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# **International Review for Environmental Strategies**



**IGES**  
Institute for  
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## Aims and Scope

The International Review for Environmental Strategies (IRES) is a peer-reviewed biannual journal aimed at disseminating strategically oriented environmental research to the world. This scope is global, although priority may be given to issues of special concern to the Asia-Pacific region. Guided by the principles of timeliness and accessibility, the journal publishes original, high-quality papers that take multidisciplinary, integrated approaches to sustainable development. In doing so, it seeks to promote and facilitate dialogue between stakeholders. The journal is published in English in order to reach a broad audience; however, papers are reviewed in terms of quality and utility, rather than for language proficiency.

IRES invites the submission of any paper whose broad aim is to contribute to effective environmental strategies for sustainable development. The journal welcomes the submission of manuscripts from researchers as well as policymakers and other stakeholders, and encourages the submission of papers from authors from developing countries.

IRES recognizes that effective strategic thinking about the environment requires a wide range of approaches: from grassroots and participatory methods, empirical and scientific methodologies, to the analysis of policies and laws. The target audience of IRES includes not only researchers, but also members of non-governmental organizations, policymakers and other stakeholders.

IRES is published by the Institute for Global Environmental Strategies (IGES), an international research institute that strives to develop innovative environmental policy instruments. The editorial board of IRES consists of external members and internal members from IGES. The IRES Editorial Board holds two meetings a year, during which submissions and comments of the peer-reviewers are read and evaluated. Articles and Research Notes are evaluated by at least two reviewers.

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## Editor's Note

The Institute for Global Environmental Strategies, IGES, completed its second research project phase in March 2004. This three-year period has been a time of growth for IGES; relocation to a new, larger research facility, expanding research staff, and strengthened research activities.

In accordance with this growth, the *International Review for Environmental Strategies (IRES)*, IGES's academic journal, has broadened its horizon. During the second phase, *IRES* featured special issues, focusing on a selection of critical topics: issues at the Earth Summit (vol. 2, no. 2), globalization and sustainable development (vol. 3, no. 1), sustainable freshwater resource management (vol. 3, no. 2), and environmental education and sustainable development (vol. 4, no. 1).

This new issue of *IRES* does not have any special theme, but consists of papers submitted on a diverse range of environmental topics. Readers will find enlightening articles by expert contributors on: environmental education, global climate policy, urban growth management, financing renewable energy, balancing trade and environmental concerns in free trade agreements, and many other issues.

Ko Nomura of IGES, Latipah Hendarti of RMI—the Indonesian Institute for Forest and Environment, and Osamu Abe of Rikkyo University present a case study of PPLH-Seloliman, an NGO-run environmental education center in Indonesia, analyzing the keys to its success—particularly its financial self-sufficiency—and looking for policy implications for the support of such centers in developing countries. Their analysis also breaks new academic ground by applying the theoretical concept of “change agency” to the center.

Suraje Dessai of the University of East Anglia, Nuno S. Lacasta of the Portuguese Ministry of Urban Affairs, and Katharine Vincent of the University of East Anglia review the troubled political history of the Kyoto Protocol up to the New Delhi meeting, examining the complex interplay of interests and bargaining power. They also assess the Protocol and its place in the context of the international climate regime and other environmental negotiations.

Byungseol Byun of the Korean Environmental Institute and Hee-Yun Hwang of Chungbuk National University look to international experiences in search of solutions to the rapid but uncoordinated growth of cities in the Republic of Korea. They argue that conservation and urban development can still co-exist in Korea and propose a new comprehensive land management program for the country based on strict, coordinated zoning that takes into account timing, infrastructure development among other factors.

Miao Chang, Mushtaq Memon, and Hidefumi Imura of IGES argue the case for public-private partnerships to urban environmental infrastructure development to keep pace with the rapid growth of China's cities. They also examine the policy and institutional changes that will be necessary to make such partnerships work.

In a research paper, Akanksha Chauery and Yuvaraj Dinesh Babu of TERI and Gueye Kamal of IGES present interim findings of a study on innovative financing options for renewable energy. They examine the role of different financing sources in the development of renewable energy technologies. They focus on two technologies that are relatively mature in India—grid-connected wind power and domestic solar

photovoltaic systems—and trace how their financing has changed as they have moved from the initial research and development phase towards commercialization

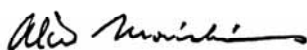
Kenichi Imai and Gueye Kamal of IGES examine how, and how far, trade and environmental concerns are harmonized in free-trade agreements concluded in the Asia-Pacific region. They compare the different approaches with that adopted by the World Trade Organization (WTO), and identify what implications this has for agreements in the region as well as the WTO's future direction.

Nachin Dashunyam looks at current trends in livestock herding in Mongolia and how they are linked to the country's critical environmental problems, particularly desertification. His paper concludes with recommendations for ways that herding practices can be changed in order to conserve Mongolia's disappearing pastureland and provide a sustainable livelihood for the many people who still rely on herding.

Finally, this issue includes reviews of two recent books: *Making Microchips* by Jan Mazurek, on the challenges facing the semiconductor industry and its regulators, is reviewed by Jone Lane of IGES; while Axel Michaelowa of the Hamburg Institute of International Economics critiques *Global Warming and the Asian Pacific* (Ching-Cheng Chang, Robert Mendelsohn, and Daigee Shaw eds.), a collection of papers from a conference that took place in December 2000 that deal with emissions forecasts for countries in the region, application of carbon taxes, and global warming policy.

I would like to take this opportunity to acknowledge and thank our *IREs* editorial board members throughout the IGES second phase. Dr. Edith Brown Weiss, Francis Cambell Brown Professor of International Law at Georgetown University, was a founding member and has been the driving force behind *IREs*. Without her compelling yet kind input, *IREs* would not exist today. She has also been a vital member of the Board of Directors for IGES. Dr. Osamu Abe, Professor of Rikkyo University, provided insightful views in the area of environmental education, which is relatively new and rapidly changing. Dr. Katsuhiko Kokubu, Professor of Kobe University, has contributed useful tools—environmental reporting for corporate and environmental accounting—to bring environment and business closer together. Dr. Shuzo Nishioka, Director of the National Institute for Environmental Studies, supported *IREs* not only by contributing his excellent scholastic knowledge and standing but also by his fairness and trustworthiness, admired by everyone.

We look forward to contributions from readers of *IREs*, to keep its future issues informative and useful, as well as your comments on this issue. It is our hope that IGES can continue to provide opportunities for readers to learn from those future issues and provide a forum for discussion of innovative solutions to global environmental problems.



Akio Morishima

Chair of Editorial Board

International Review for Environmental Strategies

Chair of the Board of Directors, President

Institute for Global Environmental Strategies

**Article**

# **NGO Environmental Education Centers in Developing Countries: Role, Significance and Keys to Success, from a “Change Agent” Perspective**

Ko Nomura,<sup>\*a</sup> Latipah Hendarti,<sup>b</sup> and Osamu Abe<sup>c</sup>

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Environmental education by non-governmental organizations (NGOs) is increasingly important in developing countries. This paper focuses on PPLH-Seloliman, an NGO environmental education centre in Indonesia, which shows us a good practice example of NGO environmental education. What is notable about this center is not only its contribution to the promotion of environmental education but also its financial self-sufficiency—most NGOs in developing countries are highly dependent on grants.

This paper considers PPLH-Seloliman from the perspective of what E. M. Rogers (1983, 1995) terms a “change agent”—that is, a marginal figure facilitating the flow of resources between a “resource system” (which could be information, knowledge, materials, the natural environment, funds, and others) and a “client system” (in this case, the target groups of the center’s programs and projects). In this role, with a grassroots approach and political independence, PPLH-Seloliman can meet public expectations, which in turn increases the support it receives and promotes environmental education.

PPLH-Seloliman has been a change agent between the following client systems and resource systems: (1) urban people and the natural environment; (2) local educators and national and international educational resources; (3) local people and national and international agencies; and (4) the classroom (formal education) and the field. This range of functions has helped PPLH’s financial self-sufficiency as well as promoting environmental education at local level.

In addition to highlighting some valuable lessons that can be learned from the example of PPLH-Seloliman, this article intends to demonstrate the usefulness of a change agent perspective in understanding the role, significance, and keys to success of NGO environmental education centers.

*Keywords:* Environmental education, NGO, change agent, international assistance.

## **1. Background and aim of this paper**

Environmental education by non-governmental organizations (NGOs) is increasingly important in Asian developing countries as a result of various socio-political and economic changes in the region. For example, the overall growth in numbers of NGOs has led to a qualitative and quantitative increase in

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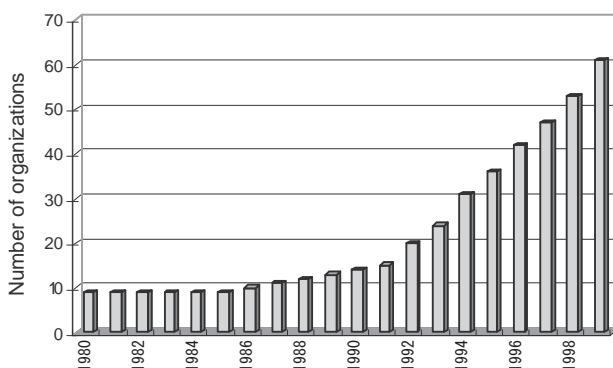
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NGO environmental education activities. Democratization has also provided NGOs with greater freedom to operate. Local governments, which have come to play an important role in providing formal education due to decentralization processes, have started to enhance their partnerships with non-governmental actors in order to complement their insufficient resources. In addition, the regional economic slump that started in the late 1990s constrained resources within formal education, which in turn increased the importance of non-state resources in promoting environmental education.

Indonesia has experienced all of these changes. The number of NGOs engaging in environmental education in Indonesia dramatically increased in the 1990s (see Figure 1).<sup>1</sup> Decentralization has increased the demand for NGOs to support local governments in providing environmental education not only to students and the public but also to government officials and educators, who lack adequate knowledge and experience (Soerjani 1999). In Indonesia, the success of pioneers such as PPLH-Seloliman<sup>2</sup> has inspired other NGOs to follow in their footsteps. As a result, NGOs' environmental education activities in Indonesia have developed significantly.



Source: Nomura and Abe (2001a)

**Figure 1.** Rising numbers of NGOs involved in environmental education in Indonesia

Insufficient studies have been undertaken to date on how to promote NGO environmental education activities, especially in developing countries, despite their importance (Nomura and Abe 2001a, 2001b). Moreover, few attempts have so far been made at analyzing NGO environmental education centers in order to identify policy implications for promoting such practices. Although some ink has been expended on introducing such centers and practical skills for managing them, the usefulness of these materials is limited. Many documents relating to individual environmental education centers are written by the centers' staff, from a subjective viewpoint and for the purpose of promoting the center. Although these materials are significant, Schulze (1991/2) argues that there is a need to evaluate environmental

<sup>1</sup> Figure 1 shows the annual increase in new members of Jaringan Pendidikan Lingkungan, the nation-wide NGO environmental education network in Indonesia, since its founding.

<sup>2</sup> Pusat Pendidikan Lingkungan Hidup (which literally means "environmental education center") is the name of an environmental NGO. Seloliman is the name of the site in East Java where PPLH's original center is located. PPLH has since established several other environmental education centers in the other regions of Indonesia, and each center has a considerable degree of autonomy. For the sake of brevity, in this paper the term "PPLH" refers to PPLH-Seloliman specifically, unless otherwise indicated.



education centers from the stance of objective outsider in order to document the experiences in a way that is useful to a larger audience. In addition, most documentation in this area has been based on cases in developed countries (for example, Schulze 1991/2, Wilson and Martin 1991). Considering the great needs in developing countries in Asia, it is crucial to develop locally appropriate policies to facilitate the establishment and development of NGO environmental education centers, such as provision of necessary resources and practical guidelines .

This paper aims to make a contribution to the development of such policies by identifying policy implications from an analysis of a best practice in the field of NGO environmental education centers in Indonesia, PPLH. This paper seeks to identify PPLH's role and significance, as well as the constraints it has encountered and keys to its success on both educational and management sides, which should help in formulation of policies to support similar activities. It is hoped that the paper will be informative for NGO staff as well as policy-makers. From an academic perspective, this paper tries to break new ground by employing a "change agent" perspective<sup>3</sup> to analyze an NGO environmental education center. Considering the lack of frameworks for analyzing such centers, especially NGO-run centers in developing countries, it is hoped that this attempt will also make a valuable academic contribution.

What makes PPLH worth studying is not only its contribution to the promotion of environmental education, but also its financial self-sufficiency; this makes PPLH unusual among NGOs, who generally are highly dependent on funding agencies. Such dependency often obliges the NGO to follow the funding agency's policies, which may be inconsistent with local needs. Also, it makes it difficult for the NGO to make long-term plans. For funding agencies, financial self-sufficiency is highly desirable in a target NGO, as it suggests that activities and programs will be sustained after withdrawal of funding. Thus, studying PPLH's managerial achievements can provide useful information.

Data about PPLH were collected through informal and semi-structured interviews, focus group discussions, document analysis, questionnaire surveys, observation, and literature review. Schulze (1991/2) proposes that a case study methodology emphasizing such qualitative data collection techniques is appropriate for evaluating environmental education centers. In addition to observations through multiple visits to Seloliman over a decade, the authors collected data using these methods intensively during 2002–2003.

## 2. Framework

### 2.1. *The four functions of an NGO environmental education center*

Any environmental education center, whether NGO, private, or public sector, has three major functions. Firstly, in the words of Wilson and Martin (1991, 5), *environmental information* "about local, regional, national, and international issues is funnelled into the centres, organized, evaluated, synthesized, and disseminated," helping to enhance users' environmental knowledge and assisting environmental practices and activities. Secondly, environmental education centers can provide *opportunities for environmental education*, such as training programs, which enhance environmental

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3 The change agent concept is described in section 3.

skills and knowledge, and facilities for workshops, meetings, and other educational activities, which strongly support local environmental efforts. This function of the environmental education center should be considered as its major *raison d'être*. Thirdly, environmental education centers can conduct *research* and other collaborative works with other institutions and local people. These could include research on regional environmental conditions; exploring locally suitable educational methods, materials, and curricula; helping institutions such as local schools to develop environmental education programs; as well as other related activities to promote environmental education at local level.

What, then, is specifically expected from an *NGO* environmental education centre? *NGO* environmental education centres have a fourth major function, which is related to their role as links between different geographical, sectoral, and topical areas. This results from the grassroots approach and political independence adopted by *NGOs* (Princen and Finger 1994). For example, being resources of environmental expertise located between the local community and other levels, and having diverse networks and contacts, they can “translate” environmental information from higher levels, such as national and international discourse, into local contexts, making it possible for local people to “think globally, act locally.” Also, educational materials and practices often have to be modified to suit them to local contexts. Seen from the opposite side, this translational function can make information about the local environment more accessible to people outside the locality. This function is particularly significant in the case of environmental education, as local or grassroots perspectives are an essential part of it. Although this function is interlinked with the other three functions, this is a comparative advantage of *NGO*-run environmental education centers.

