after 1994, respectively. In 1990 a more updated version of uniform standards modeled after the United States NAAQS was published by the TEPA. See TEPA Public Notice No. 7,457 (Mar. 12, 1990).

14. Footnote 3 of the 1990 ROC Air Quality Standards [hereinafter AQS] is ample evidence of this point: "The above-stated standards serve as reference for judging the degree of air pollution in the public living environments."

The 1992 Amendments attempted to make improvements, but were not quite successful. As amended, Section 1, Article 5 of the Act requires that the regulatory agencies of provincial and county governments,<sup>15</sup> after consulting relevant agencies, designate, in accordance with the air quality standards, various classes<sup>16</sup> of control regions based on the current air quality of each region. Section 2 of Article 5 prescribes that, "[T]he air quality standards mentioned in Section 1 shall, after consultation with relevant agencies, be promulgated by the central regulatory agency [*i.e.*, the TEPA]." However, because of ambiguities in the language, these newly added provisions fail to unequivocally establish air quality standards as statutory goals.

Section 1, Article 5 of the APCA is reasonably subject to two different interpretations. The first is that there shall be several sets of air quality standards that vary according to the type of local control region at issue.<sup>17</sup> The other interpretation is that there shall be only one uniform set of air quality standards that the various control regions are required to meet by a specified deadline.

In April of 1992, the TEPA promulgated the Air Quality Standards (AQS),<sup>18</sup> which are modeled after the United States Primary NAAQS.<sup>19</sup>

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15. The administrative districts now under the jurisdiction of the ROC include two provinces, Taiwan and Fuchien, and two metropolitan municipalities, Taipei and Kaohsiung. The hierarchical structure of Taiwan Province includes sixteen counties (Hsien) and five provincial municipalities. The Fuchien Province includes only three groups of strategic offshore islands, known as Chingmen, Matsu and Tungying, besides Fuchien, Mainland China.

16. In the Implementation Rules for the APCA (art. 7) promulgated in February of 1993, the TEPA classifies the control regions into three classes (Class I, II & III) modeled after the United States CAA Amendments of 1977.

17. This interpretation is especially plausible in light of the definition that appeared in Section 2 of the Act:

Air pollution control regions means various classes of regions delineated according to the air quality needed for their land use purpose, or upon the status quo of their air qualities.

Since the needed air quality varies for various land uses, the air quality standards shall not be unified. As to the debate of uniform versus variant air quality standards, see *e.g.*, James E. Krier, *The Irrational National Air Quality Standards: Macro-and-Micro-Mistakes*, 22 UCLA L. REV. 323 (1974).

18. See TEPA REGISTER No. 53, at 23 (May 1992). Notably, the original footnote 3 of the 1990 AQS (*see supra* note 14) was eliminated in the 1992 AQS.

19. Though the 1992 Amendments added "protection of the living environment" to the original "protection of public health" as the legislative purpose announced in Article 1, the AQS in Taiwan contains only one set of ambient limitations. In contrast, the United States NAAQS include primary and secondary standards for the assurance of "public health" and "public welfare" respectively. See 42 U.S.C. § 7409(b)(1)-

This modelling means that the first interpretation of a regime of varying local air quality standards must be rejected. Nevertheless, whether the AQS are intended as a uniform set of standards to be pursued under the Act, as the second possible interpretation would allow, is still unclear as the Act nowhere prescribes specific or even general time deadlines for the attainment of the AQS by control regions. The 1992 Amendments, also for the first time, ordained: "The regulatory agencies of provincial and county government shall, in accordance with the AQS, develop plans for maintaining or improving air quality in each of the various classes of control regions."<sup>20</sup> However, the Act does not provide any deadlines for developing such SIP equivalents or any sanctions for noncompliance by provincial and county governments.

On the other hand, the revised APCA continues to rely on emission standards to clean the air. Articles 11 and 23 require both stationary and mobile sources to abide by emission standards.<sup>21</sup> Since these emission standards refer to pollutant concentrations only, the effect of enforcing these standards on the improvement of ambient air quality is difficult to predict.<sup>22</sup>

As for water pollution, the ROC's WPCA has not followed the United States Clean Water Act in embracing a "zero-pollution" goal.<sup>23</sup>

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(2)(1988). Table 2 compares the ROC standards with those in the United States.

20. APCA, art. 6.

21. Section 1 of Article 11 reads as follows: "The stationary sources emitting air pollutants in public or private places shall be in compliance with emission standards." APCA, art. 11, § 1 (Taiwan). The author suggests striking out "in public or private places" because the APCA defines "a source" as "a particular unit of physical or chemical operation" (art. 2(2)), rather than "an entire plant."

Section 1 of Article 23 provides: "The modes of transportation emitting air pollutants shall be in compliance with emission standards." APCA, art. 23, § 1 (Taiwan). The author suggests replacing "modes of transportation" with "mobile sources" since the most seriously polluting vehicles and tools used in civil engineering cannot be suitably classified as "modes of transportation" in Chinese. In the newly promulgated Implementation Rules for the APCA, the TEPA defined "stationary sources" and "mobile sources." APCA, art. 3 (Taiwan). The deficiency is not fixed, however, since the APCA itself never mentioned "mobile sources," but only "modes of transportation."

22. In addition, the 1992 amendments tried, for the first time, to establish a comprehensive permit system by both subjecting all new and modified sources specified by the TEPA to a preconstruction review by the provincial or municipal control agencies and by requiring them to apply for operation permits from the provincial or municipal control agencies. *See* APCA, arts. 14, 15, 50 (Taiwan).

23. The United States philosophy under pre-1972 laws was only to pursue the best water quality for designated classifications of water usage at the most economic price. However, the Federal Water Pollution Control Act of 1972 established the elimination of all "discharge of pollutants into the navigable waters . . . by 1985" as a national goal



This is evidenced by Article 5 of the WPCA: "In order not to interfere with the usages of water, no person shall be allowed to utilize water as media in receiving or transporting discharges beyond the assimilative capacity<sup>24</sup> of the water." Section 1, Article 6 of the Act sets forth the major regulatory mechanisms: "The control agency of the central government (TEPA) shall, based on the characteristics of the body water and the situation of its basin, specify water zones as well as set up water classification and water quality standards." United States environmental lawyers who read these two provisions may reasonably conclude that the heart of the WPCA's regulatory program lies in water quality standards, similar to the United States Water Quality Act of 1965. It is unclear, however, that ROC lawyers would read these ambiguous words and reach the same conclusion.

In the United States, the practice of a water-quality-based approach for combating pollution involves three essential components: "First, a determination is made concerning the present and future uses of each body [of water]. Second, the specific water quality characteristics allowed or required for such uses [are] identified and descriptive or numerical values [for each of them, known as water quality criteria, are established. Finally,] a precise, detailed plan for achieving and preserving the criteria established" is proposed and implemented.<sup>25</sup>

In contrast to the well-ordered functioning of this process in the

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(the so-called "zero pollution" goal), while mandating that "wherever attainable," a "water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by . . . 1983" as an interim goal (the "fishable-swimmable" goal). 33 U.S.C. § 1251(a)(1)-(2) (1988).

24. "Assimilative capacity" refers to the "maximum amount of pollutants [that] can be allowed without interfering [with] the normal usage(s) of a particular water." WPCA, art. 2(15) (Taiwan).

Yet what is "normal usage(s)"? Article 11 of the newly promulgated Implementation Rules made another clarification:

That no person shall be allowed to utilize water as a media in receiving or transporting discharges beyond the assimilative capacity of the water, as prescribed in Article 5 of the WPCA, means that the water quality changes because of the total effluent discharged by all of the polluting sources which utilize water as media in receiving or transporting discharges cannot exceed the water classification and water quality standards prescribed in Article 6 of the WPCA.

WPCA, art. 11 (Taiwan). This clarification successfully connects the assimilative-capacity-oriented regulatory approach announced in Article 5 with the water classification and water quality standards prescribed in Article 6. However, the purpose of "water classification" and the relationship between water classifications and water quality standards is still not clear.

25. See N. Williams Hines, *Controlling Industrial Water Pollution: Color the Problem Green*, 9 B.C. INDUS. & COM. L. REV. 553, 585-86 (1968).

United States, the Taiwanese application of this approach suffers from confusion. First, the poorly phrased provisions cited above seriously obscure the "due process" for effectively carrying out specific tasks. Revisions are required to clarify the relations among the concepts of "water zones", "usages of water," and "water classification and water quality standards."<sup>26</sup>

Second, combining "water usage classifications" and "water quality standards" in the same legal documents obscures matters further.<sup>27</sup> The former classifies water usages into seven categories, including public water supply, agriculture (covering irrigation, aquaculture, and livestock), hydro-power generation, navigation, conservation and recreation, industrial utilization, and others. The latter not only subdivides public water supply into three classes and aquacultural and industrial utilization into two classes, but also fixes two sets of standards; one for surface water and another for ocean water.<sup>28</sup> For the purpose of setting standards, surface water and ocean water are re-sorted into five and three classes respectively. To avoid the confusion created by so many categories, it would be better if all water usage classifications were identified in one document, and all water quality standards were established in another document with each identified usage stated in numerical terms.

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26. Due to the legislative oversight, an unnecessary inconsistency is the use of "water usage" in art. 5 and "water classifications" in art. 6. To be consistent, the latter should be changed into "water usage classifications."

In particular, the author suggests that art. 5 remain unchanged as an announcement of the water-quality-standards-based approach, while art. 6 be revised as follows:

The control agency of the central government shall, after consulting relevant agencies, promulgate water usage classifications and water quality standards. The latter shall describe the water quality characteristics required for such classes of usage identified in the former.

The control agency of the central government shall, after consulting relevant provincial and municipal governments, divide the nation's waters into water zones.

The provincial and municipal governments shall adopt and submit to the control agency of the central government a plan which provides for the present and future uses of the water in each water zone within their jurisdiction and the methods for achieving and preserving the applicable water quality standards in the water zones.

27. Currently, the water usage classifications appear in both Section 7 of the Implementation Rules for the WPCA and Section 2 of the Water Classification and Water Quality Standards. *See* TEPA, COMPILATION OF ENVIRONMENTAL LAWS AND REGULATIONS IV-24-30 (1992).

28. The items in the standards specified for surface water and ocean water are similar, including DO, fecal coliform bacteria, BOD<sub>5</sub>/TSS, NH<sub>3</sub>-H, heavy metals, and commonly-used fertilizers. *Id.* Yet the standards for the ocean water are generally more lenient. *Id.*

The third, and probably the most telling, source of confusion is the practice by the TEPA and other regulatory agencies of enforcing only the effluent standards, although there are at least twenty-six water zones<sup>29</sup> specified by the Taiwan Provincial Government.<sup>30</sup> Section 1, Article 7 of the revised WPCA provides: "Industries, municipal sewage treatment systems and building sewage treatment facilities<sup>31</sup> discharging waste water into surface waters shall be in conformity with the effluent standards."<sup>32</sup> Like emission standards under the APCA, the effect of enforcing effluent standards on the water quality of a particular basin is hard to predict since the standards are set only in terms of density limitations.

Until the WPCA's latest amendment in 1991, the relationship between water quality standards and effluent standards was not clear. There were no limits based on water quality, such as the United States limits on total maximum daily loads (TMDL)<sup>33</sup> or water quality related effluent limits (WQREL).<sup>34</sup> As a result, effluent standards, like APCA emission standards, are designed to serve purely as mechanisms for scaling down pollution levels without imposing restrictions based on water quality.

Section 1, Article 9 of the WPCA Amendments of 1991 for the first time embraced the concept of "aggregate amount of discharge regulation."<sup>35</sup> Until a comprehensive permit system for all point sources<sup>36</sup> is

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29. See TEPA, COMPILATION OF ENVIRONMENTAL LAWS AND REGULATIONS IV-104 (1992).

30. Another problem is that the current Water Classification and Water Quality Standards were promulgated by TEPA's predecessor, the Health Administration, Executive Yuan, in 1985. The TEPA has not even bothered to update them.

31. The incorporation of sewage treatment facilities of the buildings into the effluent standards system may be based upon the fact that the overall ratio of sewer connections in the Taiwan area is still very low. (It is only about 2%, far behind the United States ratio, which was about 72% in 1979). See *The Construction Project of Sewers* (1988) (appearing in TEPA, COMPILATION OF ENVIRONMENTAL LAWS AND REGULATIONS IV-126 (1992)).

32. The effluent standards consist of three sets of standards applicable for periods prior to December 31, 1992, from January 1, 1993 to December 31, 1997, and from January 1, 1998, respectively. Each set includes the standards for municipal sewage treatment works, building sewage treatment facilities, industrial (and specified enterprises) discharges, as well as the common ones for all types of sources above-mentioned. See TEPA, COMPILATION OF ENVIRONMENTAL LAWS AND REGULATIONS IV-31 to 54 (1992).

33. 33 U.S.C. § 1313(d)(1) (1988).

34. 33 U.S.C. § 1312 (1988).

35. Section 1 provides:

The control agencies of provincial/municipal governments shall, based on the as-

established, however, this new policy cannot be implemented. Fortunately, the 1991 Amendments did call for the establishment within two years of a permit system requiring permits not only for new and modified sources,<sup>37</sup> but also for existing sources.<sup>38</sup>

In sum, contemporary ROC environmental statutes establish no specific environmental goals. All efforts seem to have focused merely on the use of emission and effluent standards as an abatement mechanism, even though establishing a comprehensive permit system is the most challenging task confronting the regulatory agencies of Taiwan.

### B. *Autonomy and Discretion of Regulatory Authorities*

The autonomy and discretion enjoyed by Taiwanese regulatory authorities can be attributed to several causes. First, current statutes contain few restrictions in the delegation of legislative powers to the control agencies. ROC constitutional law does not require that rulemaking by an administrative agency be guided by "an intelligible principle" set forth in the enabling statute, as required in the United States.<sup>39</sup> Moreover, the content, purpose, or boundary of such a legislative delegation

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simulative capacity of the waters, regulate the aggregate effluent of discharged water, whenever all or part of a particular water either

- (1) cannot attain the applicable water quality standards within the limitations imposed by effluent standards due to the concentration of industry; or
- (2) needs special protection.

36. The WPCA only regulates the enterprises designated by the central control agency and sewage systems. The former are equivalent to the selected industrial dischargers whereas the latter may be equivalent to municipal dischargers or "publicly owned treatment works." Though the effluent of buildings' sewage treatment facilities are subject to effluent standards, a building is not required to apply for a permit for discharging effluent.

In contrast, the regulated objects in the American CWA contain both point sources and nonpoint sources. A point source is defined as "any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, conduit . . . from which pollutants are or may be discharged." 33 U.S.C. § 1362(14) (1988). The nonpoint sources are mainly land use activities, such as agriculture, mining, and forestry, that cause run-off into streams. *Id.*

37. See § 14 (for new and modified industrial sources); and § 19 (for new municipal sources).

38. Article 59 of the WPCA reads: "Industrial and municipal sources which already were in existence before the Amendments shall, within the period of two years from the enactment of the Amendments, apply for a discharge permit in accordance with Articles 14 and 19 of this Act."

39. Cf. *J. W. Hampton, Jr. & Co. v. United States*, 276 U.S. 394, 409 (1928); *United States v. Grimaud*, 220 U.S. 506, 517 (1911); *Field v. Clark*, 143 U.S. 649 (1892); *Cargo of the Brig Aurora v. United States*, 11 U.S. (7 Cranch) 382, 386 (1813).

need not be unambiguously specified in the enabling statute.<sup>40</sup> Instead, ROC administrative agencies receive blank authorizations and enjoy, at least in theory, limitless discretion in deciding the stringency of various emission and effluent standards, as well as in selecting items for regulations.

In the United States, by contrast, environmental standards generally are legislated according to intelligible principles that are either health-based or technology-based. For example, the primary NAAQS have to be set "requisite to protect public health" but "allowing an adequate margin of safety."<sup>41</sup> Various emission and effluent standards, such as "new source performance standards" (NSPS) for the new and modified nonmajor stationary air pollution sources, "best practicable control technology" (BPT) standards and "best available technology economically achievable" (BAT) standards for existing industrial water pollution sources, are to be set based on considerations of technological as well as economic feasibility.<sup>42</sup> In contrast, the ROC's APCA and WPCA mandate emission and effluent standards without explicitly or implicitly dictating that these standards be technology-based.

Second, the absence of an Administrative Procedure Act (APA) in Taiwan<sup>43</sup> has further liberated administrative rule-making. Taiwan's lack of an APA means that environmental statutes contain no pre-enactment procedural requirements such as the notice-comments procedures typically employed in the United States.<sup>44</sup> In addition, judicial review of

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40. Germany, for example, requires the specification of content (*Inhalt*), purpose (*Zweck*), and boundary (*Ausmass*) of such legislative delegation. Grundgesetz [Constitution] [GG], art. 80, § 1.

41. 42 U.S.C. § 7409(b)(1) (1988). See D. TANG, *supra* note 1, at 413 (tbl. 2-4) for details.

42. See, e.g., 33 U.S.C. § 1314(b)(4)(B) (1988). The EPA should consider "the reasonableness of the relationship between the costs of attaining a reduction in effluents and the effluent reduction benefits derived." See D. TANG, *supra* note 1, at 415-416 (tbl. 2-6) for details. German law contains similar statutory mandates. Section 7(a), Wasserhaushaltsgesetz [WHG] (the minimum requirement set by the federal government shall be consistent with the "commonly recognized technical standards" (*allgemein anerkannten Regeln der Technik*)).

43. A draft of an Administrative Procedure Act was produced in the end of 1990 as the result of a research project sponsored by the central government. See COUNCIL FOR ECONOMIC PLANNING AND DEVELOPMENT, EXECUTIVE YUAN, COMPARATIVE STUDIES ON ADMINISTRATIVE PROCEDURES ACTS 43-178 for the draft (1990). The author was a member of the research committee responsible for drafting the rule-making procedures (§§ 98-112 of the draft). See Dennis Tang, *On Rule-making Procedures—An Experiment in the Chinese Transformation of the U.S. Administrative Procedure Act*, in *id.*, at 321 for details.

44. This does not mean, however, there are no procedural requirements at all. The

administrative rule-making, well-established under the United States APA,<sup>45</sup> is unavailable in Taiwan. Under the current Taiwanese system, the setting of standards is general and abstract in nature and therefore does not constitute an "administrative action."<sup>46</sup> An administrative action is currently the only form of administrative decisionmaking reviewable by the ROC Administrative Court.<sup>47</sup> As a result, environmental agencies

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most common requirements are "consulting relevant agencies" and "submitting to the TEPA for approval." *See, e.g.*, notes 15-16 and accompanying text (APCA, art. 5, § 1).

Moreover, there are poorly designed "double-key" procedural requirements. For instance, the APCA creates the hurdle of two rounds of confrontation that a local government must overcome before adopting more stringent emission standards. Section 2, Article 11 provides:

The emission standards mentioned in the first subsection of this article shall be promulgated by the control agency of the central government. But the control agency of the provincial/municipal and county/city governments may, based on special need, propose more stringent emission standards for specific industries or areas, and *submit it to the control agency of the central government for approval. The latter shall consult relevant agencies before making its final decision.* [emphasis added].

See William F. Pederson, Jr., *Why the Clean Air Act Works Badly*, 129 U. PA. L. REV. 1059, at 1078-79 (1981) for criticism of the two rounds of public notice and comment procedures for revising a SIP in the United States.

45. "A person suffering legal wrong because of agency action, or adversely affected or aggrieved by agency action within the meaning of a relevant statute, is entitled to judicial review thereof." 5 U.S.C. § 702 (1988).

46. The prevailing definition of an administrative action (*Vervaltungsakt*) contains the following five elements:

- 1) it is an action of an administrative agency;
- 2) it is an action which has direct legal effects;
- 3) it is an action of public law;
- 4) it is a unilateral action;
- 5) it is an action for a particular case (matter).

*See, e.g.*, Weng, *On the Concept of Administrative Action*, in Y. WANG, ADMINISTRATIVE LAW AND MODERN RULE-OF-LAW STATE 1, 8-36 (1976).

47. Although scholars commonly believe that courts are entitled to incidentally review the legality of the rules and regulations upon which the administrative action under dispute is based (*see, e.g.*, Weng, *On the Judicial Review of Illegal Rules*, in Y. Wang, *supra* note 46, at 109 (1987)) and the Council of Grand Justices, the counterpart of the United States Supreme Court, also supports such a viewpoint (*see, e.g.*, Interpretation No. 137: "Though judges in deciding cases may not refuse to apply all relevant rules and interpretations of an applicable statute promulgated by an administrative agency, they are still entitled, based upon the statute, to express their legal and appropriate opinions about these administrative rules and interpretations."), few administrative rules have been reviewed and overturned in practice.

To correct this institutional deficiency, the Judicial Yuan proposed, mainly modeled after the German Administrative Court Rules (*Vervaltungsrichtsordnung*), a draft of Amendments to the Administrative Litigation Act in 1988. Article 2 of the draft provides

are substantially free from the constraint and pressure of potential litigation challenging the propriety of promulgated standards.<sup>48</sup> In practice, when confronted with criticism, the TEPA usually claims that the standards promulgated are reasonable by referring to the relevant applicable standards in the United States<sup>49</sup> and other developed countries.

The third major factor is that environmental statutes contain no action-forcing provisions or provisions for citizen suits. In the United States, the EPA has a legal obligation to set up various standards within statutory deadlines.<sup>50</sup> If the EPA fails to perform its nondiscretionary duties, any public interest-minded citizen can sue the Administrator for the failure.<sup>51</sup> Since no such Taiwanese provisions exist for action enforcement or citizen suits,<sup>52</sup> the environmental protection agencies in Taiwan have established standards freer from external pressure.<sup>53</sup> On

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that all disputes of public law are revisable by the Administrative Court, except when another statute prescribes otherwise.

48. Based on the author's knowledge, there have not been any cases challenging the technological feasibility of these standards.

49. The standards set by the TEPA are generally somewhat lower than their counterparts in the United States. See TEPA, A COMPARATIVE REVIEW OF ENVIRONMENTAL STANDARDS IN THE ROC AND OTHER COUNTRIES (Aug. 29, 1991)

50. See, e.g., 42 U.S.C. § 7409(a)-(1) (1988):

The Administrator

(A) within 30 days after December 31, 1970, shall publish proposed regulations prescribing a national primary ambient air quality standard and a national secondary ambient air quality standard for each air pollutant for which air quality criteria have been issued prior to such date of enactment; and

(B) after a reasonable time for interested persons to submit written comments thereon (but no later than 90 days after the initial publication of such proposed standards) shall by regulation promulgate such proposed national primary and secondary ambient air quality standards with such modifications as he deems appropriate.

The 1977 Amendments require that each of these standards be reviewed every five years. 42 U.S.C. § 7409(d)(1)(1988).

51. See, e.g., Clean Air Act § 304, 42 U.S.C. § 7604(a)(1) (1988); Clean Water Act § 505, 33 U.S.C. § 1365(a)(1) (1988); Toxic Substances Control Act § 20(a)(1), 15 U.S.C. § 2619(a)(1) (1988); Endangered Species Act of 1973 § 1(g)(1)(A), 16 U.S.C. § 1540(g)(1)(A) (1988).

52. See discussion *infra* part III.E.

53. For instance, Section 8(2) of APCA of 1982 requires that stationary sources which utilize, emit, or may expose the hazardous air pollutants specified by the regulatory agency shall install autonomous self-monitoring equipment and an alarm system. Accordingly, Section 17(2) of the Implementation Rules of APCA states that a guideline for installing such self-monitoring and alarm systems be jointly promulgated by the TEPA, the subject business regulatory agency and the labor regulatory agency. Yet such an installation guideline has still not seen the light of day.

the other hand, some indications suggest that, while these institutional deficiencies effectively have kept average citizens (and probably most environmental groups) outside the standard-setting process, well-organized industries may have been influential<sup>54</sup> in environmental decisionmaking.<sup>55</sup>

### C. Overview of Regulatory Standards

Regulatory standards of varying levels are usually set for different industries or enterprises, and according to size, production process utilized, and fuels employed. The distinction between new and existing sources, however, lies only in different deadlines for meeting the same applicable standards.

The current Air Pollutants Emission Standards for emission of NO<sub>2</sub> from Stationary Sources<sup>56</sup> are divided into combustion processes and

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A similar provision can be found in Section 2, Article 31 of the 1992 Amendments.

54. In response to soaring criticisms from the industry, President Lee, acting as the Chairman in a conference within the ruling KMT party, instructed the TEPA Administrator Jaw to review the proprieties of effluent standards. See UNITED DAILY NEWS, Sept. 1, 1992. And, after negotiations with the representatives from industry, the TEPA has agreed to lower some of the standards. See UNITED DAILY NEWS, Oct. 3, 1992.

For a general picture of how the pressure groups have influenced the decisionmaking process of administrative agencies, see COMMISSION FOR RESEARCH, DEVELOPMENT AND EVALUATION, EXECUTIVE YUAN, A STUDY ON THE PARTICIPATION OF INTEREST GROUPS IN POLITICAL PROCESSES (1989).

55. Legal channels exist for the interest groups. For example, Section 7 of the Act for Standardizing Laws and Ordinances of the Central Government (Chung Yang Fa Kuei Piao Chung Fa) requires administrative rules (regulations) "to be sent to the Legislative Yuan" immediately after issuance or publication. In practice, the administrative rules are usually reviewed by each corresponding committee in the Legislative Yuan and the committees may recommend the Legislative Yuan to remand the regulations for revisions. See Congressional Rules, § 8. Though one may argue whether the cited provision is a "legislative veto," see generally Dennis Tang, *The Three-Branch Constitution, the Four-Branch Government, and the Legislative Veto—A Critical Review of INS v. Chadha*, 16(2) AM. STUD. 27 (1986), a committee in the Legislative Yuan does, in a subtle yet substantial way, influence the decision-making of an agency. For a discussion of the constitutionality of such a practice, see C. Schu, *On the Congressional Supervision of the Administrative Rules*, in C. SCHU, LAW AND STATE POWER 269, 273 (1992); TANG, *supra* note 43, at 361-62 n.82.

56. See TEPA Register No. 53, at 2-22 (May 1992). The pollutants regulated thereby include not only the so-called "criteria pollutants" of the United States (such as TSP, SO<sub>2</sub>, but also other pollutants (such as black smoke) and hazardous pollutants (such as asbestos and cadmium).

Prior to its amendment in 1992, Article 6 of the APCA required the provincial or municipal governments to propose emission standards for stationary sources and to submit them to the control agency of the central government for approval. Yet similar stan-



noncombustion processes. The former vary depending upon the sulphur content of the fuels used. Similarly, the standards for particulates first are divided into two sets, one for enterprise (hazardous) waste incinerating facilities and the other for other processes. Standards for enterprise waste incinerating facilities are further subdivided into two sets based upon their treatment capacities.<sup>57</sup> This practice of setting standards of differing stringency based on "fundamentally different factors" (FDF)<sup>58</sup> illustrates that economic and technological feasibility are in fact taken into account by the regulatory agencies in setting various discharge standards, even though such consideration is not required by law.

More importantly, the same applicable standards typically are applied to both new and existing sources, although the latter are given a few years to meet the standards.<sup>59</sup> This differs sharply from the United States practice under which new sources always are subject to more stringent standards than those applied to existing sources. This departure may be due to several reasons. First, as mentioned earlier, current ROC laws do not mandate that standards be technology-based. Second, the emission and effluent standards promulgated by the Taiwanese, as compared to those implemented in the United States, are still lenient. Third, and probably most telling, the current standards have not been

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ards can be found in the Air Pollutants Emission Standards for Stationary Sources in the Taiwan Province of 1986. See TEPA, COMPILATION OF ENVIRONMENTAL LAWS AND REGULATIONS II-36 to II-58 (1992).

57. The divisions are below 400 kg/Nm<sup>3</sup> as well as 400 kg/Nm<sup>3</sup> and above. The variance of effluent standards for livestock farms based on size (for farms breeding over 1,000 pigs, as well as for those breeding between 200 and 999 pigs) is another example. See TEPA, COMPILATION OF ENVIRONMENTAL LAWS AND REGULATIONS IV-31, IV-37 (1992).

58. The term originally was found in 40 C.F.R. § 421.12 (1974). If an individual discharger demonstrates that it deserves different treatment based upon "factors relating to the equipment or facilities involved, the process applied, or other such factors considered in the establishment of the guidelines," the EPA may grant a variance to the otherwise applicable effluent limitations. See 40 C.F.R. § 403.13 (1992) for the current version. The author simply borrows the idea here.

59. See, e.g., Air Pollutants Emission Standards for Stationary Sources, TEPA REGISTER No. 53, at 2-22 (May, 1992); Measures Controlling Noise from Mobile Sources, § 4, TEPA, COMPILATION OF ENVIRONMENTAL LAWS AND REGULATIONS III-27 (1992). In the former, the more lenient deadlines for existing sources to meet the same standards are varied depending upon their location, i.e., those located in the dirtiest (Taipei and Kaohsiung Metropolitan Areas) and cleanest areas (Hwalien County and Taitung County) shall meet the standards within a shorter period. This illustrates again how the TEPA can exercise unfettered discretion. It should be noted that the effluent standards under the WPCA do not distinguish new sources from existing sources.

seriously enforced,<sup>60</sup> and thus, their economic and technological feasibilities have not been tested. In any event, the "new source bias"<sup>61</sup> prevalent in the United States practice has not troubled the regulatory agencies in Taiwan.

Looking at the evolution of emission standards (both for stationary sources and mobile sources) and effluent standards, one can easily recognize the general pattern of "guided incrementalism,"<sup>62</sup> whereby agencies raise standards phase by phase. For example, the effective dates set for effluent standards to become more stringent are January 1, 1993 and January 1, 1998, while the relevant dates for emission standards for stationary sources are July 1, 1989 and July 1, 1993.<sup>63</sup>

#### D. *Scope of Regulatory Standards*

In the United States, both pollutant concentration standards and mass discharge rates<sup>64</sup> are employed in considering the issuance of discharge permits (Table 3). In Taiwan all emission or effluent standards regulate pollutant concentration only and are applied directly, without transforming the standards into particular discharge quantity limitations for individual sources. For example, the current Air Pollutants Emission Standards for Stationary Sources provide two types of emission standards for each of the regulated pollutants: one for emissions directly emitted from stacks; and the other for emissions measured by ambient air quality changes in the neighborhood. Both standards are prescribed only in terms of density.<sup>65</sup>

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60. See discussion *infra* part IV.

61. Taking coal-fired power plants, for example, the cost of sulfur abatement in new Western coal-fired plants is approximately four times the incremental cost for existing power plants. See ROBERT W. GRANDALL, *CONTROLLING INDUSTRIAL POLLUTION: THE ECONOMICS AND POLITICS OF CLEAN AIR* 36-37 (Table 3-1) (1983).

62. David Foster, *Planning for the Development of Economic Incentives under Institutional Constraints: The Role for Guided Incrementalism*, in *BUYING A BETTER ENVIRONMENT: COST-EFFECTIVE REGULATION THROUGH PERMIT TRADING* 71, 76 (E. Joeres & M. David eds., 1983).

63. Similar landmarks are identified in the Air Pollutants Emission Standards for Modes of Transportation. Those for new vehicles are: July 1, 1987, July 1, 1990, Aug. 1, 1992 and July 1, 1995. See *TEPA REGISTER* No. 56, at 10-16 (Aug. 1992). See also *supra* note 32.

64. Mass discharge rates are measured by pollutant weight per unit input, output, or time period.

65. The current emission standards do not suggest that the regulated firms employ any specific abatement equipment, and, therefore, look like pure "performance standards." Performance standards, in contrast to specification or design standards, command only performance at a given level (e.g., SO<sub>x</sub> emissions cannot exceed 1.2 lbs/MBtu) that

This practice may have been initiated for the convenience of inspection prior to the establishment of a comprehensive permit system. Nonetheless, it has caused a number of problems. First, as mentioned earlier, together with the lack of SIPs, no one can ascertain or even roughly predict what kind of air (or environmental) quality exists in Taiwan by enforcing these emission standards. Second, the measurement of changes in ambient air concentration around the polluting source inspected is a very controversial device, because it is not easy to distinguish background pollution caused by neighboring sources from the actual emissions of the inspected source.<sup>66</sup> Despite this difficulty, the Administrative Court has upheld the legality of this practice.<sup>67</sup> The court justified its decision in the relevant case by noting that the regulatory agency had taken into account these possible miscalculations by adjusting the original standards to accommodate an adequate margin of error.<sup>68</sup> Third, in the case of water pollution, much to the chagrin of the regulatory agencies, current

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must be achieved by the regulated firms, although the firms may select the means utilized to attain the goal mandated.