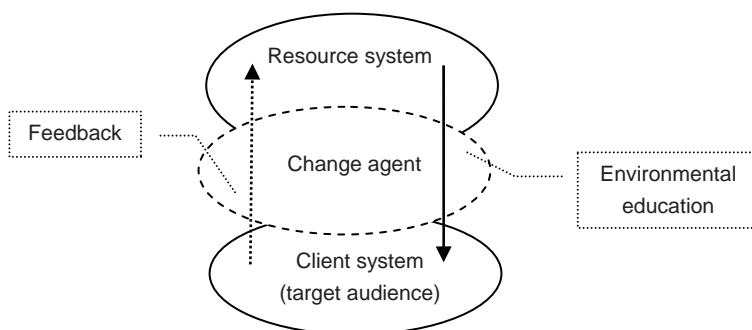
The translational function can be explained clearly by reference to the concept of the “change agent,” which was notably proposed by E. M. Rogers in his theory of innovation diffusion (Rogers 1983, 1995). Although Rogers is mainly concerned with the overseas assistance sector, the concept is versatile and has been widely used. Rogers describes the role of the change agent as: to “provide a communication link between a resource system of some kind and a client system” and facilitate the flow of resources (which he terms “innovation”) from the former to the latter (Rogers 1995, 336). For the purposes of this paper, the “resource system” comprises information, knowledge, discussion, materials, nature, funds, and other resources for environmental education. The “client system” comprises the target audiences of the environmental education center, who could be local people and local educators (including *NGOs*), as well as people outside the locality who want to study the local environment.

Since there are, in Rogers’s words, “social and technical chasms” between resource and client systems—such as heterophily<sup>4</sup> in technical competence, subcultural language differences, socioeconomic status, and beliefs and attitudes—resource systems cannot be useful for client systems as they are. For example, there may be particular environmental problems in a rural village in Indonesia, and a resource system, such as experts in the United States, may hold some useful knowledge, skills, and information relevant for addressing the problems. However, it would be inefficient to provide environmental education directly from this resource system to the villagers, since the socio-cultural differences and the gaps in technical knowledge between the two could hinder the learning process.

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4 Heterophily: the degree to which two individual entities that communicate are different in some attribute.

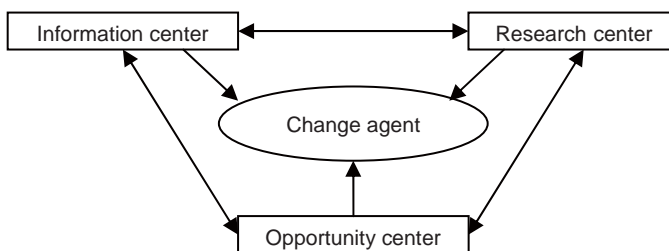
Many local people would experience difficulty in understanding such general information and applying it in their own context. As a result, what the client system learned through such environmental education activities would not be adopted, or genuinely take root, in the society. These “chasms” are often wider in developing countries, as is suggested extensively in the literature in the field of international assistance. However, a change agent can fill the gaps and make the resources useful for the clients (local people) by “translating” from the resource system for the client system, as the change agent is a “marginal figure with one foot in each of two worlds” and acts as a “bridge between two differing systems” (Rogers 1983, 315). NGOs have, as mentioned, a unique ability to link between the two.



Source: Modified from Rogers 1983, 314.

**Figure 2.** A change agent model for environmental education

One may say that the key to an NGO environmental education center’s success in fulfilling what is expected of it lies in how far it can act as such a marginal figure in many respects and between many resource and client systems. Accordingly, this analysis of PPLH focuses on examining if and how the center has played the role of marginal figure and how it has contributed to the promotion of environmental education. It would also explain its financial self-sufficiency, which is linked to its ability to meet the needs of many individuals and groups and thus attract more paying clients. The relationships between the four functions of an NGO environmental education center described above (information center, opportunity center, research center, and change agent) are illustrated in Figure 3.



**Figure 3.** Four functions of an NGO environmental education center

## 2.2. Evaluation checklist

To establish that this case is worthwhile studying, it is necessary to demonstrate its significance in environmental education and managerial performance. In reviewing PPLH-Seloliman's environmental education performance, this paper emphasizes outputs. It looks at quantitative growth in PPLH's environmental education programs and projects, such as increase in numbers of activities and of participants.<sup>5</sup> In addition, this paper employs qualitative methods (for example, interviews and focus group discussions) in assessing PPLH's teaching methods and educational achievements (that is, what the audiences have learned and achieved through PPLH's facilities and activities), which are difficult to assess in simply numerical terms.<sup>6</sup> The criteria listed in Table 1 have been used to evaluate PPLH's environmental education performance. Different criteria are linked with the four functions of the NGO environmental education center.<sup>7</sup>

For PPLH's managerial performance, Table 2 was prepared using various materials for the evaluation of NGOs or environmental education activities, including existing checklists of this kind (especially NPO Hyouka ni Kansuru Kentou Inkai 2002, IGES 2001, Wilson and Martin 1991). The following sections examine the performance of PPLH according to the items in these two checklists.<sup>8</sup>

**Table 1.** Evaluation checklist I: Environmental education performance

Role		Indicator	
Information/ research/ opportunity center	Quantitative	E-1:	Participants (numerical change).
		E-2:	Programs and projects (numerical change).
		E-3:	Educational materials and library stock (numerical change).
		E-4:	Facilities (numerical change).
		E-5:	Partnership with governments, businesses, and NGOs (numerical change).
	Qualitative	E-6:	Assessment from the viewpoints of the participants, etc.
		E-7:	Consistency with vision, mission, and strategies of the organization.
		E-8:	Implementation of evaluation (program level).
Change agent		E-9:	Participation of local people (program level; numerical change).
		E-10:	Compatibility of the programs with local needs; target orientation.
		E-11:	Link with local traditions and characteristics (culture, etc.; program level).
		E-12:	Comprehensive and international approach in its programs.

5 Although one can regard increases in funds and staff numbers as the results of success in educational programs, they are included under indicators of managerial performance in this paper.

6 Evaluating educational impact is significantly more difficult in the case of environmental education than for other activities, since environmental education is interdisciplinary in nature, embracing awareness, attitudes and participation as its objectives (see, for example, IGES 1998, 2001). The result is that the targets of environmental education are diverse and abstract, and are thus difficult to evaluate in a clear and quantitative manner.

7 The "change agent" indicators in the evaluation checklists (Tables 1 and 2) are based on what Rogers argues are criteria for success in the role of change agent (Rogers 1983, 1995).

8 When applying these checklists in other contexts, the following should be kept in mind: (1) numerical changes can be shown by chronological review (this may be illustrated by line graph/bar chart); (2) if a numerical target has been set previously, it can also be used to indicate the degree of achievement (e.g., using percentages); (3) non-numerical changes can be expressed descriptively. They can also be quantified and visualized by means of techniques such as semantic differential.

**Table 2.** Evaluation checklist II: Management performance

Area	Indicators	
Management (general)	M-1:	Articulation of vision, mission, strategies of the organization.
	M-2:	Decision-making system (degree of democratic decision-making).
	M-3:	Transparency (annual and financial reports, web site, newsletter, etc.).
	M-4:	Environmental impact of the center (energy and waste management, etc.).
Staff	M-5:	Number of full-time, part-time and volunteer staff (numerical change).
	M-6:	Number of locally recruited staff (full-time, part-time, and volunteers; numerical change).
	M-7:	Number of supporters (membership; numerical change).
	M-8:	Human resource development within the organization.
Finances	M-9:	Revenue and expenditure (numerical changes).
	M-10:	Dependence on program services; gifts, grants, and similar; membership fees; etc. (numerical change).
	M-11:	Expenditure on program services, management and general expenses (numerical changes).
Change agent	M-12:	Efforts to establish contacts with target audiences (including contacts with opinion leaders).
	M-13:	Homophily/empathy with local people; credibility in the eyes of local people.
	M-14:	Contribution to the local community (not including environmental education).
	M-15:	Relationships with other local NGOs.

### 3. Analysis

#### 3.1. *Historical development of PPLH: environmental education activities*

It could be said that PPLH has its origin in Indonesia's first local environmental NGO, Yayasan Indonesia Hijau (YIH, or Green Indonesia Foundation), which was established in 1978 as a result of conservation activities in places such as Leuseur in Sumatra. YIH's main activity was to raise public environmental awareness. It targeted schoolchildren and used visual equipment and materials effectively, particularly slide shows. YIH's activities were favourably received by the public all over Indonesia, especially in the cities of Surabaya, Ujung Pandang, Palembang, and Bandung.

Despite its popularity, some YIH staff realized in the mid-1980s that it was not time- or cost-effective to visit individual schools and provide programs. Having recognized this inefficiency, one of the staff members, Suryo Wardhoyo Prawiroatmojo, planned the establishment of a center for intensive

environmental education activities, which students and teachers could visit to enjoy nature as well as to learn.<sup>9</sup>

Suryo's commitment to constructing the center, as well as his diverse network of contacts, attracted support from a variety of sources. For example, WWF-International contributed as much as 150 million rupiah for the center's construction.<sup>10</sup> The British Embassy supported purchase of books for the library. Petra University in Surabaya provided traditional stoves. Hans Ulrich Furkhe, a German architect, voluntarily designed the center. His design is a mix of traditional Javanese and Balinese architectural styles, which gives the center an attractive and environmentally harmonious atmosphere. Foreign governments, including Germany's, also made contributions for the establishment of the center.

Suryo chose to locate the center in Seloliman because (1) the land was affordable with the contributions mentioned above; (2) it is easily accessible from populated areas; (3) it has rich natural and cultural surroundings.<sup>11</sup> After a two-year construction period, PPLH was officially opened on May 15, 1990.<sup>12</sup>

Since then, PPLH has expanded its environmental education activities. PPLH has constantly attracted a variety of *participants* to its programs, with an average of more than 10,000 participating annually, as shown in Figure 4.<sup>13</sup> In addition, PPLH has provided a range of between five and 26 kinds of educational *programs* since its establishment, and these develop year by year. They cover a variety of topics, such as tropical rainforests, biological monitoring, botany, bird watching, energy, waste, and agricultural techniques. Besides such programs, PPLH also provides opportunities like workshops for local teachers; for example, in 1995 the centre held an international teachers' workshop to develop networking between schools at local, national, and international levels.<sup>14</sup> To enhance relations with, and contribute to, local communities, PPLH developed Program Desa (Village Program) to share information, knowledge, and skills on organic farming, waste management, medicinal herbs, etc. Program Desa developed into a community development program in 1999.

PPLH has also produced *educational materials* and other learning media such as posters, booklets, brochures, books, magazines, and journals. In creating materials for local educational activities, PPLH

9 Finance was one of the factors that led Suryo to think about alternative ways to provide educational activities continuously. He said that the schools visited by YIH generally made minimal contributions to educational costs, putting the burden of covering the costs of activities onto YIH (Saidi, Abidin, and Faizah 2000, Chapter 3, p. 4). It could be said that PPLH was designed to achieve financial self-sufficiency from the very start.

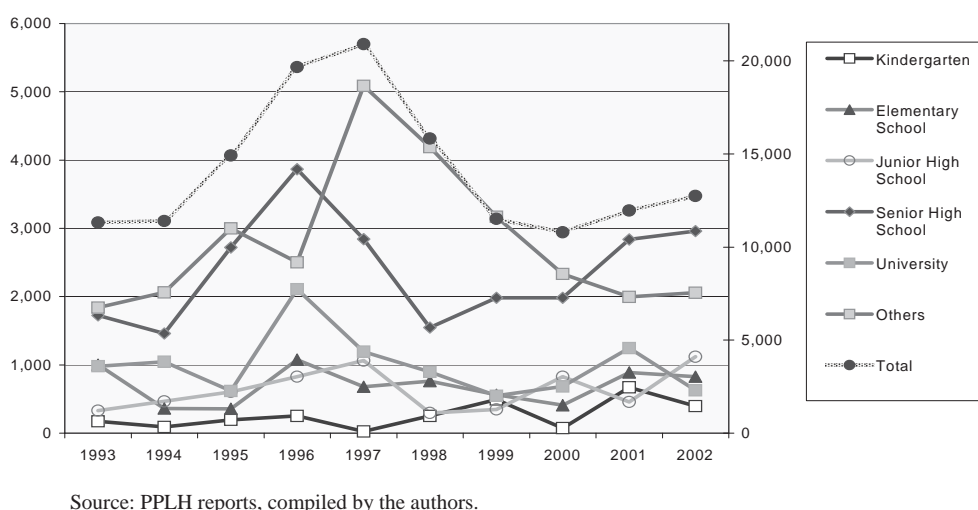
10 From the WWF contribution, 90 million rupiah was allocated for the purchase of land (3.7 ha.) and 50 million rupiah was allocated for the construction of a seminar room, restaurant and part of the PPLH office (see Saidi, Abidin, and Faizah 2000; *Tempo*, May 26, 1990; *Surabaya Post*, August 18, 1997). US\$1.00 had a value of about 1,850 rupiah in 1990; it is about 8,500 rupiah as of April 2003.

11 This list of reasons is based on related articles in the *Jakarta Post*, November 4, 1988; *Surabaya Post*, February 26, 1990; *Liberty Magazine*, August 1–15, 1992, pp. 46–48; and interviews by Hendarti with former PPLH staff member Syafruddin Ngulma Simeuleu (2003) and a builder who worked on construction of the PPLH facilities, Kardi.

12 Prince Bernhard of The Netherlands, the founding president of WWF-International, attended the opening ceremony along with representatives of several countries, including Germany, Denmark, Canada, Finland, Sweden, and New Zealand. This helped to expand PPLH's international network of contacts and increased support to the center. PPLH's growing international recognition is evidenced by the fact that PPLH received the International Global 500 Award from the United Nations in 1992 and Suryo received the Rolex Award for Enterprise in 1990. These awards motivated the PPLH staff and led to further enhancement of the organization's international connections.

13 Visitors to PPLH, including people who just visited to enjoy the facilities, amount to more than 80,000 people per year (according to Suroso, current director of PPLH-Seloliman, interviewed by the authors).

14 This workshop developed into the School Link program, which involved electronic networking between local, national, and international schools. This program terminated in 1999.



**Figure 4.** Participants in PPLH programs, 1993–2002

has tried to incorporate up-to-date international information and materials to suit the local context, so that local educators can utilize a variety of effective methods. Also, PPLH often provides seminars for local educators to provide them with information and ideas on environmental education from around the world. The centre has built up a library of more than 20,000 books. Most visitors and participants in PPLH's activities enjoy spending some time in this library, and it has helped to promote local educational activities.