66. Prior to 1987, the measurement of air quality changes was even more controversial. In Taiwan Province and Kaohsiung City, the locations for conducting such an ambient measurement, in principle, had to be outside the boundary of the polluting source being tested. Only when this was impossible could the agency properly choose a location within three meters of the boundary as the measuring spot. *See* Air Pollutants Emission Standards for Stationary Sources Applicable in Taiwan Province, § 7; Air Pollutants Emission Standards for Stationary Sources Applicable in Kaohsiung City, § 7.

The rule was different in Taipei City. The measuring location chosen had to be located somewhere between 5 meters inside the boundary and 15 meters outside the boundary of the polluting source to be tested. *See* Air Pollutants Emission Standards for Stationary Sources Applicable in Taipei City, n.3.

The current Air Pollutants Emission Standards for Stationary Sources promulgated by the TEPA in April 1992 have unified the practice by adopting the original rule applicable in the Taiwan Province. Air Pollutants Emission Standards for Stationary Sources, § 6 (1992).

67. Administrative Court Decision No. 228 (1981) (Taiwan) [hereinafter ACD].

68. *Id.* The standard for smoke density in Taipei City was originally set at 350 mg/m<sup>3</sup>. Given that emissions contributed by other sources may be collected in an ambient concentration test, the Health Administration, Executive Yuan, reset the standard to 500 mg/m<sup>3</sup>. In addition, a test error of 10% is allowed in practice; that is, only a test resulting in a concentration of more than 550 mg/m<sup>3</sup> subject the offender to punishment. Manifestly, these facts show that all relevant factors were taken into account when the control authority set up the maximum allowable concentration standards. The plaintiff's argument is thus untenable.

The industry has suggested that ambient air testing around neighborhoods be completely abolished; they believe that the only meaningful tests are those measured at the stacks. *See, e.g.,* Wei, *Opinions of the Cement Industry on the Achievement of Current Air Pollutant Emission Standards*, 7 *INDUS. POLLUTION CONTROL* 15, 18 (1983).

law allows the regulated polluters to meet pollution standards simply by diluting waste water before discharge.<sup>69</sup>

### E. Enforcement Mechanisms

The United States CAA and CWA not only provide multiple mechanisms of enforcement, but, in order to achieve a maximum degree of enforcement, delegate the power of initiation to all of the parties involved. In particular, while the states are assigned "primary responsibility," any failure to enforce will result in a federal takeover. In case neither federal nor state government takes action, private enforcement may be initiated under the "citizen suits" clause.<sup>70</sup> The federal government may also act against the lawbreakers directly through the auspices of the EPA and individual citizens.<sup>71</sup>

Whenever the Administrator finds a SIP violator, he must notify the state. If the state fails to act against the violator within thirty days after the notice, the EPA may intervene and issue an order requiring compliance. Alternatively, the EPA can bring civil actions, as any provision in a SIP approved by the EPA is a federal regulation.<sup>72</sup> If the violations of a SIP provision are so widespread that they appear to result from a failure by the state, the Administrator must instruct the state to take corrective measures. If this failure extends beyond the thirteenth day after the notice, the EPA must give public notice of its findings and take over enforcement responsibility until the state satisfies the Administrator that it vigorously will enforce the SIP.<sup>73</sup>

As for the uniform federal emission standards, the EPA must delegate enforcement authority if a state has developed adequate procedures for implementing and enforcing these standards.<sup>74</sup> Even after delegation,

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69. To overcome this problem, the 1991 amendments added a new provision (§ 20) prohibiting industrial or municipal sources from diluting their waste water without obtaining a permit in advance from the controlling metropolitan or county government.

Similar problems existed in Japan, *see* GREASER, K. FUJIKURA & A. MORISHIMA, *ENVIRONMENTAL LAW IN JAPAN* 18 (1989).

70. 42 U.S.C. § 7604 (1988 & Supp. 1991); 33 U.S.C. § 1365 (1988 & Supp. 1991).

71. This multilayered structure of enforcement is sketched in Figure 1. (See Appendix).

72. *See* 42 U.S.C. § 7413(a)(1) (1988) (amended 1990); 40 C.F.R. § 52.23 (1987) (amended 1989).

73. 42 U.S.C. § 7413(a)(2) (1988) (amended 1990).

74. 42 U.S.C. §§ 7411(c)(1) (1988 & Supp. 1991) and 7412(d)(1) (1988) (amended 1993). The states may also enforce the monitoring/inspection requirement. *See* 42 U.S.C. § 7414(b)(1) (1988 & Supp. 1991). The enforcement of new motor vehicle emis-

however, the EPA still retains enforcement power.

In sum, the "creative federalism" embodied in the CAA and CWA has made enforcement in the United States a shared responsibility of all levels of government. As a matter of practice, the EPA normally takes cases that are particularly complex or that a state has avoided for political reasons.<sup>75</sup>

Governmental enforcement of environmental regulations is supplemented by the availability of citizen suits, which are divided into two types. The first type allows any person to commence civil action on his own behalf against any person who is alleged to "be in violation of"<sup>76</sup> an applicable emission or effluent standard or limitation or an order issued with respect to such standard or limitation.<sup>77</sup> The other, as mentioned earlier, allows any person to sue the Administrator for his failure to perform nondiscretionary duties.<sup>78</sup>

In terms of procedure, the current United States enforcement system is characterized by the gradual escalation of the process. A violator first is

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sion standards, however, cannot be delegated to the states.

75. R. MELNICK, REGULATION AND THE COURTS: THE CASE OF THE CLEAN AIR ACT 197 (1983).

The dual system of enforcement, however, does cause tension. Compare *United States v. Louisiana-Pacific Corp.*, 18 ERC 2020 (1982) (the EPA may prosecute under the Clean Water Act even in the event of compliance with state NPDES schedules) and *United States v. Cargill, Inc.*, 508 F. Supp. 734, 745-6 (D. Del. 1981) ("a federal enforcement suit [can] be maintained despite the pendency of similar proceedings in state court.") with *United States v. ITT Rayonier, Inc.*, 627 F.2d 996 (9th Cir. 1980) (collateral estoppel bars EPA from litigating issues resolved in state court proceeding).

76. There are ambiguities in the meaning of "alleged to be in violation." The Supreme Court in *Gwaltney of Smithfield, Ltd. v. Chesapeake Bay Foundation, Inc.*, 484 U.S. 49, 64 (1987) held that while wholly past violations cannot serve as grounds for citizen suits, the plaintiff-citizen can allege a state of either continuous or intermittent violation, and a reasonable likelihood that a past polluter will continue to pollute in the future.

77. 42 U.S.C. § 7604(a)(1) (1988 & Supp. 1991); 33 U.S.C. § 1365(a)(1) (1988 & Supp. 1991). Serving as a supplementary mechanism, a citizen suit can be brought only after sixty days have passed after the notice of violation has been issued and the EPA or state has taken no action against the violator during that sixty day period. 42 U.S.C. § 7604(b) (1988 & Supp. 1991); 33 U.S.C. § 1365(b) (1988 & Supp. 1991).

78. 42 U.S.C. § 7604(a)(2) (1988 & Supp. 1993); 33 U.S.C. § 1365(a)(2) (1988 & Supp. 1991). It is not quite clear which duties of the Administrator are nondiscretionary. Compare *City of Seabrook v. Costle*, 659 F.2d 1371, 1374 (5th Cir. 1981) (the "principle of almost absolute discretion in initiating enforcement action should apply with equal force to the decision to take the preliminary investigatory steps that would provide the basis for enforcement action") with *South Carolina Wildlife Federation v. Alexander*, 457 F. Supp. 118, 134 (D.S.C. 1978) (the duty of the Administrator to issue a compliance order under 33 U.S.C. § 1319(a)(3) is nondiscretionary).

given an administrative order (*i.e.*, notice of the violation) in which the facts of violation are stated and a date for final compliance is set (usually through negotiation). Only if the violator fails to comply with the administrative order will the agency impose administrative "noncompliance penalties"<sup>79</sup> or commence a civil action for injunctive relief or monetary penalties.<sup>80</sup> Criminal sanctions are reserved for the most recalcitrant and intentional violators.<sup>81</sup>

Environmental violations in Taiwan usually consist of noncompliance with regulatory standards,<sup>82</sup> emergency orders of the regulatory agencies,<sup>83</sup> or monitoring- or inspection-related requirements.<sup>84</sup> The sanctions

79. 42 U.S.C. § 7420 (1988 & Supp. 1991).

80. *See, e.g.*, 42 U.S.C. § 7413(b) (1988 & Supp. 1991); 33 U.S.C. § 1319(d) (1988 & Supp. 1991).

81. *See Enforcement Today: An Interview with Thomas L. Adams, Jr.* (Assistant Administrator in charge of EPA's Office of Enforcement and Compliance Monitoring), 13(2) EPA J. 2-5 (Mar. 1987); Anne Gorsuch, *General Operating Procedures for Civil Enforcement Program*, 13 ENV'T. REP. (BNA) 78 (1982).

From 1983 to 1990, only 26 prosecutions under the CAA and 184 prosecutions under the CWA (including Safe Drinking Water Act as well as Refuse Act) have been brought by the Department of Justice. *See HUTCHINS, U.S. DEP'T OF JUSTICE, ENVIRONMENTAL CRIME SECTION, ENVIRONMENTAL CRIMINAL STATISTICS FY 83 THROUGH FY 90, MEMO* (Feb. 2, 1991), *reprinted in INNOVATION IN ENVIRONMENTAL POLICY* 78 (tbl. 4.1) (T. Tietenberg ed., 1992). The CWA provides for criminal sanctions when a discharge is "willful" or "negligent," while under the CAA a violation must be "knowing" in order to be criminal. *Cf.* 42 U.S.C. § 7413(c) (1988 & Supp. 1991); 33 U.S.C. § 1319(c) (1988 & Supp. 1991).

82. *See, e.g.*, APCA, art. 36 (Taiwan) (violations of emission standards); WPCA, art. 38 (Taiwan) (violations of effluent standards); Noise Control Act, art. 15 (Taiwan) (noise regulatory standards).

83. APCA, art. 8, § 1 (Taiwan) prescribes:

Upon receipt of evidence that the air quality might have seriously deteriorated because of sudden changes in meteorological conditions or other causes, the regulatory agencies and the operators of public and private places shall take *emergency preventive measures*. If necessary, the regulatory agencies may issue air quality deterioration warnings and may prohibit or restrain the uses of modes of transportation or the emission of air pollutants in public and private places. [emphasis added].

A stationary source in violation of this section shall be punished by a fine of between NT\$ 100,000 and NT\$ 1,000,000; if the violation is found to be serious, the source may be ordered to suspend operation temporarily. APCA, art. 34, § 1 (Taiwan).

Article 20 of the APCA provides:

The operator of a stationary source which significantly increases its emission of air pollutants due to an accident shall take *emergency responsive measures* and report to the local regulatory agency within one hour.

The regulatory agencies confronted with the situation of Section 1 of this Article may order the polluting source[s] to take necessary measures and even to suspend

available for violations include administrative fines, suspension of operation, shut down, and criminal penalties.<sup>85</sup>

Compared to their United States counterparts, the ROC's enforcement mechanisms clearly are different. First, while a regulatory agency in Taiwan can issue an immediate order of suspension, a United States regulatory agency first must bring a civil action for a permanent or temporary injunction. This difference can be attributed to the lack of a due process requirement in the ROC Constitution.<sup>86</sup> A pragmatic institutional remedy would be to adopt a formal hearing procedure for the imposition of such sanctions in the forthcoming administrative procedure act.

Second, while the Taiwanese "continuous daily fines" and the United States "non-compliance penalties" both are imposed by the regulatory agencies (without the necessity of a lawsuit), the United States approach is more effective because it deprives polluters of the economic profits reaped by delaying or avoiding compliance with pollution control requirements.<sup>87</sup> On the other hand, Taiwanese regulatory agencies only

its operation. [emphasis added].

A source in violation shall be punished by a fine of between NT\$ 100,000 and NT\$ 1,000,000; if the violation is found to be serious, the regulatory agencies may order the source to suspend operation temporarily, or may even revoke its permit of operation or suspend operation indefinitely. APCA, art. 40 (Taiwan).

The author suggests that these two above-cited articles be revised into one article modeled after Section 303(a) of the United States CAA (42 U.S.C. § 7603(a) (1988 & Supp. 1991)).

84. See, e.g., APCA, art. 36 (Taiwan) (failure to install automatic monitoring equipment and to submit a self-certification report to the TEPA periodically, as required by art. 12), APCA, art. 30 (Taiwan) (false representation).

85. See, e.g., APCA, arts. 29-33 (Taiwan); WPCA, arts. 32-37 (Taiwan). These penalties were added by the amendments of 1992 and 1991. The practice of having criminal penalties scattered in each environmental statute is different from the German model which collects all environmental crimes together as a chapter (*Straftaten gegen die Umwelt*) in the Criminal Code. *Strafgesetzbuch* [StGB] ch. 28.

86. The Fifth Amendment to the United States Constitution reads: "No person shall . . . be deprived of life, liberty, or property, without due process of law . . ." The first section of the Fourteenth Amendment contains similar provisions applicable to States.

87. The penalties assessed by the Administrator shall be "no less than the economic value which a delay in compliance . . . may have for the owner of such source, including . . . the capital costs of compliance . . ., operation and maintenance costs . . ., and any additional economic value, which such a delay may have for the owner or operator of such source . . ." 42 U.S.C. § 7420(d)(2)(A) (1988).

To meet the Due Process requirements, the Administrator can only determine the amounts of penalties through formal administrative adjudication procedures. 42 U.S.C. § 7420(b)(5) (1988).

can punish a recalcitrant violator by a fine of the maximum amount on a continuous daily basis.<sup>88</sup> If the maximum fine actually is less than the economic profits reaped by noncompliance, then the polluter has no economic incentive to comply. The United States civil penalties may be worthy of adoption by Taiwan as a middle ground sanction, so that the rationality of environmental sanctions can be improved without touching the thorny problem of distinguishing criminal wrongs or illegalities from administrative wrongs or illegalities.<sup>89</sup>

Third, the gradual escalation of enforcement in Taiwan is controlled by legislative command rather than subject to the discretion of the administrative agency. Fourth, the government purchases are not (but should be) used seriously as another available sanction against environmental violations.<sup>90</sup>

#### F. *Jurisdiction of Central and Local Governments*

A more effective division of labor among the various Taiwanese levels of government for environmental regulations is needed. Generally speak-

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88. According to the Highlights promulgated by the TEPA for guiding the imposition of sanctions under the APCA, a plant found still in violation, after expiration of the designated period for improvement, shall be punished by a fine of the maximum amount on a continuous daily basis until the plant suspends operation. See TEPA PUB. NOTICE 40,319 (Air) (Nov. 6, 1990) (*in* TEPA Register No. 36 (Dec. 1990)).

The earlier version of the Highlights promulgated by the Health Administration in 1984 even provided exact increments for each additional violation. For example, the first violation found shall be subject to a fine of NT\$ 30,000 and the second, a fine of NT\$ 60,000, and so forth. See TEPA, COMPILATION OF ENVIRONMENTAL LAWS AND REGULATIONS II-116 (1989).

89. It is the WPCA Amendments of 1991 and the APCA Amendments of 1992 that introduced criminal sanctions into the environmental laws. However, the lack of social or moral culpability in some of the environmental crimes has been questioned.

It should be noted that some civil penalties for environmental violations in the United States can be imposed by an administrative agency through formal hearings, *see, e.g.*, 7 U.S.C. § 1361(a) (1988); 15 U.S.C. § 2615 (1988), while others can be imposed only by courts, *see, e.g.*, 42 U.S.C. § 7413(b) (1988) (amended 1990); 33 U.S.C. § 1319(d) (1988) (amended 1990); 42 U.S.C. § 6928(g) (1988).