PPLH has been equipped with various *facilities* since its establishment, such as overnight accommodation, meeting rooms, a restaurant, offices, a kitchen, a meeting/gathering field (*lapangan*), a garden, waste-processing units, a solar panel unit, and a micro-hydro power plant, as well as the library. Now around 100 people at a time can stay at the center and hold activities such as meetings. Besides physical capacity, the facilities are designed with their educational function in mind, as well as harmony with the natural surroundings. For example, the restaurant provides organic dishes made from vegetables and herbs grown in PPLH's garden and on local farms, which can be used as a tool for teaching visitors about the environmental impacts of food production.

PPLH has maintained a variety of *partnerships* with many stakeholders over a long period to achieve its aims. It conducts seminars and workshops with both local and with central government bodies such as the Ministry of Environment. It also promotes its activities internationally through partnership with overseas businesses, including travel agents. This has contributed to increasing the numbers of international visitors—although their numbers fell after 1997 due to the economic crisis and political turbulence. PPLH has numerous collaborative activities with NGOs, such as holding workshops and trainings.



Besides the quantitative indicators, PPLH's achievements in environmental education were also assessed through a review of its media coverage and the outcomes of a questionnaire survey with participants in PPLH programs and interviews with participants and stakeholders.<sup>15</sup>

Most program participants surveyed felt that PPLH programs met their expectations in terms of subject matter and educational methods. Young participants in environmental education programs interviewed by the authors often reported that their visits to PPLH had helped them to deepen their understanding of the subjects at school. For example, one of them said that the composting system at PPLH had helped him to understand decomposition processes. Another said, "Now we understand how changes in natural surroundings influence our life." Many teachers interviewed said that their students became more active and motivated after a visit to PPLH. Some 98 percent of respondents to the questionnaire survey stated that they would like to revisit PPLH together with their family members and friends.

Besides participants from urban areas, local residents also attested that PPLH's activities had met their needs. Members of farmers' groups interviewed by the authors said that PPLH's ecological farming system program had benefited farmers with small landholdings. For example, they had been able to produce more rice than they used to by using more ecologically friendly methods. This motivated the local government of Mojokerto, one of the closest towns to PPLH, to draft local regulations on ecological farming systems; PPLH is helping to formulate these regulations at the request of the local government.

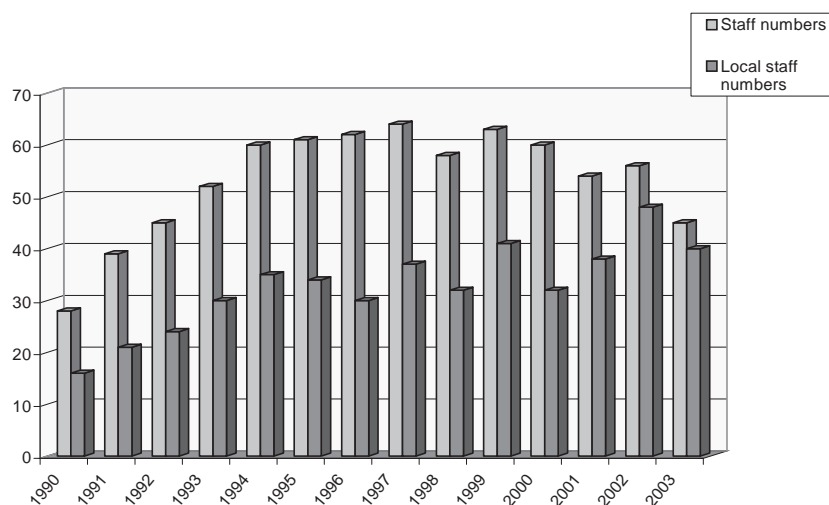
PPLH has also facilitated links between local environmental education activities and national and international resource systems. The School Link program,<sup>16</sup> which tried to exchange ideas and experiences between local, national, and international schools (mainly in northern Europe), and the training program provided for local NGOs in collaboration with the Field Studies Council (UK), are examples.

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<sup>15</sup> The survey was conducted by PPLH and the authors between January and April 2003. Questionnaires were distributed to participants of PPLH programs, ranging from schoolteachers to NGO staff. They covered most of the participants who could easily be reached by post. There were 254 individual respondents. More information about the interviews can be found at the end of this paper.

<sup>16</sup> See footnote 14.





Source: PPLH reports, compiled by the authors.

**Figure 5.** PPLH staff numbers, 1990–2003

The quality of these activities is subject to both internal and external evaluations. For the latter, PPLH has invited many stakeholders, including a Swiss funding agency PanEco, which conducts evaluations every six months. Many members of staff at PPLH state that having external as well as internal evaluations has helped to enhance staff motivation and capacity, as well as improving the quality of activities.

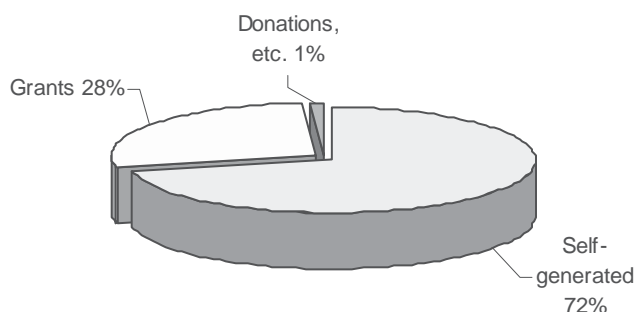
### 3.2. Management performance of PPLH

Reviewing the management performance of PPLH using the checklist in Table 2 can give us some idea of how it has survived and developed over more than a decade. As for the decision-making system at PPLH, the executive is fully responsible for PPLH's management and development, and has to provide organizational reports to the Board. Organizational decisions are taken at regular weekly and monthly meetings. Since its establishment, PPLH has had an average staff of more than 50. As shown in Figure 5, the center has increased its proportion of *local staff* as a part of community development. In 2003, 89 percent of staff were from the local community. This can increase homophily<sup>17</sup> with the local community, which is considered to be important for the success of a change agent. PPLH has also provided various opportunities for *capacity building* of the staff, such as workshops and trainings on educational skills, managerial skills, and clerical skills (computer use, languages, etc). In particular, enhancing communication skills has contributed to PPLH's success as a change agent, as it has to accommodate various types of visitor, including urban people and overseas visitors.

As mentioned, one of the reasons why PPLH can be considered a good practice example of an NGO environmental education center is its high level of financial self-sufficiency. Figure 6 shows that between 1996 and 2001, more than 70 percent of PPLH's income came from its own activities, such as

<sup>17</sup> Rogers uses *homophily* to mean the degree to which two individual entities that communicate are similar in a particular attribute.

education programs, the restaurant, and providing accommodation. Sales of educational materials, organic farming produce, and souvenirs also made a considerable financial contribution.<sup>18</sup> As start-up costs normally account for the major part of project grants from funding agencies, it can safely be said that PPLH is able to manage most of its daily activities with its own revenues. This level of self-sufficiency (70 percent of expenditure between 1996 and 2001) should be highly regarded, as the economic slump and uncertain political situation in Indonesia reduced the numbers of participants and visitors to the center during this period. The pioneering nature of PPLH is illustrated by the fact that it has stuck to its belief that this charging participants is in fact the best way to carry out its educational activities continuously and consistently, even though it faced criticism from other NGOs in the early days that an NGO should not take money from the target of its educational activities. This policy makes PPLH a truly local NGO.<sup>19</sup> It should be noted that while PPLH does charge participants in its programs, it also assists participants with limited financial resources by offering them a reduced participation fee. Some free programs have also been provided, especially for local communities.



Source: PPLH's financial reports, compiled by the authors.

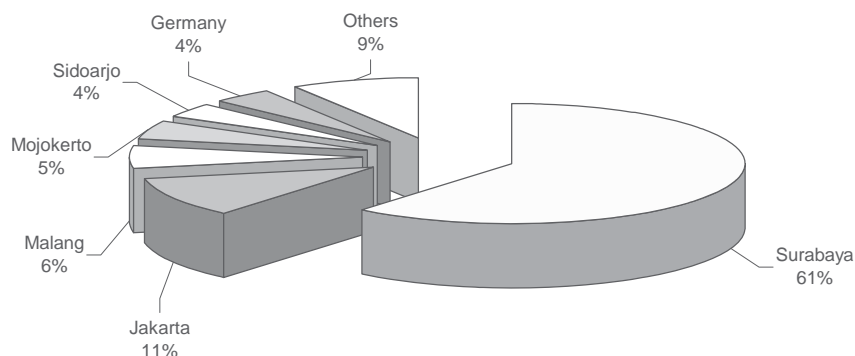
**Figure 6.** Sources of income for PPLH, 1996–2001

PPLH has also paid attention to the environmental impacts of its facilities. One hundred percent of PPLH's electricity is supplied by its micro-hydro power generating system. Organic waste is kept separate from other types of waste and processed through the center's composting system. Recyclable materials such as paper, PET, and steel are either passed on to recycling networks or used for income-generating activities by local people, such as handcraft production.

PPLH has tried to reach local people, groups, and institutions from the management side as well as through its role as a change agent. The increase in the proportion of local staff mentioned above is one part of this effort. Another is provision of programs such as Program Hari Minggu (Sunday Program), which is a regular meeting on Sundays for local people to learn about the environment as well as PPLH activities. PPLH also established a public relations division in 1995, which has used such media as printed bulletins and radio programs.

<sup>18</sup> PPLH's overall annual income during this period amounted to between 464 million and 823 million rupiah.

<sup>19</sup> In 1990, Suryo commented: "We can be self reliant some day, and we will stop begging for financial assistance from abroad." (*Jakarta Post*, "East Java village boasts its first environment education centre," precise date unknown).



Source: PPLH reports, compiled by the authors.

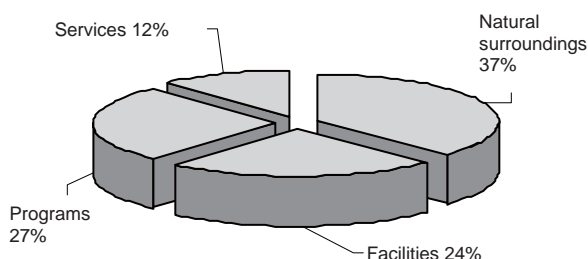
**Figure 7.** Place of residence of PPLH program participants

### **3.3. *How PPLH has developed: keys to success***

Why is PPLH so successful? The answer seems to confirm what was proposed in section 2: that the key to PPLH's success is how far it has managed to be a "change agent" in as many ways as possible. There are four main respects in which PPLH can be considered a marginal figure, which facilitates its role as a change agent; all of them seem to contribute to its success. They are outlined below.

Firstly, PPLH is a marginal figure positioned between the natural environment and urban people (in this case, the former is the resource system and the latter is the client system). This is largely responsible for so many people visiting and participating in PPLH's programs. Some 61 percent of PPLH's visitors are from Surabaya (see Figure 7), the second-largest city in Indonesia with a population of about 2.8 million. PPLH is one hour from Surabaya by car, on the slopes of the Penanggungan volcano, overlooking a dense canopy of tropical forest. It is on the margin of rich natural reserves but highly accessible for urban people. The center is a good entry point for urban people seeking to experience a wild environment, and has the added benefit of quality environmental education materials to help them learn about it. In fact, most of the participants interviewed stated that they had visited PPLH to enjoy and learn about the rich natural surroundings; figure 8 shows that for 37 percent of visitors and participants, the surroundings were the most impressive aspect of PPLH. This shows, for one thing, that PPLH has successfully played the role of change agent between urban and rural (natural) areas; for another, accessibility from the major cities is a key to success for a center of this kind.

PPLH has made various efforts to act as a change agent between urban and rural areas. It has promoted itself in Surabaya through local radio and newspapers. In addition, services at the center (for example, the restaurant and accommodation) are of high quality, which makes it more attractive for urban people to visit as they are often not used to rural lifestyles. Figure 8, showing which aspects of the center most impressed visitors, demonstrates how highly the quality of the facilities is valued.



Source: Questionnaire survey by authors.

**Figure 8.** Points that most impressed visitors to PPLH

Secondly, PPLH has been a change agent between local educators (client system) and national and international educational resources (resource system). As is often remarked, there is a very wide information gap between local educators in developing countries and national and international-level stakeholders. What is more, the sheer size of Indonesia has often been an impediment to disseminating information, knowledge, and skills for environmental education (see Nomura and Abe 2001a). With its national and international connections (which were greatly enhanced by Suryo's), PPLH has good access to national and international educational resources, including teaching methodologies and materials. It has collected, "translated," and disseminated these resources at local level, as has been noted.<sup>20</sup> Local educators and NGO staff have utilized PPLH's library and publications, participated in its workshops, and frequently consulted its staff. The examples of the international teachers' workshop and the School Link program represent PPLH's efforts to facilitate communication between local and international educators. Local educators and NGO staff interviewed by the authors considered PPLH to be a place to develop their curricula and programs, which shows their acknowledgement of PPLH's positive impacts on their environmental education activities. In addition, PPLH staff have often established new NGOs after leaving the center, which has promoted the local environmental education movement. Thus, PPLH has had significant achievements as a focal point of environmental education at the local level by being a change agent between local and national and international levels.

Thirdly, PPLH has certainly worked as a change agent helping national education authorities and other national and international entities, including funding and aid agencies, to reach local people. As environmental education is a relatively new area for aid and funding agencies, they often struggle to find the best way to support it at local level. If there is a reliable local-level focal point for environmental education, these agencies will not hesitate to input resources. Due to Suryo's excellent communication ability and his reputation for commitment to environmental efforts, various funding agencies and NGOs have provided support to and thorough PPLH. The scale of this support suggests that PPLH has satisfied the needs of funding and aid agencies. In fact, PPLH has conducted many environmental education-related activities with international resources in such a way that they have made a positive contribution

<sup>20</sup> Current and former staff of PPLH suggested that the center increasingly recognized the importance of modifying national and international educational resources, such as teaching methodologies and course content, to fit local needs. As Rogers argues, compatibility of programs with local needs is one of the key factors for the success of a change agent (Rogers 1995, 335–370).

to local community development; the promotion of ecological farming mentioned earlier is one good example.

Finally, through its programs and activities, PPLH has served as a change agent between the classroom and the field, with its emphasis on experiential learning. Making the most of its location and scale, PPLH's programs have drawn to a great extent on practical and action-oriented educational methods (*vis-à-vis* theoretical and knowledge-based approaches) such as guided interpretation and nature games. These approaches bring schoolchildren into closer contact with the natural environment, which develops their environmental sensibility. This kind of activity works in a complementary manner with formal education, which emphasizes lectures in the classroom. In relation to this point, one of the lecturers at the Institute for Technology Malang (ITN-Malang) suggested PPLH's holistic and interdisciplinary approach, which always deals with nature in relation to human behaviour, complements formal education, as it tends to study environmental problems only within the scope of each subject or discipline. Another interviewee, a teacher at a senior high school in Pringadi, suggested in the same context that what was particularly good about PPLH was its integration of a social science angle into its programs, as this had helped students to conceive the relations between different environmental problems. PPLH has also tried to make its programs accessible for schools by providing a range of options to meet different needs. It has established 20 entry points or topics (for example, waste, forests), and each group of participants (or school) can select one of these to suit where they are in their school curriculum.<sup>21</sup> Such efforts have enhanced PPLH's function as change agent between the field and the classroom.

It can thus be said that PPLH's role as a change agent in four respects has attracted interest, cooperation, and support from many groups and individuals, as well as promoting environmental education at the local level. In fact, PPLH seems to have been designed deliberately to be a change agent. Suryo said that PPLH aimed to act as a bridge between urban people and local people, as well as to provide information to raise public environmental awareness.<sup>22</sup> All of this suggests that NGO environmental education centers should be designed to function as change agents in as many ways as possible.

There are also lessons to be learned from the negative experiences of PPLH. One of them relates to the center's vulnerability to economic and environmental change. For example, the area where the center is located was hit by a landslide in December 2002. As a result, the number of visitors decreased. Since the center had already suffered from a drop-off in visitor numbers due to the long-lasting economic slump and political turbulence after 1997 (see Figure 4), this incident was financially damaging. Education needs to be provided continuously and should not be subject to interruption by such chance events. This experience suggests that NGO environmental education centers should try to increase collaborative activities with the formal education sector on a long-term (even multiple-year)

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21 During interviews with the authors, many staff of PPLH, including the director, have emphasized flexibility as a key to establishing partnerships with the formal education sector.

22 See *Wanita Indonesia*, June 1992, 10; *Surabaya Post*, April 12, 1992. According to its own documents, PPLH was established based on some of the objectives of YIH, namely: to raise public environmental awareness; to support governments in their efforts to protect nature and the environment; and to support groups and individuals concerned with environmental issues.

contract basis, as the formal education sector is less vulnerable to economic change than business and individuals. This would minimize the impact of short-term factors on the management of the center.<sup>23</sup>

Another problem PPLH has faced is discord with local communities. In its early days, local people referred to the center as a *rumah londo* (western house), implying that they considered it alien to the community.<sup>24</sup> Some locals assumed that it had received a lot of money from foreign agencies but felt that it did not make any economic contribution to their community, or that it was controlled by foreign agencies and did not act in the interests of local people. This was partly because the facilities were designed by a German architect and many funds came from abroad. The perception became even stronger as more and more international visitors and volunteers visited the center. In fact, some staff admit that there is, or has been, a negative social impact on local people due to the visits of urban or foreign visitors with different cultures and lifestyles, for example through their drinking habits (Indonesia is a Muslim country) or their use of high-tech electronic appliances. As PPLH paid insufficient attention in the beginning to such heterophily between resource system, change agent, and client system, the result was turning the aspirations of local people towards urban lifestyles. This became an impediment in conducting environmental education at local level, which should be sensitive to the local culture and environment.

Since the success of a change agent is positively related to factors such as “the extent of change agent effort in contacting clients” and the change agent’s “homophily with clients”<sup>25</sup> (Rogers 1995, 335–370), the answer to this kind of problem lies in improving relations with the local community. This is exactly what PPLH did. As mentioned, PPLH increased the number of staff it employed from the local community. In fact, the current director himself is a local. Establishing a community development division in 1998 illustrated PPLH’s determination to contribute to the local community. Setting up the public relations division was another example of this kind of effort. Free programs for local people such as the Sunday Program and the Village Program mentioned above have also changed the relationship. As a result of such efforts, the situation has improved. Local people no longer see the center as a “western house,” and instead regard it as a part of the community, promoting environmental awareness and knowledge as well as making other contributions.<sup>26</sup> Local leaders often consult with PPLH staff about environmental management. The chief of Trawas subdistrict, where PPLH is located, asserted that the existence of PPLH had played an important capacity-building role in the local community, especially increasing local skills and knowledge for sustainable development.<sup>27</sup>

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23 Most of the relationships between PPLH and schools are not based on long-term contracts.

24 Interviews by the authors with: a group of local villagers in Seloliman; a local women’s group; and PPLH staff.

25 The “client” can be understood in this context as the local community.

26 Factors that the interviewees from the local communities all mentioned as PPLH’s contribution to the community were: (1) job provision; (2) environmental impact (forest conservation, especially prevention of illegal logging); (3) electricity supply (now electricity for three hamlets of Seloliman village is provided from PPLH’s micro-hydro power generation system); (4) diffusion of skills and knowledge on not only environment but also acupuncture, medicinal plants, agriculture and recycling (from interviews by Hendarti with villagers and a women’s group in Seloliman, and villagers from Ngoro subdistrict).

27 Interview by the author (Hendarti) with the chief of Trawas subdistrict.

## 4. Conclusion

This paper has tried to analyze a good practice example of an NGO environmental education center in Indonesia, employing the perspective of Rogers's concept of change agents. It follows from what has been argued that what is particularly important for an NGO environmental education center is to act as a change agent in as many respects as possible. The comparative advantage of an NGO environmental education center lies in its grassroots approaches and political independence, which allow it to act more effectively as a change agent. Meeting what is expected by the public from an NGO environmental education center can bring about not only environmental education achievements but also financial self-sufficiency, which is a significant issue for NGO activities in developing countries.

PPLH acts as a change agent in relation to the following client and resource systems: (1) urban people and nature; (2) local educators and national and international educational resources; (3) local people and national and international agencies; and (4) the classroom (formal education) and the field. This has resulted in PPLH having a high level of financial self-sufficiency as well as boosting its contribution to the promotion of environmental education at local level. A policy implication is thus that the NGO environmental education center can play a significant role in promoting environmental education, and should be designed to act as a change agent in as many respects as possible. In addition, this paper has also shown that relations with (or contributions to) the local community are a significant factor for an NGO environmental education center to successfully play the role of change agent.

PPLH was established more than a decade ago. Its success has inspired many similar projects in Indonesia. One of the most recent, an NGO that has built an environmental education center in Bogor, suggests that this is a lower-cost model than typical ODA or other governmental projects. This NGO spent only around US\$50,000 on construction as its initial cost.<sup>28</sup> Considering the achievements of PPLH, the construction of new NGO environmental education centres seems a very cost-effective approach to promoting environmental education.

In theoretical terms, this paper has tried to apply Rogers's concept of the change agent to analysis of NGO environmental education centers in developing countries. This approach seems to have been successful as it has clarified the role, significance, and keys to success of an NGO environmental education center. The concept of the change agent fits well in the context of developing countries, as the social and technical "chasms" there are more significant. However, it does not mean that this approach cannot be used in the other contexts, considering the comparative advantages shared by NGOs as well as environmental education centers in both developed and developing countries. Further efforts need to be made to develop and refine this theoretical approach by applying it in different contexts. In turn, this will contribute to the promotion of environmental education.

## Acknowledgement

The authors would like to express gratitude to the staff of *Pusat Pendidikan Lingkungan Hidup-Seloliman* (PPLH-Seloliman) for their kind assistance in this research.

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<sup>28</sup> 1 US\$ is about 8,500 Rupiah as of April 2003.



## Interviews

A lecturer at the Institute for Technology Malang, interviewed by Hendarti at PPLH-Seloliman, April 5, 2003.

A teacher at a senior high school in Pringadi, interviewed by Hendarti at PPLH-Seloliman, February 16, 2003.

A group of local villagers in four hamlets of Seloliman: Janjin, Biting, Sempur, and Bale Kambang, interviewed by Hendarti at Janjin, Biting, Sempur, and Bale Kambang on February 16 and 18, and April 4, 2003.

Chief of Trawas subdistrict, interviewed by Hendarti in Trawas, February 17, 2003.

Kardi (construction worker on PPLH-Seloliman center), interviewed by Hendarti at PPLH-Seloliman, February 16, 2003.

Local villagers from Ngoro subdistrict, interviewed by Hendarti at PPLH-Seloliman, February 19, 2003.

Suroso (director of PPLH-Seloliman), interviewed by the authors at PPLH-Seloliman, November 2, 2002.

Local women's group in Oro-oro Jipang village, Ngoro subdistrict, interviewed by Hendarti at Jipang village, February 19, 2003.

PPLH staff, interviewed by the authors at PPLH-Seloliman, February 16–22, 2003 and April 4–6, 2003.

Syafruddin Ngulma Simeuleu (former PPLH-Seloliman staff member), interviewed by Hendarti at interviewee's house in Trawas subdistrict, February 16, 2003.

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*Article*

# International Political History of the Kyoto Protocol: from The Hague to Marrakech and Beyond

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The Kyoto Protocol is a landmark in international environmental law. As the first derived legal instrument of the United Nations Framework Convention on Climate Change, its negotiation has been pioneering, and consequently the path has not always been smooth. This paper outlines the international political history of the Kyoto Protocol, placing the key events in the negotiation process in the context of the national and interest group politics that have characterized the climate regime for the past decade. The key aims, intervening politics, and subsequent outcomes of the pivotal Conferences of the Parties (COPs) pertaining to the Kyoto Protocol—The Hague, Bonn, and Marrakech—are described. An evaluation of the Protocol is then made, using a mix of public choice and international relations theories. The final section takes a broader perspective, placing the Kyoto Protocol within the international climate regime and other multilateral environmental negotiations, which may affect its operationalization and effectiveness.

**Keywords:** Climate policy, Kyoto Protocol, United Nations Framework Convention on Climate Change, multilateral environmental agreements, climate change.

## 1. The Kyoto Protocol and the climate regime

Scientific research on climate change has a long history, but it was not until the late 1980s that a combination of factors prompted its construction as a key environmental issue. In 1988 NASA scientist James Hansen testified before a US Senate Committee that he was “99 percent certain” that global warming was underway (Pielke 2000). With the US Midwest being hit by severe heat waves, making 1988 the hottest summer on record (at that time), Hansen’s statement quickly elevated climate change to unprecedented levels of attention from the public, media, and policy-makers.

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In the same year, the World Meteorological Organization and the United Nations Environment Programme (UNEP) jointly established the Intergovernmental Panel on Climate Change (IPCC) to provide scientific advice to policy-makers on the problem of global climate change. The publication of the IPCC's First Assessment Report led the United Nations General Assembly to initiate negotiations on a Framework Convention on Climate Change (FCCC), which came into being in 1992, and was signed at the Rio Earth Summit (Irving and Amber 1994). At the First Conference of the Parties (COP-1) of the FCCC in 1995, Parties recognized the inadequacy of the Convention's voluntary targets,<sup>1</sup> and initiated the process of negotiating legally binding targets of emissions reduction or limitation for the so-called Annex I countries (that is, developed countries and those with economies in transition). This convoluted process culminated at COP-3, giving birth to the Kyoto Protocol to the FCCC, a historic landmark in international environmental law (Grubb et al. 1998, Oberthur and Ott 1999).

The Kyoto Protocol commits developed countries and economies in transition—referred to as Annex B countries in the context of the Protocol—to reduce their overall greenhouse gas (GHG) emissions to at least 5 percent below 1990 levels during the five-year commitment period 2008–2012. This overall commitment is differentiated between countries; thus the European Union (EU) reduces by 8 percent, the United States by 7 percent, Japan by 6 percent, whilst the Ukraine and Russia stabilize, and Australia and Iceland are allowed to increase their emissions compared to 1990 levels. In order to achieve this, Parties can use a range of sophisticated market-based instruments—called the Kyoto mechanisms—and land use, land use change, and forestry (LULUCF or simply “sinks”) activities. The Kyoto mechanisms include international emissions trading, Joint Implementation (JI)—which allows emissions-saving or sink-enhancement projects between Annex B Parties—and the Clean Development Mechanism (CDM), which encourages joint emissions-reduction projects between developed and developing countries. To enter into force the Protocol must be ratified by 55 Parties, including Annex I Parties accounting for at least 55 percent of the total emissions from Annex I countries in 1990.

The six years since adoption of the Protocol have been characterized by intense political and technical debate over its operationalization. In recognition of the unfinished business from Kyoto, COP-4 adopted the Buenos Aires Plan of Action (BAPA), an ambitious work programme that included developing country issues, mechanisms, sinks, and compliance. The deadline for completion of this work was COP-6, which took place in The Hague in November 2000, and which spectacularly failed to reach agreement. Having suspended the meeting and resumed it eight months later in Bonn in July 2001, Parties managed to reach a political deal, even without the United States on board. This political deal then had to be translated into finer legal text, which took place at COP-7 in Marrakech. There, after another marathon midnight session, the Kyoto Protocol rulebook was finally finished and enshrined in almost 250 pages of the so-called Marrakech Accords (for discussions on the Marrakech Accords, see Boyd and Schipper 2002, Dessai and Schipper 2003, Dessai 2001a, Michaelowa 2001).

Since the successful negotiation of its overarching architecture, the Protocol has suffered a lull. By March 2003, 105 countries had ratified it, satisfying the first criterion, but only accounting for

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<sup>1</sup> Of stabilizing the greenhouse gas emissions of developed countries and economies in transition at 1990 levels by the year 2000.

43.9 percent of 1990 Annex I emissions. Attention is currently focused on Russia, which has suggested that ratification is imminent; with its 17.9 percent of Annex I emissions, this will satisfy the second criterion and be sufficient for entry into force (Korpoo 2002).

This paper describes the political history of the Kyoto Protocol within the wider context of the climate regime. Focusing on the ultimate decision-making body of the FCCC—the Conferences of the Parties—it places their foci and outcomes within Parties' wider political positions. The paper uses a mix of public choice theory (interest group politics) and insights from international relations theories—including (neo)realist, (neoliberal) institutionalist, and regime theories—to analyze the dynamic negotiation process. The paper concludes with an evaluation of the Kyoto Protocol thus far and some thoughts on likely future directions of the climate change regime.

## 2. Distrust in The Hague

The Sixth Conference of the Parties (COP-6) that took place in The Hague in November 2000 was intended to finalize the Kyoto Protocol rulebook. Delegates had a full agenda to deal with from the BAPA, including unresolved issues regarding: funding, capacity building, and technology transfer; the Kyoto mechanisms; sinks; and the compliance system. There are many interpretations of what happened in The Hague (among them Dessai 2001b, Egenhofer and Cornillie 2001, Grubb 2001, Grubb and Yamin 2001, Jacob 2001, Jacoby and Reiner 2001, Ott 2001a, Paterson 2001, Reiner 2001, Töpfer 2001, Vrolijk 2001). Even though the media blamed the collapse of the talks on a transatlantic dispute over carbon sinks, the reality was more complex. Even if a deal on sinks could have been reached at the last minute, many other issues had proved politically contentious throughout the meeting.