90. *Cf.* 42 U.S.C. § 7606 (1988) (amended 1990); 33 U.S.C. § 1368 (1988).

For years the ROC has adopted regulations requiring the administrative agencies of the central government to purchase "clean vehicles." See *Implementation Highlights for All Levels of Government to Purchase Low-Polluting and Energy-Saving Vehicles*, in TEPA, COMPILATION OF ENVIRONMENTAL LAWS AND REGULATIONS II-137 (1992). However, these regulations have not been enforced seriously. In light of the ambitious scale of the "Six Year National Construction Project" (the total government purchase is estimated to reach NT\$ 8,200 Billion, or U.S. \$ 328 billion), however, this sanction could become very effective.



ing, China has been united since the Chin Dynasty (B.C. 246-B.C. 207), and yet for such a huge country, the relationship between the central government and local governments has been a recurring political issue throughout history. The ROC Constitution attempts to address this problem by setting some guidelines that divide all legislative subject matters into four categories: (1) those that shall be legislated and executed by the central government;<sup>91</sup> (2) those that shall be legislated by the central government, but can be delegated to the provincial or county governments for execution;<sup>92</sup> (3) those that shall be legislated by the provincial government, but can be delegated to county governments for execution;<sup>93</sup> and (4) those that shall be legislated and executed by county governments.<sup>94</sup> Any matter not enumerated in these four categories falls within the jurisdiction of the central government if national in nature, the provincial government if regional in nature, or the county if local in nature.<sup>95</sup>

Environmental protection is, however, not a matter enumerated in any of the four above-cited provisions, and its nature is so flexible that all levels of government can play a role in shaping environmental laws and policies. The challenge, therefore, is to pursue an efficient division of labor among the various levels of government.

So far, this issue has not received consideration. While recent amendments of the APCA and WPCA do allow the provincial and county governments to set up more stringent standards,<sup>96</sup> these "local superiorities" can be realized only after overcoming various procedural hurdles.<sup>97</sup> In addition, the current legal allocation of enforcement responsibility among the various levels of government is puzzling.<sup>98</sup> It seems that the central

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91. These include foreign affairs, national defense, judicial system, international trade policy, designation of national, provincial, and county taxes. *See* XIANFA, art. 107 (PRC) (Constitution).

92. These include general guidelines for provincial and county self-governance, educational system, eminent domain, and police system. *Id.* art. 108.

93. These include issues concerning education, public health, and transportation within a province. *Id.* art. 109.

94. These include issues concerning education, public health, and transportation within a county. *Id.* art. 110.

95. The Legislative Yuan of the central government shall decide any dispute arising thereon. *Id.* art. 111.

96. *See, e.g.*, APCA art. 5, § 2 (air quality standards), art. 11, § 2 (emission standards) (Taiwan); WPCA art. 7, § 2 (effluent standards), art. 9 (water quality based effluent limits) (Taiwan). *See supra* note 43.

97. *See supra* note 44.

98. Article 48 of the APCA prescribes that, except as otherwise provided in the Act, all sanctions taken by the central government shall be imposed by the TEPA; those taken

government has become increasingly involved in taking actions against major polluters.<sup>99</sup>

### G. Scarcity of Environmental Litigation

The primitive state of development of Taiwanese environmental law is evidenced by the existence of so few decisions by the Administrative Court concerning the APCA and WPCA.<sup>100</sup> Due to the lack of a comprehensive judicial review of administrative decisions, almost all environmental litigations have focused on the facts of enforcement. The fact that the courts have not been able to participate in environmental decision-making is also a marked departure from the United States experience.<sup>101</sup>

The tenor of the most important judicial decisions can be summarized

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by the provincial government shall be imposed by the Bureau of Environmental Protection; those taken by municipal governments shall be imposed by the Bureau of Environmental Protection; and those taken by a county shall be imposed by its government. APCA, art. 48 [Taiwan]. Article 56 of the WPCA has similar provisions, but does not mention the central government.

99. Former TEPA Administrator Jaw Shau-Kong criticized the slothful enforcement of local governments and established a special task force consisting of 90 members for enforcing against the targeted major polluters. See CHINA NEWS, Jan. 3, 1992, at 5.

100. The breakdown of decisions concerning air and water pollution control rendered by the Administrative Court may be illustrated as follows:

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Year	Number of cases	% of total decisions rendered	Result of decision	
			appeal rejected % (number)	decision reversed % (number)
1981	6	0.43%	100% (6)	0% (0)
1982	10	0.61%	100% (10)	0% (0)
1983	12	0.69%	91.67% (11)	8.33% (1)
1984	15	0.88%	100% (15)	0% (0)
1985	59	2.80%	74.75% (49)	15.25% (10)
1986	36	1.46%	97.22% (35)	2.78% (1)
1987	52	2.30%	94.23% (49)	5.77% (3)
1988	118	5.13%	61.61% (69)	38.39% (43) *
1989	313	11.54%	36.10% (113)	63.90% (200) @

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Source: JUDICIAL YÜAN, ANALYSIS OF JUDICIAL CASES, 1981, at 395 & 407 (June, 1983); *Id.*, 1983, at 434, 438, 447, 451 (June, 1984); *Id.*, 1984, at 500, 504 (June, 1985); *Id.*, 1985, at 475 (1986); *Id.*, 1986, at 491, 496 (June, 1987); *Id.*, 1988, at 471, 478, 486, 491 (1989); *Id.*, 1989, at 423, 435 (1990).

\* The reason for this sudden rise of success rate was not indicated in the ANALYSIS.

@ See *infra* note 111 for the reason.

101. See generally LETTIE M. WENNER, THE ENVIRONMENTAL DECADE IN COURT (1982); R. MELNICK, REGULATION AND THE COURTS: THE CASE OF THE CLEAN AIR ACT (1983).

in the following manner. First, the administrative agency that imposes sanctions bears the burden of proof.<sup>102</sup> Neither the presence of a representative from the inspected plant nor its consent is required for conducting a source test or measurement that usually forms a part of the proof.<sup>103</sup>

Second, the operators of a source discharging pollutants in excess of the applicable standards should be fined. The agency is not required either to give prior notice to the offender<sup>104</sup> or prove damage to the public.<sup>105</sup> The malfunction of control equipment due to operator negligence is not a legal excuse for violations and will not result in the avoidance of liability.<sup>106</sup>

Third, the administrative fines under the WPCA are administrative penalties and do not require proof of the elements of intent or negligence.<sup>107</sup> As long as the fine imposed does not exceed the statutory maximum, a regulatory agency enjoys full discretion in assessing the amount without regard to the guidelines established by the regulatory agency.<sup>108</sup>

Fourth, the invocation by an environmental regulatory agency and a national park administrative agency of different statutes<sup>109</sup> to punish a particular stationary source (a power plant) for the same violation (discharging waste water not in compliance with the applicable effluent standards) does not constitute a violation of *res judicata*. The reason is that the legal interests protected in the statutes involved are sharply

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102. See, e.g., ACD No. 797 (1986) (Taiwan). However, a plaintiff who asserts that a sample test conducted by the control authority produced incorrect results bears the burden of proof. ACD No. 1087 (1983) (Taiwan).

103. See, e.g., ACD No. 39 (1985) (Taiwan); ACD No. 1858 (1987) (Taiwan); ACD No. 1590 (1988) (Taiwan).

APCA art. 21 and WPCA art. 25 expressly grant the representatives of environmental agencies the right of access to the plants for inspection. So far, no controversy similar to a United States Fourth Amendment guarantee (see, e.g., *Marshall v. Barlow's Inc.*, 436 U.S. 307 (1978); *Donovan v. Dewey*, 452 U.S. 594 (1981)) has occurred in Taiwan.

104. See, e.g., ACD No. 2659 (1989) (Taiwan).

105. See, e.g., ACD No. 1364 (1990) (Taiwan); ACD No. 1003 (1985) (Taiwan).

106. See, e.g., ACD No. 559 (1985) (Taiwan).

107. See, e.g., ACD No. 597 (1985) (Taiwan); ACD No. 1285 (1987) (Taiwan). It should be noted that such opinions have been revised by Interpretation No. 275 of the Council of Grand Justices (March 8, 1991): "To be subject to administrative penalties, one must have, at least, negligence. When a statute imposes administrative penalties merely for violating prohibitions or obligations of action without requiring occurrence of damage or danger, the violator is assumed to be negligent."

108. See ACD No. 1235 (1990) (Taiwan).

109. See WPCA art. 9, § 1 (1983) (Taiwan); National Parks Act art. 5, § 3, art. 25 (1972) (Taiwan) (behavior polluting either air or water quality is prohibited in a national park).

different.<sup>110</sup>

Fifth, the period set for final compliance for a noncomplying source must be feasible. That means it must be judged by general experience to be sufficient to make the required improvements.<sup>111</sup>

#### IV. THE POLICY OF SELECTIVE ENFORCEMENT

Since its inception, the ROC government has possessed limited resources for the enforcement of pollution control. Selective enforcement of regulations, therefore, has been one of the hallmarks of Taiwan's environmental law. This policy is demonstrated in several ways.

##### A. *Emphasis on the Control of State Enterprises*

For several reasons, the Taiwanese government for many years has focused on the pollution control of state enterprises. First, because the government directly and substantially influences the management of state enterprises,<sup>112</sup> these entities made an obvious choice to be the first candi-

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110. ACD No. 19 (1989) (Taiwan). One can easily challenge this decision by questioning whether the interests protected in the statutes involved are really "sharply different."

No statutes deal with the problem of concurrent administrative sanctions. A draft of the Administrative Wrongs Punishment Act (art. 23) proposed by scholars prescribes that a violator shall be subject to the statute that has the higher maximum administrative penalties, and the penalties assessed shall not be lower than the lowest minimum penalties prescribed in the statutes which has the lower maximum penalties. See Y. LIAU, A STUDY ON THE PUNISHMENTS FOR ADMINISTRATIVE WRONGS 356 (1990).

111. See, e.g., ACD No. 1501 (1989) (Taiwan); ACD No. 1654 (1989) (Taiwan). One Administrative Court revoked 200 agency decisions in 1989 for the unfeasibility of the final compliance period. See *supra* note 100.

However, it should be noted that these decisions may no longer be applicable because Article 55 of the newly revised WPCA clearly prescribes that the time period specified under the Act for improvement cannot exceed 90 days.

112. Statistics show that there were altogether 691 inspectors responsible for monitoring 95,327 registered factories and 12,574,943 mobile sources on Taiwan in 1991. See TEPA YEARBOOK OF ENVIRONMENTAL STATISTICS, TAIWAN AREA, REPUBLIC OF CHINA 240-41 (Table 5-6), 278-79 (Tables 6-6, 6-7) (1992).

The annual budget of TEPA for the fiscal year of 1991 was NT\$ 4.091 billion, amounting to 0.49% of the annual budget of the central government (NT\$ 827.19 billion), or 0.08% of the GNP of the same year (NT\$ 4821.2 billion). *Id.* at 220, 258. In contrast, the expenditures for pollution abatement and control by the United States federal government over the period 1972 to 1986 amounted to 0.38% of the total GNP for the same period. See D. TANG, *supra* note 1, at 424 (Table 2-13) for details.

The poor collection record of administrative fines provides another indication of the government's ineffectiveness in law enforcement. According to the TEPA, only one-fourth (about NT\$ 300 million) of the fines assessed in 1990 were actually paid; around

dates for control. Second, in terms of size, state enterprises are generally giant corporations, which are more financially able to invest in pollution control. Third, state enterprises are major pollution contributors.<sup>113</sup> Fourth, successful control of state enterprises may serve as a model for private enterprises, persuading the private enterprises, in turn, to discharge voluntarily their social duties.<sup>114</sup> A famous 1991 case illustrating this strategy involved the Chung Hsing Paper Co., an enterprise run by the Taiwan Provincial government that supplied forty-six percent of domestic printing media paper. The TEPA ordered Chung Hsing to suspend production until it complied with the applicable effluent standards set by the Agency. In a cabinet meeting, Premier Hau stressed that government-run enterprises must take the lead in abiding by environmental laws.<sup>115</sup>

### B. *Emphasis on Major Polluting Industries*

Since 1984, the government has launched a series of abatement campaigns against selected industries. The industries selected for air pollution control enforcement include steel manufacturing, cement manufacturing, coke ovens, petrochemicals, non-iron metals, paper and pulp, and man-made fabric.<sup>116</sup> With respect to water pollution, the government es-

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56% (about NT\$ 593 million) of the fines assessed in 1991 were collected. See CENTRAL DAILY NEWS, Oct. 8, 1991, at 11; CENTRAL DAILY NEWS, Feb. 7, 1992, at 1. The TEPA planned to increase the ratio to 75% within 5 years. See TEPA, THE FIVE YEAR GOALS FOR ENVIRONMENTAL PROTECTION 157 (1992).

113. The State Enterprises Commission of the Ministry of Economic Affairs is responsible for supervising the operation of all state enterprises. A statistical study conducted by the TEPA shows the total investment in pollution control by all state enterprises in the 1992 budget year reached a peak of NT \$193 billion, a 7.69% increase over 1991. See ECONOMICS DAILY, April 4, 1992, at 7.

114. For example, in 1985 emissions from power generators amounted to 24.78%, 24.56% and 23.65% of the total TSP, SO<sub>x</sub>, and NO<sub>x</sub> emissions, respectively. Due to the existence of a state monopoly, only one firm is in the power generating industry, Tai Power. A similar situation exists in the oil refining industry (*i.e.*, China Petroleum Co.). See D. TANG, *supra* note 1, at 332, 475-77 (Tables 6-15, 6-16, 6-17) for details.

115. For example, the TEPA listed 28 state plants, including those of Tai Power, China Petroleum, Taiwan Fertilizer, and Taiwan Sugar as first priority target plants for air pollution abatement. By August 1989, 22 of these 28 plants had achieved the regulatory goals. THE TEPA WORK BRIEFING 113 (Aug. 1989).

As to water pollution combat, 72 state enterprise plants have been targeted. By August 1989, 63 of them had achieved the regulatory goals. *Id.* at 128.

116. In Taiwan Province, an inventory of 1,200 plants was conducted. These plants were classified into three classes. Plants of the First Class, including 19 public plants and 203 private plants, are subject to inspection once a month. As of December 1987, 110 of the 222 plants had achieved the improvements required. See K. LEE, A STUDY ON THE

tablished a special program in 1984 aimed at controlling all discharges of industries that used fermenting processes (primarily the provincial government-run enterprises). Since 1986, the control program has been expanded to cover seventy-two major public enterprises and seventy-two major private enterprises.<sup>117</sup> In 1987 and 1989, the program was further extended to cover another 341 governmental and 1178 private industrial plants.<sup>118</sup>

In 1987, as an initial step for treating heavily polluted rivers, the government inaugurated a comprehensive project for cleaning the Tam-Sui River system. The first stage of this process, however, which lasted three years has turned out to be a government failure.<sup>119</sup> The most commonly cited explanation for this failure is the government's difficulty in taking land under eminent domain for sewage treatment plants and for other pollution control facilities. The difficulties also have been the partial result of poor cooperation among various levels of government,<sup>120</sup> or even

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MAKING OF AIR POLLUTION CONTROL POLICY 13-14 (1988).

117. As of August 1989, 63 of the 72 targeted public enterprises and 53 of the 72 targeted private enterprises had achieved the improvements required. See THE TEPA WORK BRIEFING 128 (1989).

118. In addition to these controls on industrial effluent, the government also has focused on livestock farms. For the district of Taiwan Province, livestock production (mainly pigs) is the second largest water pollution source; it results in 25% of the total BODS Produced. See TEPA, ROC TAIWAN AREA ENVIRONMENTAL STATISTICS 91, Table 4-4-4 (1991). It is generally agreed that the BODS produced by pig feces are several times more potent than those from human feces.

119. The Executive Yuan (Cabinet) decided to extend the construction period by two years until October 1993 and to increase the original budget by NT\$ 40.6 billion. See CHINA NEWS, Oct. 8, 1991, at 14.