One set of issues that encapsulates the North-South divide is funding, capacity building, and technology transfer, usually treated under the theme of “developing country issues” and of prime concern to the Group of 77 and China (G77/China).<sup>2</sup> Annex I countries neglected G77/China's concerns for most of the conference. It was not until a day before the intended end that the Umbrella Group<sup>3</sup> revealed a proposal that offered the creation of a new window within the Global Environment Facility (GEF)<sup>4</sup>, with additional funding that would reach a level of US\$1 billion in the first commitment period. The European Union presented a counter-proposal shortly after, but neither proposal was to G77/China's liking.

Other stumbling blocks pertained more specifically to European Union-Umbrella Group divisions relating to the Kyoto Protocol. Regarding compliance the European Union wanted a strong system (independent and impartial with, for example, mandatory payments into a Compliance Fund in case of non-compliance), whereas the Umbrella Group opted for a softer version. The composition of the compliance committee branches was also contentious. Developing countries argued for equal regional representation, which Annex I countries were not willing to accept.

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2 UN developing countries lobbying group that was founded in 1964 and later expanded to represent 133 nations. China is not a member but an associate of the Group of 77 (see, e.g., Williams 1997 on G77/China and the environment).

3 The Umbrella Group is an informal coalition that emerged after Kyoto, which includes the United States, Japan, Canada, Australia, New Zealand, Norway, Russia, and Ukraine.

4 The financial mechanism of the Convention administered by the World Bank.

The Kyoto mechanisms were also hotly debated at The Hague. The European Union argued for strong domestic action, which for them meant a 50 percent cap on the use of the mechanisms. The Umbrella Group, on the other hand, argued for no quantitative cap, for the sake of economic efficiency. Together with sinks this proved to be the breaking point in EU-US talks.

The issue of sinks proved to be one of the most contested at COP-6. The European Union wanted limited sinks activities and no sinks in the CDM. The United States argued that its acceptance of a -7 percent target at COP-3 was conditional on full use of the Protocol's sinks provisions. Consequently, the United States came to The Hague claiming that by managing existing forests properly it saved 300 million tonnes of carbon (MtC) a year. Neither the Umbrella Group nor G77/China was internally consistent with respect to this issue. Of the Umbrella Group Parties, only Canada and Japan appeared to follow the United States on sinks, whereas within G77/China the Group of Latin American Countries was lobbying to get sinks into the CDM. So whilst sinks were indeed a contentious issue, it was their combination with other disputed elements that led to the whole package crumbling.

It is also important to mention how the process led by the COP-6 president, Dutch Environment Minister Jan Pronk, took place. President Pronk's innovative negotiation style did not prove particularly conducive to achieving an agreement, according to some observers. With all the negotiation groups deadlocked, the "Pronk paper," a compromise deal, which was not a "take it or leave it" proposal, came out one day before the end of the conference. As Parties analyzed the paper, they further entrenched themselves in their own positions (Vrolijk 2001), which in conjunction with the lack of time remaining to negotiate amongst each other led to the collapse of the talks. Many other factors, such as the sheer breadth of the agenda and the political uncertainty about the next US president, could be added as contributing to the breakdown, but most of these concerns are subsumed within a general feeling of distrust that seemed to prevail. After expressing much disappointment, Parties decided to suspend COP-6 and resume it in the summer of 2001.

### 3. Bushwhacking the Kyoto Protocol

The breakdown of negotiations in The Hague was followed by extensive media coverage. The press capitalized on the blame game between the United States and the European Union, and within the European Union itself.<sup>5</sup> Climate change assumed a position alongside a growing portfolio of other transatlantic disputes such as banana wars, genetically modified foods, and nuclear missile defence systems.

The European Union and the Umbrella Group still tried to revive the talks at a meeting in Ottawa, Canada, shortly after COP-6, but with no success.<sup>6</sup> President Bill Clinton wanted to reach an agreement before he left office, but according to a senior American delegate there was lack of common understanding on some key issues.<sup>7</sup> In the meantime, the Bush-Gore election battle was being taken up

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5 There were bitter recriminations between UK Deputy Prime Minister John Prescott and French Environment Minister Dominique Voynet (France had the EU presidency at the time).

6 Reuters, Friday, December 8, 2000, "U.S. says progress on climate talks depends on EU."

7 David Sandalow, US assistant secretary of state for oceans, environment, and science, as quoted by the *Washington Post*, Friday, December 8, 2000, "Global warming accord remains elusive."

in the courts. Whilst climate change itself did not become a major election issue, it was nonetheless encapsulated within the environmental issues that featured prominently. Al Gore, a self-proclaimed environmentalist, was known to be a strong supporter of the Kyoto Protocol. In fact, he even went to Kyoto in 1997 as US vice-president to instruct his delegation to show increased flexibility if a package deal could thus be agreed. On the other side, George W. Bush, a former Texas oilman,<sup>8</sup> was known to be suspicious of the Protocol,<sup>9</sup> but nevertheless pledged to regulate and reduce carbon dioxide emissions from power plants during his presidential campaign. Eventually Bush won in court and was sworn in as the forty-third president of the United States. After being queried by Senator Hagel on the administration's position on climate change, President Bush sent a letter to several senators on March 13, 2001 reversing his presidential campaign position.<sup>10</sup> He argued that mandatory controls on carbon dioxide emissions would lead to higher electricity prices as more utilities shifted to natural gas from cheaper coal. Nevertheless, he stated, he took climate change "very seriously." He went on to say:

As you know, I oppose the Kyoto Protocol because it exempts 80 percent of the world, including major population centers such as China and India, from compliance, and would cause serious harm to the US economy. The Senate's vote, 95-0, shows that there is a clear consensus that the Kyoto Protocol is an unfair and ineffective means of addressing global climate change concerns.

This policy reversal received a massive wave of criticism that was quickly picked up by the international media. Environmental groups blasted the White House, while Europeans and Japanese alike expressed deep concern and regret.<sup>11</sup> President Bush responded saying, "We're in an energy crisis now ... I was responding to reality, and reality is the nation has got a real problem when it comes to energy."<sup>12</sup> According to many experts, this was an overstatement used to cover up the big benefactors of this policy reversal; that is, the US oil and coal industries, which have powerful lobbies with the administration and conservative Republican lawmakers.<sup>13</sup> Calls for US leadership in this area followed from UN Secretary-General Kofi Annan, UNEP Executive Director Klaus Töpfer, and many other world leaders. On March 23, 2001, the European Union sent a letter to the White House emphasizing that a global strategy to tackle climate change was an integral part of relations with the United States (Dessai 2001b). European Commission President Romano Prodi and Swedish Prime Minister Goran Persson, whose country held the European Union presidency at the time, signed a joint letter that challenged the United States to find the "political courage" to agree on the fine print of the deal struck in Kyoto, at the resumed COP-6, due to take place in Bonn in July.<sup>14</sup> A series of transatlantic letters and diplomatic endeavours followed to try to keep the Kyoto Protocol alive. Even Canada, a key US ally,

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8 As were other key administration officials: Vice-President Richard Cheney is also a former oilman, Attorney General John Ashcroft led the charge against the Kyoto Protocol in the Senate, and current Secretary of Energy Spencer Abraham fought to protect Detroit auto makers from stricter fuel-efficiency standards when he was a Michigan Senator (Bomberg 2001, Carpenter 2001).

9 While campaigning, Bush described the Kyoto Protocol as "a bad deal for America and Americans" (Jacoby and Reiner 2001).

10 White House press release, March 13, 2001, "Text of a letter from the President to Senators Hagel, Helms, Craig and Roberts." <http://www.whitehouse.gov/news/releases/2001/03/20010314.html>.

11 In the background, US lawmakers were actually preparing a bipartisan bill that would regulate carbon dioxide from power plants.

12 *Washington Post*, March 15, 2001, "Hill pressure fuelled Bush's emissions shift."

13 *New York Times*, March 15, 2001, "Bush defends emissions stance."

14 Reuters, March 23, 2001, "EU Tells Bush Climate Is Key to Europe/U.S. Ties."

expressed disappointment with President Bush's decision.<sup>15</sup> Climate change officially became a disputed area of transatlantic global foreign policy. Under such international pressure, the White House had to keep explaining its arguments: "The president has been unequivocal. He does not support the Kyoto treaty. It is not in the United States' economic best interest."<sup>16</sup> In reply, EU environment ministers pledged to pursue ratification of the Protocol with or without the United States. Various European environment ministers reiterated that the Kyoto Protocol was "the only game in town."<sup>17</sup> Almost all world leaders (including the leaders of China, Japan, South Africa, and Pacific Islands) expressed their disappointment at Bush's decision.<sup>18</sup> Both European and Japanese delegations went to Washington in an effort to persuade Bush not to pull out of the Kyoto Protocol, but neither succeeded. In fact, the European Union was reportedly even willing to renegotiate parts of the Protocol to accommodate the United States,<sup>19</sup> but the administration was simply not listening. After receiving a slap in the face in Washington, the European Union started gathering support for the Kyoto Protocol around the world (Gupta and Ringius 2001). A European delegation, headed by the Swedish environment minister, Kjell Larsson, visited Moscow, Tehran (the Islamic Republic of Iran was the presiding country of G77 at the time), Beijing, and Tokyo. The objective of this diplomatic tour was to gather support from a wider coalition of countries in the face of the US pull-out. Japan and Russia were key countries because of their share of greenhouse gas emissions. The Japanese supported the Protocol adopted in their ancient capital city, but stressed the importance of US participation for the environmental integrity of the deal.<sup>20</sup> Australia was the first country to follow the US line. Polls in both the United States and Australia, however, revealed that the majority of Americans and Australians wanted their countries to join the Kyoto Protocol.<sup>21</sup> It was also becoming increasingly clear that the Kyoto Protocol was causing friction in the business community.<sup>22</sup>

On April 9, 2001, COP-6 President Jan Pronk released a new proposal based on comments received from Parties on the original COP-6 Pronk paper<sup>23</sup> and extensive bilateral consultations. The new paper was to be discussed at informal ministerial consultations in New York on April 20–21.<sup>24</sup> The objective of these informal consultations was to advance political preparations before the resumed COP-6 in July 2001. During these consultations, all countries but the United States supported the Kyoto Protocol. With respect to the paper itself, Parties noted that it still had problems that needed to be resolved.

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15 Reuters, March 29, 2001, "Canada disappointed by Bush move on pollution."

16 White House spokesman Ari Fleischer, as quoted by CNN, March 29, 2001, "Dismay as US drops climate pact."

17 BBC News, March 21, 2001, "US facing climate isolation."

18 Even prominent figures ranging from ex-Russian President Mikhail Gorbachev to actor Harrison Ford had written to President Bush urging him to develop a plan to cut greenhouse gas production (*Time* magazine, Letters section, April 2, 2001).

19 BBC News, April 7, 2001, "EU ready to renegotiate Kyoto."

20 *New York Times*, April 9, 2001, "EU: support rising for climate deal without U.S."

21 ABC News, April 17, 2001, "Six in 10 say U.S. should join Kyoto treaty"; Reuters, April 20, 2001, "Most Australians back Kyoto Protocol—poll."

22 *Financial Times*, April 18, 2001, "Raising the temperature: President Bush's rejection of the Kyoto Protocol has created a deep divide among businesses about the urgency of addressing global warming." Paterson (2001) explains this shift in terms of the discourse of ecological modernization in a technocratic/corporate-led version.

23 See FCCC/CP/2001/MISC.1.

24 Parallel but separate to the High-Level segment of the ninth meeting of the Commission on Sustainable Development.



While this major diplomatic endeavour was taking place, the new US administration was performing a Cabinet review of US climate policy so that it could be presented to other Parties in Bonn. In Washington, more senators were criticizing Bush for scrapping the Kyoto Protocol. These included Senator Robert Byrd, one of the most vocal critics of the Kyoto Protocol,<sup>25</sup> and Senator John McCain, Bush's arch rival during the Republican leadership campaign. In mid-May President Bush released details of the new US energy plan, which would undoubtedly increase GHG emissions. Both environmental groups and European ministers criticized the new plan for promoting use of oil and coal and for doing too little to promote conservation. Jan Pronk called it a "disastrous development" for international efforts to slow output of GHGs.<sup>26</sup>

Around this time, the Bush administration realized they would not have their proposal ready for Bonn. As part of their Cabinet review, they asked the US National Academy of Sciences to identify areas of greatest certainty and uncertainty in climate change science and whether there were any substantive differences between the IPCC reports and the IPCC summaries for policy-makers. The report concluded that "temperatures are, in fact, rising," and that "the changes observed over the last several decades are likely mostly due to human activities" (NAS 2001). More importantly, the report backed up the IPCC conclusions, which had previously been openly questioned by the new US administration.

On 11 June 2001, President Bush disclosed his administration's view on the development of "an effective and science-based approach to addressing the important issues of global climate change."<sup>27</sup> Bush continued to insist that "the Kyoto Protocol was fatally flawed in fundamental ways," but wanted the United States to collaborate within the UN framework. He argued that the Protocol did not include developing countries, failed to address two major pollutants (black soot and tropospheric ozone), and was unrealistic—"many countries cannot meet their Kyoto targets." Nonetheless, he recognized the United States' responsibility and commitment to a leadership role on this issue. The Cabinet-level working group proposal included: (a) investment in advancing the science of climate change; (b) setting up a National Climate Change Technology Initiative for advancing technology to monitor and reduce GHGs; and (c) partnerships within the Western Hemisphere and with other like-minded countries. The administration made these decisions public at an opportune moment just before Bush left to meet European leaders in Gothenburg, Sweden.

At the EU-US summit in Gothenburg, the two Atlantic powers agreed to disagree on the Kyoto Protocol, but were determined to work together in all relevant fora to address climate change. The European Union stood firm in its objective to ratify the Protocol, sending the strongest signal that it would go ahead in spite of the United States (Athanasίου 2001). The European Union also decided to send out another diplomatic mission to gather support from Australia and Japan. While the Australians were unconvinced, Japan was determined to try its luck at convincing the United States to come on board. Much faith was put in a summit at Camp David between Bush and Japanese Prime Minister

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25 An author of the unanimously passed 1997 Byrd-Hagel resolution that says that any climate agreement must not harm the United States economy and must include provisions that bind key developing countries to domestic emissions reductions or limitations within the same compliance period.

26 CNN, May 18, 2001, "Anger over Bush energy plan."

27 White House press release, June 11, 2001, "President Bush discusses global climate change."

Junichiro Koizumi, but still no advancement was achieved. It was now European leaders who were urging Koizumi to continue the Kyoto process, even without the United States. At the same time, COP-6 President Pronk was having informal high-level consultations to provide an opportunity for Parties to present their views on the new Pronk paper.<sup>28</sup> While Parties did not reach any sort of agreement, there was a growing sense of co-operation reflecting the need for some sort of compromise. Some multinationals<sup>29</sup> were urging the Bush administration to get back into the Kyoto process.<sup>30</sup> They feared that if other countries ratified the Protocol, US business would be out of the trading game.