A good example in the United States is "below-cost timber sales," in which the costs of harvesting the timber on public lands exceed the revenues from the timber sales. See Sedjo, *Forest Resource Management and the Environment: the Role of Economic Incentives*, in OECD, RENEWABLE NATURAL RESOURCES: ECONOMIC INCENTIVES FOR IMPROVED MANAGEMENT 76 (1989).

The reason why governments "fail" in their management regulation of public goods is explained best in terms of Public Choice Theory. Public Choice, sometimes referred to as the economic theory of legislation, is commonly defined as a theory of politics derived from the assumption that all political participants are rational, egotistic utility maximizers; they are motivated solely by the desire to maximize their self-interests, such as reelection and budget aggrandizement. Because the incentives in public management are inherently flawed and distorted, government failures are inevitable. See generally Robert D. Tollison, *Public Choice and Legislation*, 74 VA. L. REV. 339 (1988); D. FARBER & P. FRICKEY, LAW AND PUBLIC CHOICE: A CRITICAL INTRODUCTION (1991).

120. The cleanup became even more troublesome after 1990 when the opposition Democratic Progressive Party (DPP) won the election for the Taipei County magistrate. DPP Magistrate Yio Ching has several times publicly criticized the feasibility of the

among various agencies of the same government. The Tam-sui River essentially is a microcosm of Taiwan's environmental problems. Many Taiwanese citizens involved consider the present compensation system for eminent domain unfair because compensation is calculated based upon the publicized land prices, which are much lower than their market counterparts.<sup>121</sup> In addition, the lack of an integrated agency responsible for cleaning up the Tam-sui River is a further obstacle to reaching an effective solution.<sup>122</sup>

### C. Sulphur and Lead in Gas Phasedown

Because a state enterprise, the China Petroleum Corporation (CPC), enjoys a monopoly over domestic oil, the Taiwanese government can effectively reduce sulphur dioxide emissions by requiring a lower sulphur content in the gas for sale. Beginning on July 1, 1986, and again on July 1, 1990, the CPC lowered the sulphur content in its gas to no more than two percent and one and one-half percent, respectively. The CPC plans to make a further reduction to less than one percent after July 1, 1993.<sup>123</sup> Since June 1, 1986, in another effort to reduce lead emissions, the CPC has marketed unleaded gas.<sup>124</sup> However, the use of unleaded

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project. In response, TEPA Administrator Jaw urged that "all of the government agencies working on the project put the cleanup first, and politics second." See Mindich, *Intractable River Pollution*, 41(10) FREE CHINA REVIEW 4, at 16 (Oct. 1991).

121. Indeed, land appropriation has become a thorny problem for all public construction projects. The construction of the second northern highway has also lagged behind schedule due to eminent domain disputes.

122. According to Jaw Shau-kong, TEPA's Administrator, his agency is responsible for coordinating the Tam-sui project, while local governments are to carry out the project. See Mindich, *supra* note 120, at 6. It is reported that Premier Hau has instructed the Taipei Municipal Government to establish a new agency to prepare for the overall administration of Tam-sui basin. See UNITED DAILY NEWS, Aug. 2, 1992.

Another source reported that the Ministry of Interior is considering a suggestion received by the central government to establish several "basin administration bureaus" for major rivers. See UNITED DAILY NEWS, Nov. 19, 1992.

123. See TEPA, IMPLEMENTATION PROGRAM OF AIR POLLUTION CONTROL, at 5 (approved by the Executive Yuan on Jan. 27, 1987).

The TEPA has announced that fuel with a sulfur content of more than 1.5% is the material that would easily cause air pollution. Since July 1, 1990 no one can sell or use this fuel without obtaining a permit. See TEPA AND MINISTRY OF ECONOMIC AFFAIRS JOINT PUBLIC NOTICE No. 07,299 (Mar. 9, 1992), reprinted in TEPA REGISTER, No. 52, at 7 (Apr. 1992) (replacing the Joint Public Notice No. 18,906 (June 5, 1990) that appeared in TEPA Register, No. 30, at 46 (June 1990)).

124. The TEPA plans to decree that after July 1993, the amount of lead in leaded fuel should be decreased from 0.12 grams per litre to 0.08 grams, and after July 1997 decreased further to 0.026 grams. The CPC also expects to sell only unleaded fuel by

gas as a pollution control device has proven unsuccessful, because the price of unleaded gas has been higher than that of leaded gas<sup>125</sup> and therefore has served as an adverse incentive for consumers. This is yet another illustration of poor coordination among the agencies and policies in the ROC.

#### D. *Limiting Development of Heavy Pollution Industries*

The government prohibition of openly burning waste electric cables to recover heavy metals presents a good example of Taiwanese governmental limits on heavy pollution industries. Studies have shown that this now prohibited process releases hazardous gases, including PCBs and dioxin. Since a great portion of the raw materials used in this business is imported,<sup>126</sup> the government approached the problem by regulating their importation. In 1983, the waste cables first were classified into four classes: A, B<sub>1</sub>, B<sub>2</sub>, and B<sub>3</sub>. Cables of class B<sub>3</sub> are completely banned from importation, while those of classes B<sub>1</sub> and B<sub>2</sub> can be imported only with a permit obtained in advance.<sup>127</sup> As a second step, the Bureau of Environmental Protection, Department of Health (the predecessor of the TEPA) promulgated the Highlights for Setting Quotas for the Importation of Classified Waste Cables<sup>128</sup> in July 1985 to specify the import quota. Additionally, two special industrial districts, Da-Fa and Wan-Li, were set up in order to concentrate the waste disposal of these cables. Starting in September 1988, the original import quota was cut in half;<sup>129</sup> and in 1989 the TEPA required that all accumulated waste cables in the two districts be disposed of by specific deadlines or the import quota

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2001. See CHINA NEWS, Mar. 26, 1992, at 3.

125. China Petroleum insisted that this practice is necessary for recovering its purification investments. After severe criticism by the public, China Petroleum lowered the sale price of unleaded gas equal to that of leaded gas. See MINISTRY OF ECONOMIC AFFAIRS NEWSRELEASE (Feb. 13, 1992). It should be noted, however, that because of the state monopoly, the CPC is the only supply source of gasoline in Taiwan.

126. Besides some 50,000 metric tons of electric cables from the domestic ship industry, about 360,000 metric tons are imported from the United States and Japan every year. See DEPARTMENT OF HEALTH, Waste Cables Pollution Control Report 1-5 (1987).

127. See BUREAU OF INTERNATIONAL TRADE, MINISTRY OF ECONOMICS, GUIDELINES FOR CLASSIFYING WASTE CABLES (Oct. 1983).

128. See DEPARTMENT OF HEALTH, PUBLIC NOTICE (ENVIRONMENT) No. 551197 (Sept. 6, 1985), reprinted in BUREAU OF ENVIRONMENTAL PROTECTION, DEPARTMENT OF HEALTH, COMPILATION OF ENVIRONMENTAL LAWS AND REGULATIONS 565 (1987).

129. TEPA PUBLIC NOTICE (WASTE) No. 17205 (Sept. 5, 1988), reprinted in TEPA, COMPILATION OF ENVIRONMENTAL LAWS AND REGULATIONS XII-163 (1989).



would again be cut in half.<sup>130</sup> A complete ban on importing waste cables finally became effective on January 1, 1993.<sup>131</sup>

In the beginning, many plants operating on a very small scale could not afford pollution control expenses and, quite understandably, refused to move into these special industrial districts. Since the burning activities are highly mobile, many plant operators have adopted the tactics of guerilla warfare and simply burn the cables at night and hide in the daytime.<sup>132</sup> Reports indicate, however, that such violations have been reduced dramatically with the progressive implementation of control programs.<sup>133</sup>

### E. *Selective Enforcement Against Existing Sources*

In order to protect their own re-election prospects, popularly elected mayors and county magistrates are disinclined to strictly enforce laws against existing sources.<sup>134</sup> Conversely, these officials are inclined to side with residents in preventing new sources from establishing local sites.<sup>135</sup> The environmental enforcement commitments may vary greatly in various administrative areas.<sup>136</sup> The practice by local politicians of lenient and selective enforcement against existing sources coupled with a strong disinclination towards new sources may lead to an unique Taiwanese "new source bias."

## V. MISGUIDED EXPERIMENTS WITH ECONOMIC INSTRUMENTS

Economists tend to view environmental pollution as an economic problem.<sup>137</sup> They believe that pollution is the result of a market failure.<sup>138</sup>

130. See TEPA, COMPILATION OF ENVIRONMENTAL LAWS AND REGULATIONS V-96 to V-98 (1992).

131. See BUREAU OF INTERNATIONAL TRADE, MINISTRY OF ECONOMICS, TRADE (81) No. 20934 (Dec. 14, 1992).

132. See BUREAU OF ENVIRONMENTAL PROTECTION, DEPARTMENT OF HEALTH, REPORT ON POLLUTION CONTROL OF WASTED ELECTRIC CABLES (1987).

133. See TEPA Register No. 19 (July 1989), at 507.

134. See CHINA NEWS, July 26, 1991, for a complaint by TEPA Administrator Jaw about the spotty enforcement by local governments.

135. In the past few years, local residents have increasingly voiced opposition against large-scale and usually important investment plans. For example, plans for the fifth naphtha cracking plant of China Petroleum and the sixth naphtha plant of Formosa Plastics were seriously contested by local residents.

136. It is evident that various states in the United States have enforced environmental laws to different degrees of stringency. See CLIFFORD S. RUSSELL, W. HARRINGTON & W. VAUGHAN, ENFORCING POLLUTION CONTROL LAWS 40-41, table 2-7 (1986).

137. See, e.g., LARRY E. RUFF, THE ECONOMIC COMMON SENSE OF POLLUTION,

Specifically, private markets may provide inadequate environmental protection when environmental values are externalities inadequately reflected in the prices consumers pay for goods and services, or when environmental values are public goods from which all individuals benefit but in which no single individual has an adequate incentive to invest. To correct this market failure, economists would require private decision makers to internalize the externalities through governmental intervention. In general, four means of intervention are available: regulations, subsidies, pollution fees, and transferable discharge permits (TDP).<sup>139</sup>

In remedying these market failures, governments (including the Republic of China and the United States)<sup>140</sup> traditionally have employed

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reprinted in MICROECONOMICS: SELECTED READINGS 498 (Mansfield ed., 2d ed. 1975) ("We are going to make very little real progress in solving the problem of pollution until we recognize it for what, primarily, it is: an economic problem, which must be understood in economic terms.") See generally, WILLIAM J. BAUMOL & WALLACE E. OATES, *THE THEORY OF ENVIRONMENTAL POLICY* (2d ed. 1988); J.H. DALES, *POLLUTION, PROPERTY, AND PRICES* (1968).

138. Bator, *Anatomy of Market Failure*, 72 Q. J. ECON. 31 (1958). For a criticism of the confusion of this concept, see Alan Randall, *The Problem of Market Failure*, 23 NAT. RESOURCES J. 131 (1983).

A market in this context should be understood as an arrangement in which people pay for the things they do that affect others. Except when damage suits can successfully be brought to recover for the injury, these environmental effects are outside the pricing system. However, serious institutional barriers prevent tort litigation from being an effective tool for recovering environmental damages. For a discussion of these barriers and the need of an administrative compensation scheme, see, e.g., *Developments in the Law: Toxic Waste Litigation*, 99 HARV. L. REV. 1458, 1602-30 (1986); Palma J. Strand, Note, *The Inapplicability of Traditional Tort Analysis to Environmental Risks: The Example of Toxic Waste Pollution Victim Compensation*, 35 STAN. L. REV. 575 (1983).

139. Liability rules may be regarded as the fifth approach in controlling externalities. See generally A. Mitchell Polinsky, *Controlling Externalities and Protecting Entitlements: Property Right, Liability Rule, and Tax-Subsidy Approaches*, 8 J. LEGAL STUD. 1 (1979). Under the liability rule, the polluter is obliged to pay the victim compensation for damages suffered. The amount of damages is set by a collective body, usually a court, and need not reflect what the entitled party would have been willing to accept or the actual reduction in the value of his entitlement. Some commentators believe that an appropriately defined strict liability approach has lower deadweight costs and information costs compared to quantity regulations and pollution charges or taxes. See, e.g., Michelle J. White & Donald Wittman, *A Comparison of Taxes, Regulation, and Liability Rules Under Imperfect Information*, 12 J. LEGAL STUD. 413 (1983). Nonetheless, litigation has commonly proved to be an ineffective way of controlling pollution. See, e.g., RICHARD B. STEWART & JAMES E. KRIER, *ENVIRONMENTAL LAW AND POLICY* 255-324 (2d ed. 1978).

140. The U.S. has long relied on what Professor James Krier has called "The Great American Regulatory Tradition" to solve social problems, especially during a crisis. See James E. Krier, *The Pollution Problem and Legal Institutions: A Conceptual Overview*,

command-and-control regulations that rely on uniform, inflexible, technology-based standards coupled with monitoring and sanctions. However, this type of regulatory system has been severely criticized by many<sup>141</sup> as being cost-ineffective,<sup>142</sup> inflexible, and as discouraging innovation and investment.<sup>143</sup>

Another form of governmental intervention is to subsidize private activities that produce collective goods or to pay firms directly to supply the goods in question.<sup>144</sup> For example, the government could subsidize the expenditures necessary for installing abatement equipment for removing sulphur from stack gases, or it simply could pay pollution sources for each increment of improved air quality resulting from pollution control.

A "pollution fee"<sup>145</sup> can be attached to each unit of emissions to induce the emitter to internalize the social costs imposed by its emission. Each emitter reduces emissions to the point that its costs of control become as expensive as paying the fee. This point will vary for each emitter, but the aggregate emissions reduction will correspond to the size of the fee exacted.<sup>146</sup> Under this system, in contrast to subsidization, money flows in the opposite direction: from the polluters to the government.

A transferable discharge permits (TDP)<sup>147</sup> system attempts to solve the externality problem by redefining private property rights in terms of environmental media.<sup>148</sup> Under this approach, the government, in con-

18 UCLA L. REV. 429, 461-62 (1970-71). See also Robert L. Rabin, *Federal Regulation in Historical Perspective*, 38 STAN. L. REV. 1189 (1986).

141. See, e.g., Bruce A. Ackerman & Richard B. Stewart, *Reforming Environmental Law: The Democratic Case for Market Incentives*, 13 COLUM. J. ENVTL. L. 171 (1988); THOMAS H. TIETENBERG, *EMISSIONS TRADING: AN EXERCISE IN REFORMING POLLUTION POLICY* (1985); Robert W. Crandall, *supra* note 61; BRUCE A. ACKERMAN AND WILLIAM T. HASSLER, *CLEAN COAL/DIRTY AIR* (1981); ALLEN V. KNESSE AND BLAIR T. BOWER, *MANAGING WATER QUALITY: ECONOMICS, TECHNOLOGY AND INSTITUTIONS* (1968).

142. For example, it has resulted in unnecessary and high compliance costs.

143. See TANG, *supra* note 1, at 93-140 for a detailed summary.

144. This approach is also known as "polluter bribes." See generally Talbot Page, *Failure of Bribes and Standards for Pollution Abatement*, 13 NAT. RESOURCES J. 677 (1973).

145. See, e.g., DALES, *supra* note 137, at 81-82. The term "pollution fee" is equivalent to "emission/effluent charges" or "emission/effluent taxes."

146. See STEWART & KRIER, *supra* note 139, at 572, for a further graphic illustration of this point.

147. This system is also known as "marketable permits" or "tradeable allowances."

148. Related to the nonexclusive feature of public goods, the source of an externality can be found in the absence of well-defined property rights. This implies that the distortions resulting from an externality, at least in some cases, can be eliminated from an appropriate redefinition of ownership rights. BAUMOL & OATES, *supra* note 137, at 26.

sideration of the assimilative capacity of the environment, first imposes a constraint on the total quantity of pollutant discharged and then issues permits or allowances<sup>149</sup> adding up to that total. Once issued, the permits are tradable among polluters as a property right. The price of these permits is set by market forces, as are the costs of alternatives to pollution (*e.g.*, pollution control equipment). A TDP system represents a blend of regulations and charges.<sup>150</sup> On the one hand, to the extent that the amount of permits to be issued (representing the total amount of pollution of a particular pollutant) in a given airshed or water basin is determined by the agency and the individual permit specifies an emission standard, the TDP system possesses the directness of a standard control system. On the other hand, because the redistribution of permits after the initial issuance is taken care of by the market, the TDP system embraces the flexibility of allocating the control responsibility embodied in a charge system.