Just days before the resumed COP-6, the Bush administration revealed they would not offer an alternative approach when talks resumed in Bonn. The Cabinet-level climate change working group had very little to show.<sup>31</sup> The US lead negotiator at COP-6, Undersecretary of State Paula Dobriansky, said the administration would not block the Europeans from attempting to negotiate with the Japanese and others on an agreement that included mandatory targets. However, she said the United States would oppose any action that would adversely affect the country or commit it financially to international climate change activities.<sup>32</sup> Japanese efforts to persuade the United States back into the game were thus shattered on the Friday before the start of the Bonn conference. The Japanese were becoming increasingly pessimistic about going ahead without the United States. The European Union warned the United States not to obstruct the talks in Bonn. Last-minute diplomatic efforts continued throughout the major capitals,<sup>33</sup> building a highly uncertain atmosphere for the Bonn negotiations.

#### 4. The Bonn Agreement

Under this mood of high uncertainty and low expectations, the Bonn climate talks started on July 16, 2001. It was clear to everyone involved that if a deal was not reached the Kyoto Protocol would certainly die. With the US withdrawal from the process it was understandable that any deal reached would have to accommodate the interests of other Umbrella Group members, in particular Japan, Russia, Canada, and Australia.<sup>34</sup>

Unlike previous COPs, ministers were asked to attend the first week of negotiations (in addition to the second week) in an attempt to address the time constraint that was evident in The Hague. On Thursday, President Pronk came out with his final compromise deal. Even though the deal did not please all Parties, most were willing to accept it, except Umbrella Group members Japan, Russia, Canada, and Australia;

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28 FCCC/CP/2001/2/Rev.1.

29 For example, Enron Corp., DuPont Co., American Electric Power Co., Alcoa, BP, Ford Motor Co.

30 Bloomberg, June 7, 2001, "Enron, DuPont urge Bush to salvage environmental pact."

31 Except for some specific initiatives, which included: (a) an investment of over US\$120 million for NASA research on carbon cycle computer modelling, etc.; (b) carbon sequestration projects with NGOs and companies; (c) co-operation with El Salvador, Mexico, and Canada. However, most of these "initiatives" were repackaging proposals presented by the Clinton administration.

32 *Washington Post*, July 14, 2001, "U.S. won't have new plan for global warming talks."

33 John Prescott went to see Prime Minister Koizumi; Japanese Environment Minister Yoriko Kawaguchi went to see Paula Dobriansky, etc. It is important to acknowledge the role of President Pronk's support team, who went around the world holding informal talks with heads of delegations and ministers in order to build a well-balanced package (Schoenmaeckers 2001).

34 Ironically, these countries were in many respects more conservative than the United States itself.



especially Japan, which was concerned with the compliance provisions of the deal. After many informal consultations and 48 hours of non-stop negotiations, a final deal was reached in the early hours of Monday. Euphoria was in the air, and the “Bonn Agreement”<sup>35</sup> was hailed as another milestone in the Kyoto process. According to the European Union, the Kyoto Protocol was saved. For G77/China it represented the “triumph of multilateralism over unilateralism.”<sup>36</sup> Four main issues were encapsulated in the Bonn Agreement, which we describe next (see also: Athanasiou and Baer 2001a, Benedick 2001, den Elzen and de Moor 2002, Depledge 2001, Müller 2001, Ott 2001b, Torvanger 2001).

The first of these issues, *developing country concerns*, was a notable area of achievement in Bonn, with the creation of three new funds to facilitate adaptation, technology transfer, and economic diversification of vulnerable countries: the Special Climate Change and Least Developed Country (LDC) funds (under the Convention) and the Adaptation fund (under the Protocol) (Huq 2002). The Adaptation fund is to be financed by 2 percent of the share of proceeds on CDM projects (projects in LDCs are exempt from this levy) and will provide for concrete adaptation projects in developing countries that are signatories to the Protocol. As Ott (2001b) has pointed out, this decision represents a major breakthrough in environmental law because it establishes a levy on international business transactions for the financing of adaptation projects. All three funds will be managed by the GEF, a cause of some discontent among G77/China, who tend to perceive this institution as too bureaucratic. An Expert Group on Technology Transfer was also established to assist this process. The European Union, Canada, Iceland, New Zealand, Norway, and Switzerland pledged to contribute €450 million annually by 2005 (with this level to be reviewed in 2008) for the three funds, GEF climate change activities, bilateral and multilateral funding, and the CDM.

The second crunch issue the Bonn Agreement tackled was the *Kyoto mechanisms*. Surprisingly, the text’s call for emissions to be reduced “in a manner conducive to narrowing per capita differences between developed and developing countries” paves the way for a contraction and convergence framework (Meyer 2000). On the issue of supplementarity, the European Union and others lost their battle to have a quantitative cap on the use of the mechanisms. Both project-based mechanisms (JI and the CDM) are to “refrain” from using nuclear projects, a provision much welcomed by environmental groups. Within the CDM, small-scale projects will be given priority, for example renewables up to 15 megawatts. Afforestation and reforestation projects were allowed in the CDM, only during the first commitment period, up to a ceiling of 1 percent of a Party’s 1990 emissions times five.<sup>37</sup> In an attempt to avoid overselling of credits by Parties, a commitment period reserve was introduced, so that Parties should not drop below 90 percent of their “assigned amount” (that is, their emissions allocation).

The third issue was the expansion of eligibility for LULUCF or sinks activities. Indeed, forest management, cropland management, grazing land management, and re-vegetation were added to the list of sinks activities. Whilst Annex I countries are subject to a forest management cap, there is no equivalent for agricultural management, which could represent significant extra emissions. Many

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35 Decision 5/CP.6 contained in FCCC/CP/2001/L.7.

36 Ambassador Bagher Assadi, Chairman of the Group of 77, at the closing session of the high-level segment of the resumed COP-6 to the UNFCCC, Bonn, July 22, 2001.

37 That is, 183 Mt CO<sub>2</sub> (Jotzo and Michaelowa 2002).

methodological issues, such as non-permanence, additionality, leakage, uncertainties, and socio-economic and environmental impacts, will need to be taken up by the Subsidiary Body for Scientific and Technological Advice (SBSTA) and the IPCC.

The fourth and perhaps most contentious issue under negotiation in Bonn was matters relating to *compliance* under the Kyoto Protocol. With the withdrawal of the United States, the European Union remained the main Party advocating a strong compliance system. As a result, it had to cave in to the extreme positions of Umbrella Group members like Japan, who claimed this was a bottom-line issue for them. The outcome was the postponement of the adoption of a legally binding compliance system until the Kyoto Protocol enters into force, at the first meeting of the Parties (COP/MOP-1). Nevertheless, the creation of a two-branch Compliance Committee was agreed. The facilitative branch will act as an early-warning system and will facilitate compliance for Parties. The enforcement branch will apply the consequences of non-compliance, which include: restoration of 130 percent of the assigned amount in the next commitment period, preparation of a compliance action plan, and suspension of emissions trading. The Compliance Committee membership, the composition of which was much contested, ended up including 10 members: five from each regional group, one from a small island state, two from Annex I, and two from non-Annex I Parties. This was a considerable victory for G77/China.

The Bonn Agreement was a political deal. In order to take effect it had to be converted into decisions that the COP could then adopt. This was the task of delegates who remained in Bonn during the second week of negotiations. A day after the Agreement was reached, however, Russia held the negotiations hostage for a whole day because it wanted twice as many sinks credits as it had been given in the generous Bonn Agreement. While decisions pertaining to developing country issues were agreed and awaiting adoption, it soon became clear that different interpretations of the Bonn Agreement were emerging in all other negotiating groups, with the differences particularly convoluted in compliance. There was also little work done on the technical matters of monitoring, reporting, and verification (known in the jargon as Articles 5, 7, and 8), which were crucial for the architecture of the Kyoto regime. Therefore, the cumbersome task of translating the Bonn Agreement into COP decisions was deferred to COP-7, to be held at Marrakech in October/November 2001.

## 5. September 11 and the United States

The events of September 11, 2001<sup>38</sup> changed the world between the Bonn and Marrakech conferences. There is no doubt that their repercussions are being felt across the whole spectrum of international and national affairs, including global climate change negotiations. An immediate consequence of September 11 for the climate regime was that the United States was unable to prepare its proposal in time for the Marrakech conference. What most commentators were wondering, however, was whether the United States' multilateral approaches signalled by the fight against terrorism would be transferred into other arenas such as environmental policy or climate change. Opinions were divided: optimists argued that the

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38 Nineteen terrorists hijacked four commercial airplanes and crashed two of the planes into the twin towers of the World Trade Center in New York City and one into the Pentagon in Washington, DC, while a fourth plane crashed in Pennsylvania; thousands of people were killed.

events would lead to enhanced co-operation and a stronger commitment to multilateralism, while “realists” believed that environmental issues would drop off the agenda (in favour of military security issues) and US unilateralism would be maintained in the areas of environment and development.<sup>39</sup> So far the realists’ arguments have tended to ring true.

The “war on terror” declared by the United States and its allies in the wake of September 11 has very close connections with oil, itself inextricably linked with the climate change regime as a major contributor to GHG emissions; oil consumption accounts for about 25 percent of GHG emissions. George Bush Senior has made no secret of the importance of oil to the United States:

[S]ecure supplies of energy are essential to our prosperity and security. The concentration of 65 percent of the world’s known oil reserves in the Persian Gulf means we must continue to ensure reliable access to competitively priced oil and a prompt, adequate response to any major oil supply disruption. (Quoted in Barnett 2001).

The Kyoto Protocol will constitute the first step towards a gradual decrease in Parties’ dependence on fossil fuels by decarbonizing their economies. The extent to which this dependence is decreased, however, will depend on Parties’ domestic efforts vis-à-vis the usage of the mechanisms and sinks provisions.

## 6. Bargaining in the Marrakech bazaar

Building on the Bonn Agreement forged in July 2001, the Marrakech meeting (COP-7) was supposed to complete the Buenos Aires Plan of Action. The objective of this immensely technical meeting was clear: translate the political Bonn Agreement into legal decisions that could be adopted by the COP. On the last day of negotiations the small closed negotiation group co-facilitators, ministers from Switzerland and South Africa, presented a package that was acceptable to all Parties, apart from the usual four Umbrella Group members (Japan, Russia, Canada, and Australia). All-night negotiations were concluded in the early hours of Saturday, after which the COP adopted all the decisions in a mammoth 250-page document, known as the Marrakech Accords. The main political issues are briefly outlined below (for further information on the technical aspects see: Boyd and Schipper 2002, Dessai 2001a, Dessai and Schipper 2003).

Much as in the Bonn Agreement, the first major political issue in the Marrakech Accords relates to *compliance*. The adopted text honours the compliance section of the Bonn Agreement in its entirety, even though some Parties wanted to water it down further. Besides the features mentioned in section 4 above, some more detail was added to the compliance system in Marrakech. In particular, there will be opportunities for public participation in the compliance proceedings, which was a major victory for NGOs. Within the enforcement branch, there are now also expedited procedures for the reinstatement of eligibility to participate in the mechanisms, a key concern for Umbrella Group members, in particular Japan. The complex issue of legally binding consequences has been postponed until the Kyoto Protocol enters into force.

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39 See Heinrich Boell Foundation and UNED Forum (2001) for many different insights on this issue in the context of the run-up to the World Summit on Sustainable Development.

The second major focus of discussion was unresolved issues about the *Kyoto mechanisms* and *sinks*. Among decisions to be made at COP-7 were several related to LULUCF reporting: composition of the Expert Review Teams (involved in monitoring national inventories and compliance); modalities for the accounting of assigned amounts; and eligibility requirements for participation in the mechanisms, all of which were critical prerequisites for finalizing the Kyoto regime architecture. With respect to sinks, Parties are required to report on sinks activities annually and how these activities are directly human-induced, but failure to meet the quality thresholds will not endanger eligibility to participate in the mechanisms. This was a necessary compromise because otherwise Russia, which apparently does not have the capacity to meet the sinks reporting requirements, would not be able to sell its surplus of carbon credits to other interested Parties. The European Union and the Umbrella Group preferred that the composition of Expert Review Teams be based on technical knowledge, while G77/China wanted it to be based on geographical distribution. As a compromise it was decided that: (a) the teams will refrain from making political judgements; (b) the Secretariat will choose the members so that there is North-South balance, and try to achieve geographic balance, but without compromising the expertise; (c) the team will be jointly led by an Annex I and a non-Annex I reviewer; and (d) training will be available for reviewers.

Issues relating to *emission units* were also heavily contested. One issue raised for the first time in Marrakech was the nature of the assigned amount and the occasions for adding or subtracting units to, and from, it. This prompted complex and long-winded discussions but concluded with agreement on the need for publicly available national registries detailing units from the various mechanisms. In terms of eligibility requirements for a Party to participate in emissions trading, the Umbrella Group wanted as few restrictions as possible, whilst the European Union and G77/China argued for strict requirements (albeit for different reasons). The link between compliance and the eligibility criteria was one of the main issues for ministers to decide at COP-7. For the four Umbrella Group members this was a bottom-line issue, in that they did not want to see any meaningful linkage with the compliance system. This issue will be taken up at the first COP/MOP when the form of the compliance regime will be finalized.

## 7. Evaluation

Analysis of three key COPs post-Kyoto highlights the complexity and intensely political nature of operationalizing an international legal instrument on climate change. While almost everyone hailed the Marrakech Accords as another milestone in the combat against climate change, was the Kyoto Protocol really saved or indeed sunk further? This section will try to evaluate and analyze the recent period of climate negotiations. We start with the drawbacks.

It is relatively easy to criticize the Kyoto regime, as the current US administration and some experts have done (Lomborg 2001, Reiner and Jacoby 2001, Soroos 2001, Victor 2001). Many commentators will surely argue that it is almost meaningless to worry about “the Marrakech dilution of the watered down Bonn Agreement to the fatally flawed Kyoto Protocol to the UNFCCC.” The weakening of the Kyoto Protocol, or “Kyoto-lite” as some NGOs put it, is a genuine concern. The sacrifice of *prima facie* environmental integrity for almost full-fledged economic flexibility was the price to pay to keep the

Umbrella Group on board the process without US participation. Compared to the original Kyoto Protocol (here referred to as pre-COP-6 Kyoto), we now have a regime with substantial amounts of sinks in the form of either forests or agricultural lands.<sup>40</sup> With so much emphasis on sinks, it has become harder to take up CDM energy emissions reduction projects. In fact, unlike forest management, agricultural practices are not capped, representing extra credits. Afforestation and reforestation are now allowable activities under the CDM. Sizable sinks credits were handed out to whoever called for them in Bonn, and the more one asked for the more one got; Russia got its Bonn deal doubled in Marrakech after much insistence.<sup>41</sup> It was an especially troubling precedent to remove the quality of sinks reporting as an eligibility requirement. In effect, what Russia and its allies in the Umbrella Group did was to demand ever-increasing sink credits<sup>42</sup> for which they will never be accountable. Based on this decision under the Bonn Agreement, and without US participation, it is expected that demand for CDM projects will be relatively small (Jotzo and Michaelowa 2002). Supplementarity, a former recurrent issue for the European Union and environmental NGOs, has now become an arcane, almost meaningless item within the Accords.<sup>43</sup> Units resulting from the use of the Kyoto mechanisms and sinks are all fungible and interchangeable. In effect, all the units Annex I Parties will have a surplus of (compared to their assigned amount) at the end of the commitment period will be carried over to their second commitment period, leaving newcomers to the regime in a fairly disadvantaged position.<sup>44</sup>

The decision about how far the compliance system would be legally binding, a matter dear to many Parties and NGOs, was postponed until the Protocol enters into force, at Japan's insistence.

Needless to say that the pledge by some developed countries<sup>45</sup> to contribute €450 million is utterly inadequate to tackle the ongoing and future negative impacts of climate change in the most vulnerable developing countries, whose contribution to the problem is, in some cases, virtually zero. More troublesome still is that some of the highest per capita emitters, including Australia, the United States, and Japan, failed to contribute anything to assist developing countries to cope with the detrimental consequences of climate change.

One of the disadvantages of this framework package is that it created a complex regime with an overwhelming number of institutions. Each institution has its own rules of procedure (some simple, some complicated) and configuration in a sea of acronyms that is only understandable to a handful of

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40 The pre-COP-6 Kyoto already had a large potential supply of surplus emissions quota from Russia and other economies in transition, pejoratively known as hot air.

41 It is difficult to understand the reasoning behind Russia's insistence because one of the end results is a drop in the price of carbon. Vaguely similar strategies have been applied by Russia against the OPEC cartel in order not to cut oil exports (cf. *Guardian*, December 15, 2001, "Baron who beat the sheikhs"). These efforts seem to be aimed at gaining short-term benefits to boost the economy, whilst forgetting the long-term perspective.

42 Which, for most critics, represents a re-negotiation of the targets agreed at Kyoto.

43 According to one delegate, "The EU took a very public beating in Bonn, by not being able to explain how its own proposals [on supplementarity] would be operationalised in a context of international trading."

44 That is, developing countries will start negotiating their targets with the perception that Annex I countries will carry over so many credits to the second commitment period, and undertake such small reductions in the first, that they will certainly demand equally generous targets for themselves. This is one of the biggest problems of full-fledged banking based on very liberal sinks rules. It may make second commitment period negotiations much harder and less environmentally friendly than the first commitment period's.

45 It is astonishing that the European Union, which played a leadership role in the negotiations, is already backtracking on this matter; the European Commission already envisages a shortfall in Member States' contribution to this effort.

experts in the world. One could say the climate regime is suffering from bureaucratic entropy due to the creation of an excessive number of institutions.<sup>46</sup> It is virtually impossible to get a holistic perspective of the whole climate regime. Initial modelling of the Bonn Agreement showed that its environmental effectiveness dropped from the 755 MtC that would have been reduced in a pre-COP-6 Kyoto to 130 MtC, whereof 520 MtC are due to the US withdrawal (den Elzen and de Moor 2002).<sup>47</sup> This watered down agreement was the result of numerous concessions that had to be made because of the pivotal position of four Umbrella Group members. But did the hard bargaining of four countries leave the rest of the world (minus the United States) with an unworkable or virtually insignificant framework? It does not appear to be so. Arguments in favour of the regime are abundant (see, for example, Grubb and Depledge 2001).

Probably the most important feature of the Hague-Bonn-Marrakech process is that it finalized the Kyoto Protocol architecture; that is, there are no more unresolved issues that would prevent Parties from ratifying the Protocol.<sup>48</sup> We now know how the Kyoto Protocol will work up until the end of the first commitment period, in 2012. Despite the flaws mentioned above, the Marrakech Accords represent the culmination of 10 years of negotiations on one of the most complicated global problems of the day. As Ambassador Assadi from Iran—at the time Chair of G77/China—put it, “of course, we could always speculate on the contours of a perfect, ideal agreement, that may exist on paper only and rarely, if ever, as the practical, tangible outcome of a multilateral negotiating process.”<sup>49</sup> Multilateral processes are inherently cumbersome as efforts are made to accommodate the interests and expectations of as many as 180 diverse sovereign states (Soroos 2001). This is the reason why global negotiations have been so complicated, rendering a convoluted outcome that, in our opinion, still honours the Bonn Agreement, and more distantly the Kyoto Protocol.

The Marrakech Accords have dealt with many developing country concerns with respect to the FCCC obligations, including capacity building and technology transfer. A welcome innovation was the establishment of the three new funds for developing countries, mainly to fund projects related to adaptation to climate change, a much-neglected area of climate policy (Sarewitz and Pielke 2000). It is a good omen that the FCCC process is starting to take a more holistic approach to climate change, and not focusing almost exclusively on climate mitigation through the Kyoto Protocol. In essence these funds and the financial pledge of €450 million by some developed countries were the *quid pro quo* for G77/China to accept the rest of the deal.

The upshots of the Marrakech Accords for the Kyoto mechanisms are numerous. The structure and processes of these instruments are now well defined, thus effectively creating a carbon market where international emissions trading between developed countries will start in 2008. In essence, the

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46 We thank Tim O’Riordan for this insight.

47 Nordhaus (2001) concluded that without the United States, global CO<sub>2</sub> emissions would be about 1 percent below “business as usual” during the first commitment period. These estimates, however, do not include reductions in targets due to new provisions regarding sinks and other technicalities of the Bonn Agreement.

48 Except maybe the United States, which is opposed to the whole Kyoto process for the reasons elaborated in section 3.

49 Statement by Ambassador Bagher Assadi, Chairman of the Group of 77 (Islamic Republic of Iran), before the Second Committee of the General Assembly on Agenda item 98 (f): “Protection of global climate for present and future generations of mankind.” New York, November 28, 2001.



Marrakech Accords have definitively commodified the atmospheric commons (see, for example, Glover 1999). Another bonus from the Accords is the possibility of having unilateral CDM projects, where a developing country Party can undertake the project itself and then sell the credits accrued in the international market.

The Accords have also brought clarity about how emissions will be counted, traded, subtracted, and added. This was of crucial importance for the assessment of compliance.

As mentioned above, the sinks section of the Accords provides the flexibility demanded by four members of the Umbrella Group (Russia, Australia, Japan, and Canada) to keep them on board and thus save the Protocol from collapse. From COP-6 to COP-7 the compliance system evolved considerably to become one of the most sophisticated and far-reaching systems of its kind.

Even though a decision on the legally binding nature of compliance consequences was postponed until COP/MOP-1, Parties that are in non-compliance will have to restore an extra 30 percent in the second commitment period and prepare a compliance action plan. Even if one is critical of the achievement, one should look at the first commitment period as a learning-by-doing experiment, which will be improved in subsequent commitment periods. As Nordhaus (2001) notes, this process brings institutional innovation, with the first experience with market instruments in a truly global environmental agreement. The efforts that ministers, government officials, NGOs, and the FCCC Secretariat have put into the Marrakech Accords, in times of international insecurity, are a fine example of human ingenuity and international co-operation at its best.

Insights from an international relations perspective can be useful to understand the climate negotiations. The collapse of negotiations in The Hague was a blessing for realists, lacking examples of power struggles in the context of environmental affairs. Realists would argue that the barraging power between the United States and the European Union was so equal that an agreement was not possible. Realist theories are mostly based on power and the existence of a hegemon (Rowlands 2001). Clearly there is no longer a hegemon, if there ever was one, in the climate regime. While not being the climate hegemon, the United States indirectly affected the Marrakech Accords by giving *de facto* ratification (or veto) power to the rest of the Umbrella Group, in particular to Japan, Russia, Australia, and Canada. It will be interesting to see the future dynamics of this informal group now that the United States has alienated itself from the Kyoto process. Knowing that the Protocol would not enter into force without their ratification, these four Umbrella Group members extracted as many benefits as possible from other Parties, very much in line with neorealists' expectations.<sup>50</sup> Though these four countries had incredible veto power, they did not prove to be the hegemons of Marrakech or Bonn. This is because climate negotiations are a clear example of give and take, which is much more aligned with neoliberal institutionalist theories. Although the four Umbrella Group countries might have taken the most, they also had to give, for example regarding Article 3.14 (the OPEC clause) or the composition of boards or committees. If there is any framework that best fits the Bonn-Marrakech process it is probably the modified structural approach of the regime theorists. For these scholars co-operation can be achieved

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50 In the context of climate change, "an international relations neorealist would look to the distribution of power among the world's states in order to assess the prospects for cooperation."—I. H. Rowlands (2001).

when individual decision making leads to sub-optimal outcomes, but only under circumstances that are not purely conflictual. Under these circumstances regimes can be formed to make agreement easier by resolving institutional deficiencies. However, states' power and interests remain the dominant factors in regime formation. According to these scholars, regimes facilitate co-operation by building trust between parties, transferring information and resources, and highlighting free-riding. Business and environmental NGOs and the Secretariat helped shape Parties' perceptions, which ultimately created the Kyoto regime, now inscribed in the Marrakech Accords.

Sometime around 2014 we will be able to measure the effectiveness of the regime that was created. While the European Union proclaimed itself leader of the climate regime throughout the year 2001, especially after US President Bush denounced the Kyoto Protocol, Parties still have mixed perceptions about the European Union's leadership (Gupta and Ringius 2001). The European Union certainly played a very important role in rallying support for the Protocol, without which the regime probably would not have formed. It appears that the European Union has learned its lesson from The Hague—avoid staying in the European Union “bunker” discussing amongst each other; instead negotiate with other Parties—but it still looks as if the European Union is a leader only by default. This perception could simply be a result of the successful use of bargaining leverage by the Umbrella Group, who managed to get almost all they wanted, but it nevertheless sometimes appears that the leader seat is there for the taking. Leadership by example will be crucial in the next couple of years; the European Union should take the initiative.<sup>51</sup> Recent reports have been promising, with some Member States (for example, Sweden) taking on tougher targets than their Kyoto Protocol commitments without the use of carbon sinks or flexible mechanisms, thus deprecating the “freebies” introduced into the Accords. In addition, the European Union and the remaining Member States are undergoing, for the first time, comprehensive assessments of how, and whether, they can meet their Kyoto Protocol targets through the development of implementation plans. At the EU level, for example, a groundbreaking emissions-trading directive came into force in 2003, and is expected to prove a vital boost for the Kyoto Protocol in the long run.<sup>52</sup>

G77/China played a critical role throughout the negotiations. They did particularly well in Bonn, but have been criticized (Loong 2001) for not seizing gains in Marrakech when they were being handed out to some Umbrella Group members. The real question is whether G77/China could have gained much more after the developing countries package had been agreed in Bonn. Probably not. It is still surprising to see how many concessions were granted in favour of OPEC countries. Also remarkable was the “narrowing per capita differences between developed and developing countries” language inserted in the mechanisms text. Overall, G77/China—a group difficult to keep together because of its diverse interests—ranked highly in their performance.

Institutional bargaining was a major feature of the Hague-Bonn-Marrakech process. The real question we should be asking is not whether the Protocol was sunk or saved, but whether Parties have paid what

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51 For a more in-depth analysis of how the European Union has dealt with the problem of climate change see Lacasta et al. (2002).

52 The European Union has also enacted legislation on renewables targets (albeit not binding), biofuels, energy taxation, voluntary agreements with the car industry (Lacasta et al. 2002). It is expected to also develop more Kyoto mechanisms legislation.



they think the Protocol is worth. In general, our analysis of group positions and dynamics suggests that Parties perceive that they have paid the right price.<sup>53</sup> In the next section, we offer some considerations on how the Kyoto Protocol might evolve in the short, mid and long terms as a key instrument within the climate regime.

## 8. Outlook

Since the adoption of the Marrakech Accords several relevant events have taken place. One of these was the World Summit on Sustainable Development (WSSD) in Johannesburg in August 2002. Held ten years after the signing of the Framework Convention, it provided an ideal opportunity for critical reflection on the accomplishments of the negotiations in addressing climate change. In an attempt to continue “directional leadership”—that is, leadership by example—in the process, the European Union ratified the Protocol and stepped up diplomatic efforts to ensure its entry into force by the WSSD. Unfortunately, continuing inaction by critical players such as Russia did not allow the threshold of 55 percent of 1990 Annex I emissions to be reached at that time, a requirement for the Protocol to become international law.

Without entry into force of the Protocol there was precious little evidence of the tangible contributions of the FCCC. Voluntary targets of returning emissions to 1990 levels by 2000 were met by the UK, Germany, Russia, and most economies in transition, but this was attributable more to flukes of changing energy use and consumption levels than explicit attempts at addressing climate change.

Now that the Kyoto Protocol architecture is in place, ongoing pressure for ratification of the Protocol is critical, particularly as global politics and international relations draw attention away from climate change. For those that have ratified, domestic constituencies need to be encouraged to develop plans and programmes that will enable the fulfilment of their Kyoto Protocol commitments. Legge and Egenhofer (2001) have dubbed this next phase “the regionalization of the Kyoto Protocol.” Just before the Marrakech meeting, the European Commission adopted a major package of decisions on the ratification of the Kyoto Protocol, and the implementation of the European Climate Change Programme and a host of other regulatory instruments is underway. This effort represents considerable progress towards implementation, but the European Union should not be complacent. European bureaucracy can be complicated because of shared competences between Member States and the European Commission,<sup>54</sup> the complicated EU burden-sharing agreement<sup>55</sup> and Member States’ politics and interests.

Even ratification of the Protocol does not signal the end of the story—rather this is the first step in a very long journey to stabilize GHG emissions at a level considered safe. It appears that the first commitment period will resemble more a test drive than the tough emission reductions envisaged by Parties in December 1997 when the Protocol was adopted. The impact of the Kyoto Protocol on the

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53 Athanasiou and Baer (2001b) answered the same question in other words: “This is not a good deal, but there is no reason to believe that a better one was possible in the past, or will be possible in the future if this one is derailed.”

54 Each Member State legislature had to ratify the Kyoto Protocol as well as the European Community (cf. Lacasta et al., 2002).

55 Using article 4 of the Kyoto Protocol (also called “joint fulfilment”), the European Community is allowed to redistribute its –8 percent target among its members states; countries like Germany and the UK will reduce emissions by much more than 8 percent, while Portugal and Spain will actually be allowed to increase their emissions.

atmosphere will be almost negligible (Dessai and Hulme 2001, Wigley 1998), but this will be dependent on the targets set during future commitment periods and the underlying development path the world takes during this century. Having this in mind, some final thoughts on where the climate regime is heading are briefly presented.