The subsidies, pollution charges, and transferable discharge permits are all intended to correct the market failure problem by providing or creating economic incentives for individual polluting sources to control pollution. Thus, they are grouped commonly under the title of economic incentives or economic instruments (E/I).

Since it generally has been agreed that subsidies are not an effective means for environmental protection, even though they are widely utilized in Taiwan,<sup>151</sup> they will not be discussed here. What follows is a brief survey of the programs that employ market-based mechanisms as tools for implementing environmental policy.

First, a few words to clarify the title of this section. On the one hand, the term "experiments" suggests that current applications of economic instruments to date have been limited in number and scope, and often serve as tests for wider applications in the future. This is the case in Taiwan at this moment. In spite of these limitations, one should be aware that, in fact, economic instruments have been applied quite successfully in Europe<sup>152</sup> and the United States<sup>153</sup> for years to redress vari-

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149. *E.g.*, 1,000 kg/day of TSS.

150. Thomas H. Tietenberg, *The Design of Property Rights for Air-Pollution Control*, 22 PUB. POL'Y 275, 278 (1974).

151. See W. CHEN, 6 EVALUATION OF THE ECONOMIC BENEFIT OF THE STATUTE FOR ENCOURAGEMENT OF INVESTMENT: ENCOURAGEMENT OF POLLUTION CONTROL (1987); TANG, *supra* note 1, at 115-128, 362-367 for details.

152. See, *e.g.*, OECD, ECONOMIC INSTRUMENTS FOR THE PROTECTION OF ENVIRONMENT (1989); BLAIR T. BOWER, R. BARRER, J. KUHNER AND C. RUSSELL, INCENTIVES IN WATER QUALITY MANAGEMENT, FRANCE AND RUHR AREA (1981).

153. See, *e.g.*, Richard B. Stewart, Current Experiments with Economic Instruments

ous environmental problems. On the other hand, the title suggests that the author believes that the programs to be discussed below have deviated from the correct use of E/I. To see why these experiments are misguided, one has to acquire some understanding of Taiwan's basic environmental policy.

### A. *Polluter-Pays-Principle (PPP) and Economic Instruments*

The guidelines for environmental protection, the Environmental Protection Policy Outline for the Current Stage (the Outline), was adopted at the Executive Yuan Cabinet meeting of September 24, 1987. The Outline contained three chapters and consisted of fifty-three articles. Chapter II announced the basic strategies.<sup>154</sup> It seems clear by now that the Outline embraces the Polluter-Pays-Principle (PPP) mainly, if not solely, for revenue raising purposes. However, the problem is that the PPP is not necessarily consistent with E/I. The PPP has been defined generally as: The polluter should bear the cost of measures to reduce pollution, which measures have been decided upon by public authorities

in Environmental Policy, Paper delivered at the Soviet-American Conference on "Economic Instruments for Environmental Protection: From Theory to Practice" (Nov. 12-14, 1989); David W. Hoskins, Note, *Acid Rain, Emissions Trading and the Clean Air Act Amendments of 1989*, 15 COLUM. J. ENVTL. L. 329 (1990); Robert W. Hahn and Gordon L. Hester, *Where Did All the Markets Go? An Analysis of EPA's Emissions Trading Program*, 6 YALE J. ON REG. 109 (1989).

154. The following deserve special attention:

Art. 2 For the nation's long term interests, environmental protection and economic development shall be given the same attention. During the process of economic development, if there are significant adverse impacts on the environment, environmental protection shall receive priority of consideration.

Art. 3 The people and industry share the responsibility of environmental protection with the government.

Art. 5 In order to obtain the funds for pollution control, population compensation, and environmental restoration systems based on the *polluter pays principle (PPP)* should be established. At the same time, the government may adopt appropriate reward and subsidy measures (emphasis added).

For the purposes of this paper, the most pertinent provisions of the Outline were prescribed in Chapter III:

Subchapter VI (Enhancing Industrial Pollution Control):

Art. 1 Proper measures, such as tax incentives, bank loans and technical assistance should be adopted to facilitate an industry to install pollution control equipment.

Art. 2 The emission standards should be enforced strictly by imposing fines on the violating sources on a continuing daily basis until the noncompliance stops.

Art. 3 In order to establish systems based on the *polluter pays principle (PPP)*, industries should be required not only to set up pollution control equipment, but also to pay *pollution charges* (emphasis added).

to ensure that the environment is in an "acceptable state."<sup>155</sup> On the one hand, E/Is that do not result in the polluter bearing the full costs of pollution control measures would be inconsistent with the PPP. On the other hand, E/Is have been applied in hopes of achieving some "incentive impact," that is, using the E/I as an incentive for the target group to bring positive changes to reach the environmental objective. Therefore, the better the correlation between the volume and hazardousness of discharge and the amount or size of payment, the better the compatibility between the PPP and E/I.<sup>156</sup> Whenever revenue raising becomes the major purpose, *prima facie* economic incentive-based instruments will be distorted and will lose their originally expected incentive impact.

### B. *Trash Disposal Fees*

Based on the delegation mandated by the Waste Disposal Act,<sup>157</sup> the TEPA promulgated the "Measures for Collecting Clean-up and Disposal Fees of General Waste"<sup>158</sup> on July 31, 1991. According to the Measures, trash disposal fees in Taipei City and Kaohsiung City will increase monthly tap water fees by 24.25 percent and 20 percent respectively. Other cities and counties near Taiwan Province will add trash disposal fees that will increase tap water bills by 20 percent, while fees for Kinmen Island and Matsu Island will increase 23 and 19 percent, respectively.<sup>159</sup>

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155. OECD, *OECD AND THE ENFORCEMENT* 24 (1986); see OECD, *supra* note 152, at 27.

156. See OECD, *supra* note 152, at 19, 28.

157. Article 11 of the Act prescribes:

The implementation agency shall, for the purpose of general waste (municipal trash) clean-up and disposal, collect fees from the residents in the areas designated for clean-up.

The rate and methods for collecting the fees mentioned in the last subsection shall be specified by the control agency of the central government with references to the clean-up methods employed by the local agencies and the costs of installing disposal facilities as well as other expenses.

158. TEPA PUBLIC NOTICE 80 (Law) No. 29621 (July 31, 1991), *reprinted in* 44 TEPA REG. 2 (1991). The term "general waste" in Chinese is equivalent to the English term "solid waste" used in the United States, yet the general waste in Taiwan is not that solid; chemical analysis shows that over 50.5% of the garbage is composed of water. See TEPA, *THE ROC TAIWAN AREA ENVIRONMENTAL INFORMATION* 2356, Table 11-4-4 (1991).

159. In the areas that do not have tap water service, each household will pay a monthly trash disposal fee of NT\$ 765 in Taipei City, NT\$ 40 in Kaohsiung City, NT\$ 40 throughout the rest of Taiwan, NT\$ 50 on Kinmen Island, and NT\$ 75 on Matsu Island. See CHINA NEWS, Aug. 31, 1991, at 3.

That the trash disposal fees have become the pioneer of all pollution charges programs is not surprising in view of the mounting pressures for trash disposal being encountered by all levels of government, especially by local governments.<sup>160</sup> However, the TEPA was unpersuasive when it tried to sell this program by not only referring to the PPP, but also by arguing that residents thereby would be induced to reduce the amount of garbage produced. One cannot help but doubt whether such trash fees will result in reduced trash or reduced consumption of tap water.<sup>161</sup> The trash disposal fees were intended to collect revenues for solid waste disposals, and it seems the only outcome such a policy will achieve.

Besides the trash fees program, at least two other pollution charge programs are under discussion. One program involves the imposition of air pollution fees (emission charges) on mobile sources (both automobiles and motorcycles).<sup>162</sup> The means of collection under consideration include adding a surcharge to the gasoline bill based on the amount purchased, increasing the annual license fees, or raising the commodity tax paid upon the purchase of a new car or motorcycle.<sup>163</sup> The other plan is to

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160. The average daily collection of municipal solid waste reached 18,753 metric tons in 1990, representing an increase of 114% since 1980 (8736 metric tons per day). See TEPA YEAR BOOK OF ENVIRONMENTAL STATISTICS, TAIWAN AREA, THE REPUBLIC OF CHINA 134, Table 3-1 (1991).

Since the refusal, disposal has been a responsibility typically shouldered by local governments; many have suffered serious problems because of insufficient budgets and a lack of landfill sites on such a small, yet highly populated, island. For the last few years, there have been "trash wars" among local governments. See, e.g., UNITED DAILY NEWS, July 15, 1992, at 5.

161. A study sponsored by the TEPA on the feasibility of collecting trash disposal fees was issued in April 1989. (See A STUDY OF THE SYSTEM OF COLLECTING TRASH FEES IN TAIWAN, TEPA RESEARCH REPORT NO. 34044780132 (April 1989)). The means of collection under consideration included adding a surcharge to tap water and electricity bills and a charge based on the number of members of a household. The idea and the report were heavily criticized partly because of the questionable connection between the production of trash and the consumption of electricity, tap water, or the number of members of a household. However, after a two-year, low-key wait-and-see approach, the TEPA finally put the program into force with little opposition.

162. This is based on the authorization of Article 10 of the APCA:

The regulatory agencies of all levels of government shall collect air pollution control fees based upon the type and amount of the air pollutants discharged by polluting sources. The classification of the sources mentioned in the last subsection and the detailed measures for collecting the fees shall, after consulting relevant agencies, be promulgated by the regulatory agency of the central government.

163. See, e.g., UNITED DAILY NEWS, Sept. 6, 1991, at 5. It was reported that Premier Hau and Finance Minister Wang warmly endorsed the program because the fees are expected to increase revenues by NT\$ 24 billion a year. See UNITED DAILY NEWS, Aug. 30, 1991, at 5.

collect effluent charges from point sources discharging wastewater into surface waters.<sup>164</sup>

### C. Waste Recycling Programs

In response to the rapid increase of municipal waste and the resultant shortening of the life spans of landfill sites,<sup>165</sup> and in recognition of the fact that garbage actually contains many valuable resources which can be recycled for usage,<sup>166</sup> the TEPA since 1989 has launched a series of programs for recycling waste under a campaign entitled "Hsi-Fu" (literally "Cherish Luck"). Article 10-1 of the Waste Disposal Act provided the legal basis for these recycling programs.<sup>167</sup> So far, nine recycling programs have been put into force,<sup>168</sup> and another three are expected to

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164. See, e.g., S. Lo and D. Shaw, A STUDY ON THE WASTE EFFLUENT CHARGES SYSTEMS, TEPA REPORT NO. 78-03-28-118 (June 1989). The effluent charges are authorized by Article 11 of the WPCA:

The control agencies of local governments shall collect water pollution control fees from the sources discharging waste water into surface waters based on the quality and quantity of their discharged waste water; the fees collected shall only be used for water pollution controls.

The measures for collecting the charges mentioned in the last subsection shall be promulgated by the control agency of the central government.

165. Currently, 93% of the municipal waste is disposed of at landfills, 0.4% by incineration, 0.08% by composting, and 6.5% by other means such as open burning or river dumping. See TEPA, YEAR BOOK OF ENVIRONMENTAL STATISTICS, TAIWAN AREA, THE REPUBLIC OF CHINA 134 (1992).

166. An estimate shows that the reusable resources contained in the garbage produced in the Taiwan area in 1990 amounted to NT\$ 30 billion. See ECONOMIC DAILY NEWS, Sept. 9, 1991, at 3.

167. Article 10-1 reads:

The manufacturers, importers, and sellers of an article, its packing or container, which after consumption, may produce waste with one of the following characteristics, and thus may seriously pollute the environment, shall be responsible for its collection, clean-up and disposal if such waste;

- 1) is difficult to clean up or dispose of
- 2) has contents which are not biodegradable for a long period;
- 3) contains hazardous substances.

The classes of the waste, and the scope of the industry manufacturing, the importing and selling of the article, the packing or container of the waste, mentioned in the last subsection shall be announced by the regulatory agency of the central government; the measures for collection, clean-up and disposal of the waste shall be jointly promulgated by the environmental regulatory agency and the subject-matter regulatory agency of the central government.

168. In addition to the 10 implemented programs listed on Table 4, a recycling system for waste paper has long existed. The actual recycling rate of waste paper is 58%. See TEPA, ANNUAL REPORT ON ENVIRONMENTAL PROTECTION 1180 (1991).



follow soon. Table 4 traces the development of the programs by indicating the number and date of the relevant TEPA public notices. In general, the TEPA has established these programs in three stages. It first announced that a particular article had been classified as "non-biodegradable general waste." The TEPA then promulgated a measure for collecting, cleaning up, and disposing of the classified article. Finally, it set up the annual percentage of recycling return for target groups (industries).<sup>169</sup>

A closer analysis of these nine measures promulgated for recollection, clean-up, and disposal is shown in Table 5.<sup>170</sup> The most noteworthy among the regulatory mechanisms are the "deposit-refunded system"<sup>171</sup> and the guaranteed minimum price for the returned articles.

Four of the ten programs with recycling measures, such as the style E programs for mercury cell batteries, aluminum cans, iron cans, and PET (polyethylene terephthalate) bottles, explicitly list a deposit-refund system as a means of recollection. Two others, specifically the programs for tires and lubricant oils, employ a guaranteed price system, with the price to be set by the central agency, as a means of collection.<sup>172</sup> A deposit-refund and a guaranteed price for returned articles are parallel in terms of their function. The remaining three measures did not adopt any specific E/I to facilitate recycling, but also did not preclude the later application of E/I.<sup>173</sup>

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169. Following the common track of enforcement, Article 23-1 of the Waste Disposal Act prescribes that a source violating the regulations under Sec. 2 of Art. 10-I will be subject to an administrative fine of between NT\$ 60,000 and NT\$ 150,000. If the violations continue after the specified time period allowed for improvement, a continuous daily fine will be imposed. If the continued violations are found to be serious, the regulatory agency may order the source to suspend operation for a period of from one month to one year, or may even order the source to partially or wholly shut down.

170. In order to help readers relate the programs to the types of regulation analyzed in Table 5, a label of types, from A to F, is included in boldface type with each measure listed in Table 4.

171. A deposit-refund system is a fee with a rebate: those who generate a waste, or purchase a reusable product, must pay a deposit on the item; when they return the item for proper treatment, they receive a refund. The deposit provides an incentive for return.

172. See TEPA PUBLIC NOTICE NO. 19,561 (June 17, 1991), *reprinted in* COMPILATION OF ENVIRONMENTAL LAW AND REGULATIONS V-103 (1992) for the guaranteed prices for waste tires.

173. This interpretation is warranted in view of the relevant provisions. For example, § 4 of the Measures for Recollecting, Clean-up and Disposing of Capacitors reads: The capacitor-related industries shall collect the wasted capacitors in accordance with the following methods:

- 1) by establishing area-wide recycling depots and centers;
- 2) *by other means announced by the central regulatory agency.* [emphasis added].

Instead of promoting a nationwide waste recycling network supported by E/I, such as a comprehensive deposit-refund system, the TEPA unwisely has devoted its attention to importing and installing recycling bins that resemble extra-terrestrials and are popularly known as "E.T.s."<sup>174</sup> Due to their high cost<sup>175</sup> and huge size,<sup>176</sup> it is impossible to station the recycling E.T.s effectively. Since the splendid landing of the E.T.s in 1989, two things have become obvious. One is that they generally are welcomed only in large institutions, such as schools and large hotels, in which relatively more space is available and a profit-sensitive authority exists. The other is that only the most decent, public-minded citizens will sort their garbage first and then walk for a long distance to feed the stony and unwelcoming E.T.s.<sup>177</sup>

So far the limited experiments with the recycling programs have revealed valuable lessons. First, the simple specification of an annual rate of return proved to be ineffective.<sup>178</sup> Second, the authorization for founding a joint disposal fund in each of the nine recycling programs has not led to productive results. The industries forced to organize such a fund did not spend the money effectively.<sup>179</sup> Third, the guaranteed price for each recycled waste tire has resulted in a higher actual rate of recycling

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174. Each bin is an "IGLOO" made by Kotrac, a Dutch company. There are four kinds of E.T.s: the yellow one called "Golden Mouse" for metal cans; the green one known as "Jade Frog" for glass; the red one known as "Red Pepper" for plastics; and the blue one known as "Dr. Blue" for paper.

175. Each E.T. costs United States \$840 or NT\$ 20,000.

176. Each recycling bin is 175 cm in height with a net weight of 100 k.g. and a capacity of about 1 ton.

177. The E.T. program is quite understandable, however, from other viewpoints. For example, the campaign for E.T.s is something fresh and highly visible in the society.

178. The leading example is the pioneer of the nine programs. The PET bottle industries have failed to reach the specified goal of 50% return for two consecutive years. See CHINA NEWS, July 29, 1991, at 5.

Although the TEPA did punish the industries for such a failure by fining them between NT\$ 60,000 and NT\$ 90,000 and setting up a three month deadline for improvement, it did not impose further punishment, such as continuous daily fines and suspension of operation when the period for compliance had elapsed and noncompliance continued. Therefore, in January 1992 the Control Yuan passed a "solution of correction" to push the TEPA for stricter enforcement of law. See UNITED DAILY NEWS, Jan. 17, 1992.

179. For example, the PET bottle-related industries have contributed NT\$ 1 to the recycling fund whenever one PET bottle is produced. The industries association admitted that the fund has reached more than NT\$ 200 million. According to the estimate of the Earth Day Association on Taiwan, the fund has accumulated more than NT\$ 400 million. Since its outset, less than NT\$ 1 million has been spent (supposedly only for disposal purposes). See ECONOMIC DAILY NEWS, Aug. 10, 1991.

than specified. However, the shortage of equipment for chopping the waste tires into pieces,<sup>180</sup> as well as of effective uses for the recycled product, unexpectedly has stalled the recycling effort.<sup>181</sup> It seems fair to say that to be successful, a recycling program must have comprehensive planning for upstream waste collection, downstream treatment, and reuse.

Fourth, in the beginning, the deposit-refund systems were not successful. Many regulated industries complained that the deposit<sup>182</sup> was too low to cover the handling costs, while the citizens wanted to have more recycling shops and a higher deposit-refund.<sup>183</sup> In response, TEPA pushed the industries' association to raise the deposit refund to NT\$ 2.00 for each PET bottle returned since March 16, 1992 and to contract a total of 10,600 shops for return around the whole island. The preliminary results of this new effort seem very encouraging.<sup>184</sup>

#### D. *Emissions Trading Program: Bubbles*

Article 15 of the newly revised APCA formally adopted a bubble-like policy.<sup>185</sup> Despite all of the unnecessary ambiguities contained in this provision, one still can easily see the influence of the Final Emission Trading Policy<sup>186</sup> announced by the United States EPA in 1986.<sup>187</sup>

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180. The industries have reached the first annual target, 50% of return, yet only 20% of the collected waste tires have been chopped. See CENTRAL DAILY NEWS, Jan. 4, 1992, at 3.

The storage sites of waste tires have become potential breeding grounds for mosquitoes carrying dengue fever and thus have led to a secondary pollution. See, e.g., CENTRAL DAILY NEWS, July 15, 1991, at 11.

181. It was reported that a cement plant had planned to use the chopped tire pieces as subsidiary fuels, yet the plant finally gave up the plan under the pressure of local residents. See ECONOMIC DAILY NEWS, Feb. 22, 1992, at 7; see also ECONOMIC DAILY NEWS, June 25, 1992, at 9 (two companies were selected to be contractors for the final disposal of old tires).

The recycling of waste batteries with mercury cells poses a similar dilemma. See CENTRAL DAILY NEWS, Nov. 8, 1991, at 11.

182. NT\$ 0.5 per bottle before March 19, 1992.

183. In a Gallup poll, 55% of the people in the Taipei Metropolitan area indicated that the recycling points should be increased, and 41% thought the deposit-refund was too low. See CENTRAL DAILY NEWS, Oct. 7, 1991, at 11.

184. PET bottles recycled in the first quarter increased by 72% over the same period last year. See ECONOMIC DAILY NEWS, June 9, 1992, at 9.

185. Before the APCA provision was enacted, art. 13 of the Air Pollutants Emission Standards for Stationary Sources in the Province of Taiwan already permitted internal bubble trades. See COMPILATION OF ENVIRONMENTAL LAWS AND REGULATIONS 59 (1987). Yet, to the author's knowledge, no such bubbles were approved.

186. 51 Fed. Reg. 43814-43860 (1986).

The United States bubble policy<sup>188</sup> allows existing plants to increase emissions at one or more emissions sources in exchange for larger decreases in emissions at other emission sources. In contrast to the original "existing source bubbles" are the "new source bubbles" which allow trades between two new sources that are subject to the same New Source Performance Standards (NSPS).<sup>189</sup> The use of a bubble enables a firm to adjust the mix of controls on individual sources so that it can meet the emission limits in a cost-effective way.<sup>190</sup> The bubbles can be extended to include, not only emission points within the same plant (internal trades) but also emission points owned by other firms (external trades).

Article 15 of the APCA reads:

The public and private place[s] within the same [air quality] control region, which [have] more than one stationary source emitting the same air pollutant, may improve [their] total emissions of a *particular* air pollutant, so that the total emissions are less than those specified in the applicable emission standards and will made positive contributions to the air quality. These areas may then request the regulatory agency of the provincial/municipal government to review and allow [their] individual sources to be free from the limitations set by the emission standards under Section 1, Article 11 of the Act.

The extent of allowance as well as the total amount of emissions and their density, shall be in accordance with the provisions to be established by the regulatory agency of the central government. [emphasis added]

The controversial wording of this article of the APCA Amendments needs further analysis in order to clarify the problem. In terms of grammar, the subject of the first sentence in Section 1 of Article 15 is "the public and private place(s)." Although in Chinese the singular and plural is not always clear, the subject here must be singular if the legislators

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187. Specifically, the "baseline" used in such a Taiwanese bubble is the applicable emission standard: "To improve the total the emissions so that they will be less than those specified in the applicable emission standards" seems to reflect the "net reductions in actual emissions" requirement, and "it will make positive contributions to the air quality" seems to correspond to the "assurance that bubble is consistent with ambient progress" requirements. For details, *see id.* at 43,832; TANG, *supra* note 1, at 229.

188. The interesting name is derived from its treatment of multiple emission points as if they were encased in a single bubble. *See, e.g.*, Errol Meidinger, *On Explaining the Development of 'Emissions Trading' in U.S. Air Pollution Regulation*, 7 *LAW & POL'Y* 447, 455 (1985); Blackman & Baumol, *Modified Fiscal Incentives in Environmental Policy*, 56 *LAND ECON.* 417, 420 (1980).

189. *See* 50 Fed. Reg. 3688-3695 (1985).

190. *See* TANG, *supra* note 1, at 230, for examples.

really intended to allow "bubbles."<sup>191</sup> Reading the subject involved to be plural would imply strongly that what is involved in this trade are different plants (which may or may not belong to the same owner) within the same control region, since otherwise "within the same control region" will be redundant.<sup>192</sup> This interpretation, however, will essentially convert the bubbles from "plant-wide emission trading" into "region-wide emission trading." That interpretation is unacceptable, not because it misconstrues the United States bubble policy, but because the big jump involved in trading levels is dangerous and unjustified in terms of environmental policy.<sup>193</sup> The problem, therefore, lies in the "within the same (air quality) control region" language, which is not only redundant, but also extremely misleading. If the Legislative Yuan really means to introduce "bubbles", then the phrase "within the same control region" must be eliminated.<sup>194</sup>

If through the amendments the Legislative Yuan meant to adopt a bubble policy, then the current wording ("which has more than one stationary source") probably should be interpreted to allow existing source bubbles only, though the new sources bubbles may also be allowed through a broader reading of the Article.

## VI. PROSPECTS: SUGGESTIONS FOR THE FUTURE

The Republic of China on Taiwan can draw many useful lessons from United States environmental law. A comprehensive review of the environmental laws and policies in Taiwan is especially appropriate and necessary now with the possibility of upgrading the TEPA to the Ministry for Environment Protection. Because of the limitations of space, only the most urgently needed general policy reforms shall be mentioned.

In terms of traditional command-and-control regulations, the ROC is still at a very primitive stage of development. Strictly speaking, it has no fundamental and coherent regulatory strategies. The lack of unambigu-

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191. The legislative reasons for this Article, which accompanied the draft submitted by the TEPA to the Legislative Yuan, indicated clearly that it was aimed at adopting "bubbles." See TEPA, DRAFT OF AIR POLLUTION ACT AMENDMENTS 15 (Nov. 1989).

192. A plant that belongs to different air quality control regions is extremely unusual.

193. As explored earlier, *supra* notes 64-65 and accompanying text, a comprehensive permit system for stationary sources in Taiwan is still missing and all applicable emission standards are written in terms of pollutant density with no mass discharge limits. The author can see no reason at present to create a "freer" market for emission trading in Taiwan than exists in the United States.

194. The central government has not yet promulgated the rules for bubbles transactions as mandated by sec. 2 of art. 15, APCA.

ous goals and credible tools for achieving goals is the most critical problem with ROC environmental policy and law in the long run.

In particular, the decisions that the Taiwanese WPCA not follow the United States CWA in adopting the "zero-pollution" goal and the ROC APCA not mandate "health-based" ambient air quality standards are both correct.<sup>195</sup> What the Taiwanese should do now is confirm the water-quality-oriented strategy in the WPCA and establish the air-quality-oriented strategy for the APCA. Once the quality-oriented regulatory strategies are installed, all regulatory mechanisms should be reviewed thoroughly to ensure that they are consistent with the statutory goal.

During the decisionmaking process, the TEPA should express clearly the necessary relativism and flexibility involved, so that all participants and ultimately all the people will be able to make conscious choices, such as how much money will be spent in exchange for how clean and healthy an environment.<sup>196</sup> Local superiors should be permitted within a specific range. The existing spatial area units for various environmental regulation purposes should be redelineated according to the ecological realities, such as geographical, meteorological, and topographical conditions, instead of being subject to the limitation of arbitrary and irrelevant political districts. In the redelineation, the decisionmakers should also try to integrate pollution control policies with natural resource conservation policies.<sup>197</sup>

To conduct all reforms correctly, the TEPA should recognize that environmental law, just as environmental engineering, is an established discipline of knowledge. Without the participation of environmental lawyers, the environmental laws and regulations simply cannot realize the envisioned policies.

For the time being, the TEPA should take advantage of its almost limitless discretion, as entrusted to it by the extant system, to set up the various standards that are still missing and to upgrade the standards that already have been promulgated. During the process, increasing opposition and pressure from the affected industries and the allied legislators is inevitable. But the TEPA can balance the pressures by voluntarily adopting a more open decision-making process, such as providing notice-

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195. The underlying philosophy of the "zero-pollution goal" and the "health-based" standards are absolutism and a belief in technological solution. See WILLIAM H. RODGERS, *ENVIRONMENTAL LAW*, Vol. 1, §§ 1.2, 3.5 (1986); Tang, *supra* note 1, at 31-34.

196. See, e.g., Bruce A. Ackerman & Richard B. Stewart, *Reforming Environmental Law*, 37 *STAN. L. REV.* 1331, 1351-59 (1985).

197. See OECD, *WATER RESOURCE MANAGEMENT: INTEGRATED POLICES* 15 (1989).

comments and informal hearings for the public.<sup>198</sup> Certainly the quality of environmental decision-making can be significantly improved by an institutional fix of law. In my opinion, an administrative agency's discretion should be subjected to both substantive restrictions and procedural checks. Yet in light of the United States experience, it seems there is a trade-off between the substantive restrictions and procedural checks. In particular, the applicable boundary of the Reservation for Statutes<sup>199</sup> principle should be narrowed down, and "an intelligible principle" should be flexibly interpreted for the exercise of delegated legislative power in order to introduce a more comprehensive administrative procedure act.<sup>200</sup>

So far, the selective enforcement policy seems to have met with some success. These limited achievements can be attributed to several factors, such as the fact that few factories have installed control equipment,<sup>201</sup> the applicable standards are generally quite lenient, and the various problems inherent in the CAC regulatory approach have not been uncovered or experienced. As the standards become more stringent, however, the enforcement becomes more vigorous, and as the numerous medium and small businesses and plants begin to be subjected to regulations, the problems inherent in the CAC regulatory approach will become more obvious. Under an industrial structure which is dominantly composed of medium and small businesses, the demand for the cost-effectiveness of the chosen environmental approach will probably be much stronger than expected. The TEPA therefore should be aware of this potential problem and try to explore every possibility of incorporating

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198. In the absence of a general administrative procedure act, an agency which voluntarily adopts more "due process" procedures is not only free to proceed, but also widely welcome in view of the soaring demand for political participation by the general public.

199. *Vorbehalt des Gesetzes*.

200. See Dennis Tang, *On Rule-making Procedures—An Experiment in the Chinese Transformation of the US Administrative Procedure Act*, in COUNCIL FOR ECONOMIC PLANNING AND DEVELOPMENT, EXECUTIVE YUAN, COMPARATIVE STUDIES ON ADMINISTRATIVE PROCEDURES ACTS 321, 344 (1990) for details.

201. For example, the Taipei city government conducted an investigation of the 35 registered rubber manufacturers in August 1988 and found that only 2 plants had installed some sort of pollution control equipment. See *Current Development*, 7 INDUS. POLLUTION CONTROL, at 33 (1988). It is generally believed that the situation with the illegal (not registered) plants, which are quite popular in Taiwan, is even worse.

The situation may be improving. Statistics of the Bureau of Statistics, Executive Yuan, show that among the 1022 private manufacturers investigated, the average investment on environmental protection in 1991 was NT\$ 5.12 million, an amount 8 times more than that of 1980 (NT\$ 620,000). See ECONOMIC DAILY NEWS, June 1, 1992, at 3.

various economic-incentive instruments into the present regulatory system.<sup>202</sup> To pursue more effective enforcement, the TEPA should consider adopting incentive-based noncompliance penalties and a well-adjusted system of citizen suits and civil penalties.

As to experimental E/I programs, the TEPA should seriously consider the following suggestions: First, though other agencies may be concerned mainly, if not merely, with the revenues which an economic instrument can generate, the TEPA ultimately should be concerned with the "environmental impact" that such an E/I may have. Although some trade-offs among the goals of an environmental policy are inevitable, if an E/I program sacrifices all of its environmental impact for the administrative convenience of collecting revenues, it may no longer be an E/I worthy of adoption, or indeed may be only a tax hike in the guise of environmental protection. A reasonable connection between the fees paid and the pollution produced (*i.e.*, the quantity and the hazardousness of the pollutants involved) is necessary for the environmental significance of an E/I program. Only well-designed E/I programs will create incentives for public goals (*i.e.*; improving the environment) to become private interests.

Second, besides setting up the annual rates of return and pushing for the establishment of joint disposal funds, the TEPA should more actively intervene in: (1) standardizing the sizes and materials of the items for recycling, such as PET bottles and aluminum cans; (2) requiring all retail dealers to join the recycling programs; (3) guiding the expenditures of the joint disposal fund for speeding up the exportation/transfer or the importation of the necessary disposal know-how and collective disposal facilities;<sup>203</sup> and (4) raising the deposit refund periodically to make sure that enough economic incentive is provided.<sup>204</sup>

Third, the TEPA should be very cautious in initiating an emission trading program. The earlier analysis of Article 15 of the APCA shows that the TEPA is not familiar with the origin, the evolution, and the problems with the United States EPA's Emission Trading Program.<sup>205</sup>

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202. The author has offered a two-stage proposal for the adoption of a hybrid economic incentive system with an implementation timetable. See TANG, *supra* note 1, at 301-403.

203. If the relevant industry associations are not interested in capitalizing the fund, the TEPA should open the door to others.

204. Though the TEPA successfully raised the deposit for each PET bottle from NT\$ 0.5 to NT\$ 2.0, compared to the deposit of NT\$ 4.0 provided for each bottle by the Taiwan Tobacco & Wine Monopoly Bureau, it is probably still too low to provide strong incentives for recycling.

205. See TANG, *supra* note 1, at 213-240 for a detailed analysis.



In view of the fact that there has been no comprehensive permit system in Taiwan, and that all regulatory standards are written in terms of concentration only, the TEPA has additional reasons to be prudent in adopting bubbles and related policies, such as offsets and banking,<sup>206</sup> since the "paper credits" problem may arise, and the ambient air quality may therefore be further deteriorated.

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206. An earlier draft of the Amendments to the APCA, proposed by the predecessor of the TEPA in 1985, adopted offset and banking in place of bubbles. For some unknown reason, the TEPA dropped offset and banking policies in the proposed draft which became the 1992 Amendments.

TABLE 1 MAJOR U.S. AND R.O.C. ENVIRONMENTAL LEGISLATION  
(Taiwanese legislation indicated in bold type)

Period	-1949	1950-1959	1960-1969	1970-1979	1980-1989	1990-
Subject						
General Policy			National Environmental Policy Act of 1969		International Environmental Protection Act of 1983	Pollution Prevention Act of 1990 *
Air Pollution Control		Air Pollution Control Act of 1955	Clean Air Act (CAA) of 1963  Motor Vehicle Air Pollution Control Act of 1965  Air Quality Act of 1967	CAA Amend. of 1970  CAA Amend. of 1977  Air Pollution Control Act (APCA) of 1975	APCA Amend. of 1982	CAA Amend. of 1990  APCA Amend. of 1992
Water Pollution Control	Rivers and Harbors Act of 1899  Federal Water Pollution Control Act (FWPCA) of 1948	FWPCA Amend. of 1956	Water Quality Act of 1965	FWPCA Amend. of 1972  FWPCA Amend. of 1977  Water Pollution Control Act (WPCA) of 1974	Water Quality Control Act of 1987  WPCA Amend. of 1983	WPCA Amend. of 1991

\* The Draft of Environmental Protection Fundamental Act and the Draft of Environmental Impact Assessment Act are pending in the Legislative Yuan.

(TABLE 1)(Continued)

Period	-1949	1950-1959	1960-1969	1970-1979	1980-1989	1990-
Water Pollution Control				Safe Drinking Water Act (SDWA) of 1974  Drinking Water Management Act of 1972	SDWA Amend. of 1986	
				Marine Protection, Research and Sanctuaries Act (MPRSA) of 1972  MPRSA Amend. of 1977	MPRSA Amend. of 1980	Oil Pollution Act of 1990
Noise Control			Noise Control Act (NCA) of 1965	NCA Amend. of 1972  Quiet Communities Act of 1978	Noise Control Act (NAC) of 1983	NAC Amend. of 1992
Waste Management			Solid Waste Disposal Act of 1965	Resources Recovery Act of 1970  Resources Conservation and Recovery Act of 1976  Waste Disposal Act (WDA) of 1974	Hazardous and Solid Waste Amend. of 1984  WDA Amend. of 1980  WDA Amend. of 1985  WDA Amend. of 1988 Medical Waste Tracking Act of 1988	Federal Facility Compliance Act of 1992

(TABLE 1)(Continued)

Period	-1949	1950-1959	1960-1969	1970-1979	1980-1989	1990-
Subject						
Waste Management					<p>Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA = Superfund) of 1980</p> <p>Superfund Amendments and Reauthorization Act of 1986</p>	<p>Community Environmental Response Facilitation Act of 1992</p>
Toxic Substances Control				<p>Hazardous Materials Transportation Act of 1975</p> <p>Toxic Substances Control Act of 1976</p>	<p>Toxic Chemicals Regulation Act (TCRA) of 1986</p> <p>TCRA Amend. of 1988</p>	
Pesticides Control				<p>Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) of 1972</p> <p>Pesticide Regulation Act (PRA) of 1972</p>	<p>FIFRA Amend. of 1988</p> <p>PRA Amend. of 1986</p>	

(TABLE 1)(Continued)

Period	-1949	1950-1959	1960-1969	1970-1979	1980-1989	1990-
Subject						
Radiation	Atomic Energy Act (AEC) of 1946	AEC Amend. of 1954  AEC Amend. of 1959	Atomic Energy Act (AEA) of 1968	AEC Amend. of 1970  Uranium Mill Tailings Radiation Control Act (UMTRCA) of 1978  AEA Amend. of 1971*	Low-Level Radioactive Waste Policy Act (LLPWPA) of 1981  Nuclear Waste Policy Act (NWPA) of 1982  UMTRCA Amend. of 1983  LLPWPA Amend. of 1985  NWPA Amend. of 1987	
Land Use and Conservation	Taylor Grazing Act of 1934		Multiple Use, Sustained-Yield Act (MUSYA) of 1960  MUSYA Amend. of 1968  Urban Planning Act (UPA) of 1964	Federal Land Policy and Management Act of 1976  UPA Amend. of 1973  Area Planning Act of 1974	Hillside Conservation and Utilization Act of 1980	

\* A relevant act is Nuclear Damage Compensation Act of 1971 &amp; 1977.

(TABLE 1)(Continued)

Period Subject	-1949	1950-1959	1960-1969	1970-1979	1980-1989	1990-
Land Use and Conserva- tion			National Trails System Act of 1962	National Coastal Zone Manage- ment Act (NCZMA) of 1972  National Reserves Manage- ment Act (NRMA) of 1974  National Parks Act of 1972	NCZMA Amend. of 1980  Alaskan National Interests Land Conserva- tion Act of 1980  Coastal Barrier Resources Act of 1982	
			Wilderness Act of 1964  Wild and Scenic Rivers Act of 1968	Antarctic Conserva- tion Act of 1978  Endan- gered American Wilderness Act of 1978		
				National Forest Manage- ment Act of 1976  Forest Act of 1972		
				Surface Mining Control and Reclama- tion Act of 1977  Mineral Industry Act of 1978		

(TABLE 1)(Continued)

Period	-1949	1950-1959	1960-1969	1970-1979	1980-1989	1990-
Subject						
Land Use and Conservation					Cultural Assets Preservation Act of 1982	
Wildlife Conservation			Anadromous Fish Conservation Act of 1965  Fur Seal Act of 1966  Endangered Species Preservation Act of 1966  Endangered Species Conservation Act of 1969	Marine Mammal Protection Act of 1972  Endangered Species Act (ESA) of 1973  Fishery Conservation and Management Act (Magnuson Act) of 1976  Whale Conservation and Protection Study Act of 1976  Fish and Wildlife Improvement Act of 1978	Fish and Wildlife Conservation Act of 1980  Magnuson Act Amend. of 1982  ESA Amend. of 1988  Wildlife Conservation Act of 1989	Fishery Act of 1991

TABLE 2 U.S. AND R.O.C. NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging time	Primary standard (health related)		Secondary standard (Welfare related)	
Particulate matter (PM <sub>10</sub> )†	Annual (arithmetic mean)	50 $\mu\text{g}/\text{m}^3$	<b>65 <math>\mu\text{m}^3</math></b>	Same as Primary	<b>None</b>
	24-hour* (average)	150 $\mu\text{g}/\text{m}^3$	<b>125 <math>\mu\text{g}/\text{m}^3</math></b>	Same as Primary	<b>None</b>
Sulfur dioxide (SO <sub>2</sub> )	Annual (arithmetic mean)	80 $\mu\text{g}/\text{m}^3$ (0.03 ppm)	<b>0.03 ppm</b>	None	<b>None</b>
	24-hour* (maximum)	365 $\mu\text{g}/\text{m}^3$ (0.14 ppm)	<b>0.1 ppm</b>	None	<b>None</b>
	3-hour* (maximum)	None	<b>None</b>	1300 $\mu\text{g}/\text{m}^3$ (0.50 ppm)	<b>None</b>
	1-hour	None	<b>0.25 ppm</b>	None	<b>None</b>
Carbon monoxide (CO)	8-hour* (average)	10 mg/m <sup>3</sup> (9 ppm)	<b>9 ppm</b>	None	<b>None</b>
	1-hour* (average)	40 mg/m <sup>3</sup> (35 ppm)	<b>35 ppm</b>	None	<b>None</b>
Nitrogen dioxide (NO <sub>2</sub> )	Annual (arithmetic mean)	100 $\mu\text{g}/\text{m}^3$ (0.053 ppm)	<b>0.05 ppm</b>	Same as Primary	<b>None</b>
	1-hour	None	<b>0.25 ppm</b>	None	<b>None</b>
Ozone (O <sub>3</sub> )	Maximum Daily 1-hour Average*	235 $\mu\text{g}/\text{m}^3$ (0.12 ppm)	<b>0.12 ppm</b>	Same as Primary	<b>None</b>
	8-hour Average	None	<b>0.06 ppm</b>	None	<b>None</b>
Lead (Pb)	3-month (maximum arithmetic mean)	1.5 $\mu\text{g}/\text{m}^3$	<b>None</b>	Same as Primary	<b>None</b>
	1-month Average	None	<b>1.0 <math>\mu\text{g}/\text{m}^3</math></b>	None	<b>None</b>

(United States standards are indicated in standard type and ROC standards appear in bold type.)

Source: 40 CFR 50 (1991); R.O.C. Environmental Protection Agency Register No. 53, at 23 (May, 1992).

Notation:  $\mu\text{g}/\text{m}^3$  is micrograms per cubic meter.

mg/m<sup>3</sup> is milligrams per cubic meter.

ppm is parts per million.

† PM<sub>10</sub> (particles  $\leq 10\mu$  in diameter) replaced the original TSP as the new indicator pollutant in July, 1987 [ 52 FR 24663 ].

\* not to be exceeded more than once a year.



TABLE 3 TYPES OF STANDARDS USED IN PERMITS

	Air	Water
Total agencies reported	30	44
Proportions of limitations used:		
Concentration	97%	100%
Mass/unit input*	97%	36%
Mass/unit output	70%	50%
Mass/unit time		
per minute	10%	4%
per hour*	70%	9%
per day*	33%	59%
per week	7%	14%
per month*	7%	27%
per year*	33%	7%

Source: RFF, Survey of State Agency Surveillance Activities and Practices (1982) cited from C. Russell, W. Harrington & W. Vaughan, *Enforcing Pollution Control Laws* 19, Table 2-2 (1986). Reprinted by permission of Resources for the Future.

\* Difference in proportion between air and water programs significant at 5 percent level or better.

TABLE 4 DEVELOPMENT OF WASTE RECYCLING PROGRAMS

PHASES ITEMS	Classification Announced	Measures Promulgated	Annual Rate of Return Specified/Actual
PET bottles	78 (Waste) No. 03051 [01/31/1989]	78 (Waste) No. 17038 [06/16/1989]E	60% [06/26/'92 - 06/25/'93] 81 (Waste) No. 34523 [08/14/1992]  55% [06/26/'91 - 06/25/'92] 80 (Waste) No. 41936 [11/01/1991]  50% [06/26/'90 - 06/25/'91] 26.1% 79 (Waste) No. 40416 [11/10/1990]  50% [06/26/'89 - 06/25/'90] 33.5% 78 (Waste) No. 19318 [07/03/1989]
Tires	78 (Toxic) No. 18400 [06/24/1989]	78 (Toxic) No. 28780 [09/20/1989]C	80% [10/01/'92 - 09/30/'93] 81 (Waste) No. 39794 [10/09/1992]  70% [10/01/'91 - 09/30/'92] 80 (Toxic) No. 43860 [10/23/1991]  50% [10/01/'90 - 09/30/'91] 60.4% 80 (Toxic) No. 16309 [05/10/1991]  50% [Nov. '89 - Nov. '90] 79 (Toxic) No. 20802 [06/27/1990]
Insecticide containers	78 (Toxic) No. 24206 [08/08/1989]	79 (Waste) No. 27192 [08/20/1990]A	60% [07/01/'92 - 06/30/'93] 81 (Waste) No. 45506 [10/09/1992]  50% [07/01/'91 - 06/30/'92] [07/01/'91]
Pesticide containers	78 (Toxic) No. 30963 [10/18/1989]	79 (Waste) No. 3374 [09/21/1990]A	55% [04/01/'92 - 03/31/'93] 81 (Waste) No. 34408 [08/04/1992]  20% [04/01/'91 - 03/31/'92] 80 (Toxic) No. 10613 [03/28/1991]

TABLE 4 (Continued)

PHASES ITEMS	Classification Announced	Measures Promulgated	Annual Rate of Return Specified/Actual
Aluminum cans	78 (Waste) No. 39756 [12/21/1989]	79 (Waste) No. 29015 [08/31/1990]E	60% [01/01/'93 - 12/31/'93] 82 (Waste) No. 01034 [01/18/1993]  55% [01/01/'92 - 12/31/'92] 81 (Waste) No. 15311 [04/15/1992]  30% [01/01/'91 - 12/31/'91] 31.8% 79 (Waste) No. 45740 [12/13/1990]
Iron cans	78 (Waste) No. 39756 [12/21/1989]	79 (Waste) No. 29106 [08/31/1990]E	60% [01/01/'93 - 12/31/'93] 82 (Waste) No. 01035 [01/18/1993]  55% [01/01/'92 - 12/31/'92] 81 (Waste) No. 15343 [05/01/1992]  20% [01/01/'91 - 12/31/'91] 21.4% 79 (Waste) No. 45741 [12/14/1990]
Lubricant oils	79 (Waste) No. 01384 [01/22/1990]	79 (Waste) No. 14450 [05/25/1990]B	Not applicable, but semiannual report required since 01/01/1992] 5.4% 80 (Audit) No. 37471 [09/12/1991]
Capacitors	79 (Waste) No. 10992 [04/24/1990]	79 (Waste) No. 29008 [08/31/1990]D	50% [07/01/'92 - 06/30/'93] 81 (Waste) No. 34593 [08/26/1992]  30% [07/01/'91 - 06/30/'92] 80 (Waste) No. 09606 [03/05/1992]
Mercury cell batteries	79 (Waste) No. 15562 [05/21/1990]	79 (Waste) No. 29177 [08/31/1990]E	40% [01/01/'93 - 12/31/'93] 81 (Waste) No. 51164 [12/08/1992]  30% [01/01/'92 - 12/31/'92]*  5% [01/01/'91 - 12/31/'91] 5.4% 79 (Waste) No. 45757 [12/19/1990]

TABLE 4 (Continued)

PHASES ITEMS	Classification Announced	Measures Promulgated	Annual Rate of Return Specified/Actual
Fluorescent light tubes	79 (Waste) No. 27051 [08/22/1990]		
Styrofoam containers	81 (Waste) No. 05740 [03/03/1992]  80 (Audit) No. 23331 [07/11/1991]	80 (Waste) No. 34551 [08/30/1991]F	
Aluminum Foil Lining	81 (Waste) No. 39640 [09/10/1992]		

(Actual rate of return figures are indicated in bold type.)

Sources: Annual Report on Environmental Protection 184 (Table 4-2-1) (1991); TEPA Register No. 15, 20, 21, 22, 23, 26, 27, 30, 31, 34, 35, 36, 37, 40, 42, 43, 44, 47, 52, 54, 56, 57, 58, 59 & 62.

\* For some unknown reason, the notice was not formally made public on the TEPA Register.

TABLE 5 ANALYSIS OF RECYCLING PROGRAMS

CONTENTS  TYPES	Collection						Disposal		
	Target group	How (Means)				Annual rate of return specified	Joint fund		Means restrictions
	Related businesses	Recycling bins depots & centers	De-posit-refund system	Special storage requirements	Price guarantees		Supervisory committee	Rate set up procedure	
A	*					*	*	Report	
'B				*	*		*	Report	*
C	*		*	*1	*2	*	*	Report	*
D	*	*		*		*	*	Report	*
E	*	*	*			*	*	Report	
F	*					*	*	Report & Approval	*

<sup>1</sup> See TEPA, Public Notice 80 (Toxic) No. 30024, appeared in TEPA Register No. 44, at 11 (Aug., 1991).

<sup>2</sup> See TEPA, Public Notice 80 (Toxic) No. 19561, appeared in TEPA Register No. 43, at 14 (July, 1991).

Figure 1 Enforcement structure under the Clean Air Act