The Kyoto Protocol architecture is now in place, but there are still some details that need to be fleshed out. The Marrakech Accords have introduced a number of new sinks activities that will need proper reporting, accounting, and verification. According to some experts (for example, Nilsson et al. 2001), mainly due to the inclusion of biospheric sinks, it will be impossible to know whether mean fluxes are rising or falling over the five year commitment period of the Kyoto Protocol, thus rendering precise determinations on compliance virtually impossible. These are some of the issues the IPCC will have to overcome in its good practice guidelines with respect to methods and guidelines for reporting information on LULUCF activities, which was due at COP-9 in 2003. It will be crucial, but probably difficult, to not politicize this IPCC process so that definitions and modalities of sinks projects are based on sound science. COP-9 also dealt with the remaining technical issues of the Kyoto regime accounting system. The question of legally binding consequences will resurface at the first COP/MOP for yet more contention amongst Parties.

Whilst mitigation issues have dominated the climate regime, the past year has made it clear how important adaptation to climate change will become in the coming decade, with COP-8 in New Delhi heralded as the “adaptation COP.” No matter how fast climate mitigation takes place in the coming decades we are already committed to some degree of climate change to which societies will have to adapt. The IPCC Third Assessment Report concluded that those with the least resources have the least capacity to adapt and are the most vulnerable (IPCC 2001). This has captivated the interest of LDCs and other developing countries in trying to operationalize adaptation within the FCCC. At Marrakech, these countries were successful in designing guidelines for the preparation of National Adaptation Programmes of Action and the establishment of an LDC expert group, whose objective is to advise on the preparation and implementation strategies of these programmes, amongst others. These are just the initial steps of a much more complicated process that is taking its first concrete steps within the FCCC process. There are many methodological issues<sup>56</sup> that will have to be dealt by the SBSTA and the IPCC in order to get adaptation projects up and running in the next decade. In effect, the process of mainstreaming adaptation into the FCCC process has barely started. It is also crucial not to forget that the most vulnerable countries will most likely lack the technologies to adapt to climate change, thus making technology transfer of the utmost importance in addressing both the adaptation and mitigation sides of the problem. The creation of the three new funds for developing countries by the Marrakech Accords shows political commitment to this aim, but details of their operationalization will have to be negotiated in future COPs.

The placing of the climate change regime within a complex and rapidly evolving global geopolitical configuration is difficult to predict. Initially it did not look like the war on terrorism had an adverse

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<sup>56</sup> For example, methods and tools to evaluate impacts and adaptation (see FCCC/SBSTA/2001/INF.4) need to be further explored and elaborated.

effect on global climate negotiations. COP-7 was the first major intergovernmental conference after the events of September 11 and it succeeded in its objective, the completion of the Buenos Aires Plan of Action, which finished the work for the ratification and allows the entry into force and implementation of the Kyoto Protocol. The Doha World Trade Organization meeting and WSSD were both convened, each surrounded by a flurry of (largely negative) publicity, and each concluding with decisions that will interact with the climate change regime; through the relationship with trade and multilateral environmental agreements in the case of the former (Brewer 2002, Kim 2001, Werksman et al. 2003); and biodiversity, water, agriculture, and sustainable production/consumption in the case of Johannesburg.

As the major emitter of carbon dioxide, the need for the United States to take responsibility in the climate regime remains critical. While it might be possible to ignore the United States in other contexts (Murphy 2000, Washburn 1996), the global nature of climate change does not allow us this luxury. The “indispensability and indefensibility” of US climate policy (Agrawala and Andresen 1999) is clearly at play here; but work is underway to investigate potential avenues that might be amenable to US participation yet still effective in dealing with climate change (see, for example, Lisowski 2002, Matsuo 2002).

The role of non-state actors (business and environmental NGOs) in prompting the complicated multi-level policy process (Lee et al. 2001) will be important, particularly as foreign affairs and international security begin to make headway in national politics. Lobbying for national legislation needs to be accompanied by international diplomatic pressure for the United States to return to the Protocol. This has wider implications—allowing the United States a free ride raises deeper issues of equity for the international community as a whole that could strengthen the resistance of developing countries to accede to the Kyoto regime in future commitment periods (Soroos 2001). Furthermore, the United States needs to be reminded that there are a number of reasons (other than climate change) to improve energy policy (Pielke and Sarewitz 2003).

Second commitment period target negotiations are another key strategic issue for the next couple of years. At COP-8, the United States and certain key developing countries, such as India and China, refused to even mention the beginning of a process leading towards these negotiations in the Delhi Declaration that came out of the COP. A division between North and South, and between supporters and opponents of the Kyoto Protocol, was apparent at this COP. If the commitment period 2008–12 is to be a test drive, then second commitment period targets will have to be strengthened, especially as we start detecting the impact of climate change on natural systems (Parmesan and Yohe 2003). In some aspects the negotiations leading to the second commitment period targets will be a replay of earlier pre-Rio and pre-Kyoto negotiations. In 1992, in Rio, US President George Bush refused to accept any binding commitments that would jeopardize the American way of life. Almost 10 years later in 2001, George W. Bush did exactly the same by rejecting the Kyoto Protocol. Several other examples could be given on repeated technical or political discussions within the negotiations. This clearly emphasizes the importance of learning lessons from history.

This synthesis of the political history of the Kyoto Protocol and the climate regime has provided a number of lessons to be learned. First, the problem of climate change still needs much human ingenuity to be solved because of the scientific, technical, and ethical issues it raises. Second, the Kyoto-Bonn-Marrakech Accords are only a starting point in a long journey that will carry on for decades. Third, the negotiation and development of the Kyoto Protocol within the FCCC regime has been and will likely continue to be a complex process, with the outcomes reflecting the highly political nature of the issue and its solution. In this way addressing climate change typifies the evolution of a new form of environmental governance, in which occasional large-scale conferences focus attention on decisions that are in fact taken on the basis of an ongoing process of diplomatic negotiation and lobbying by multiple actors (state and non-state) (Haas 2002, Seyfang and Jordan 2002). The ongoing success of any such environmental regime is thus highly dependent on the nature of international relations and the commitment of states to multilateralism.

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*Article*

# **Land Use Control Strategies Around Urban Growth Boundaries in Korea**

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This paper proposes a comprehensive land-use management program aimed at enhancing the effectiveness of land management within urban growth areas and at the same time managing areas around the outside of urban growth boundaries through controlled development, thereby facilitating both development and conservation in areas around urban centers. This paper also suggests approaching urban development projects from a broad regional planning perspective, taking into account the availability of public facilities and services; managing land through phased development programs; and obliging developers to contribute partial or full costs of meeting additional need for public facilities and services. Emphasis is also placed upon the necessity of reaching a social consensus regarding limiting land ownership in order to ensure the success of such urban growth management programs.

**Keywords:** Land use system, urban growth management, boundaries, phasing programs

## **1. Background of the study**

Urban sprawl may be characterized as relatively low-density, non-contiguous development that consumes large amounts of farmland and natural areas (Burchell et al. 1998). It is increasingly viewed as a significant and growing problem that entails a wide range of environmental and social costs (Bengston et al. 2004).

Previous studies related to urban sprawl and growth management tend to fall into two categories. In the first category are studies that focus on using geographic information systems (GIS) to manage urban development. Oh (2001) has developed the Landscape Information System for the purpose of managing urban landscape information and analyzing the visual impacts of proposed development projects. Cheng and Masser (2003) present a spatial data analysis method to seek and model major determinants of urban growth, using Wuhan City of the People's Republic of China as a case study. Studies in the second category focus on the use of indicators. Nelson (1999) defines and computes several statewide indicators designed to evaluate the effectiveness of growth management efforts in Oregon and Florida in the United States using US Census of Population and US Census of Agriculture data to evaluate urban

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sprawl and farmland preservation. Kline (2000) recomputes Nelson's indicators using land-use data and briefly discusses the use of statewide indicators to evaluate the effectiveness of growth management efforts.

The process of urbanization in Korea dates from the 1970s, but serious problems did not emerge until the early years of the 1990s; environmental and social costs of uncontrolled development grew in the middle of the 1990s—and with them, public interest in environment-friendly development; and in the 2000s they have increased dramatically.

Many apartment blocks, factories, restaurants, and other structures have been developed around the megacities in Korea without proper infrastructure to support them. This has caused residents many inconveniences and devastated our exceptional natural environment. Against this backdrop, in January 2003 the Korean Government enacted the National Territorial Basic Act and the National Territorial Planning and Use Act, combining the past National Territorial Management Act and the Urban Planning Act.<sup>1</sup> The main feature of the National Territorial Basic Act is the establishment of basic principles for systematic land management. Among the main features of the National Territorial Planning and Use Act are: the modification of land-use zoning; the introduction of second-class subdivision planning; a development permission system; an infrastructure linkage system; and enforcement of the land-aptnitude evaluation system. These features are described in more detail below.

First of all, *land-use zoning* has been modified as follows: national territory is classified into urban areas, management areas, agricultural areas, and natural environment conservation areas. The management areas are further divided into planning management regions, production management regions, and conservation management regions.

The main objective of the *second-class subdivision planning* is planned development of planning management regions and development promotion districts. The main issues covered include: layout and size of basic facilities; restrictions on use of individual new buildings; maximum and minimum limits on building height; and landscape planning.

The *development permission system* mandates the mayor or county magistrate to refuse or grant full or conditional permission for small-scale development projects, taking into account such factors as pertinence of the development for local planning priorities, establishment of basic facilities, and harmony with the area surrounding the development sites, according to development permission standards. For mid-scale projects, the mayor, county magistrate, provincial governor, or minister of construction and transportation may make the final decision, based on committee discussions and reviews.

The *infrastructure linkage system* levies an installment charge on the developer for the cost of installing required basic facilities. Lastly, the *land-use aptitude evaluation system* aims to identify land that should be protected and land that can be developed, based on the results of a general evaluation of the human and natural environments and the relationship between them.

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1 See [www.krihs.re.kr](http://www.krihs.re.kr).

The objective of this study is to propose reasonable growth management strategies in the light of the aforementioned changes in the land-use system in Korea.

The expanding role and increasing power of local governments in Korea has created conflicts of interest between central government, metropolitan region governments, and local governments, especially in regard to urban growth management. Of particular concern is that local governments are pursuing growth-oriented urban development policies without carefully considering the overall social costs that may result.

When an urban development project only satisfies local interests and is launched without proper growth management and comprehensive development management, it ultimately increases overall social costs through negative impacts on surrounding areas and depletion of natural resources and other negative environmental effects. Moreover, it prevents the realization of the common social good. Therefore, a different concept of urban development management is needed that can show local governments how to pursue development projects without harming society as a whole, not only the communities concerned. Urban growth management (UGM) has emerged as a new land-use management concept that can meet this need.

Although an exact definition is not yet firmly established, the concept of UGM embraces three key aspects of development: location, timing, and cost. Traditional land-use management programs, including zoning systems and subdivision regulation, have proved effective in deciding whether or not to approve a development proposal at a particular site, but they do not effectively address the issues of timing and cost. For this reason, UGM may serve as an important corrective to traditional land-use management practices. While traditional urban development policies have pursued development in an unmanaged, growth-oriented way that overlooks the appropriate scale of development in urban areas, UGM programs aim at gradual and sustainable managed growth, giving careful consideration to the development capacity of the areas concerned (Lee et al. 1996).

These ideas regarding UGM have their origins mainly in environmental concerns. But recent deterioration in the quality of urban infrastructure is also a reminder of the importance of proper management of urban development. Currently, UGM programs are extending their scope from the usual environmental issues to addressing broader questions regarding quality of life. Thus, issues related to quality and adequacy of public services and facilities (such as roads, clean water supply, sewage systems, parks, and schools) currently form the nucleus of recent UGM programs.

All UGM programs aim to induce desirable urban growth, but they differ in the means to achieve it. One type of program seeks to revitalize deteriorating urban areas by providing legal and financial support. Others attempt to solve various problems caused by -growth-oriented urban development. A UGM program can be defined as a program that aims to promote development where it is needed by controlling development projects based on the overall needs of the urban area. The ultimate goal of UGM is preventing environmental deterioration and infrastructure overload and increasing the effectiveness of urban management through short or long-term growth management programs. UGM does not aim to stop growth; rather it strives to enhance the quality of life and preserve more usable land for the future. The recent agenda of UGM programs in Western urban areas include the prevention of

ecosystem collapse and environmental degradation caused by chaotic development; decreasing publicly owned land and transformation of farmland into urban land; and dealing with overburdening of the road network. In addition, the agenda support reduction of public-sector expenses and social capital overheads, while increasing the quality of citizens' lives.

To achieve the above-mentioned goals, UGM adopts such strategies as down-zoning; preservation of usable land for future needs; conservation of historically and environmentally important areas;; coordination of city, county, and state policies into unitary regional land management plans; and administrative reorganization for effective growth management (Lee and Jung 1999).

## **2. Limitations of the zoning system and adoption of urban growth management systems**

### ***2.1. Limitations of the existing zoning system***

Korea has adopted a zoning system as its main land-use management policy. A zoning system is a land management system that encourages or discourages development in specific areas in order to maximize economic benefits, encourage effective land use, and promote public welfare.

Zoning systems are passive and static ways of managing development, and lack the flexibility to meet the needs of ever-changing development environments. In other words, zoning systems can only decide for what purpose certain land will be used in the future, but cannot manage phased development or control the timing of development.

The zoning system in Korea has been significantly modified from the original concept of zoning that was developed in the West early in the twentieth century, but this modification has undermined the original purposes of a zoning system. For example, Korea's current zoning system allows individual development projects as long as they meet zone-designation requirements. When necessary, it is even possible to alter zone designations under National Territorial Management Act in order to facilitate urban development projects. The zoning system in Korea also allows construction even where the necessary infrastructure is not fully established. This kind of unregulated land management has been the cause of chaotic development in both urban and non-urban areas. To date, Korea's zoning system has only resulted in a state of general confusion, unnecessary environmental destruction, and an uneven supply of land.

Any land that is developed must have access to urban infrastructure. Therefore, in an important sense, the question of whether to permit a development proposal in a certain area must consider whether adequate public facilities and services are available or can be provided. The existing zoning system in Korea does not do this. Even when development environments change, the current zoning system allows development proposals to be approved as long as they satisfy the existing zoning specifications. As a result, local governments, though they are seeking effective means of land management, still face many problems in terms of disparities between actual needs and their capacity to provide public facilities and services. In particular, local governments often lack the financial resources to meet such demands.

## **2.2. *The rise of urban growth management programs***

The existing static zoning system does not take into account local land conditions, effectively cope with future land demand, nor respond flexibly to social change. Thus there is a need for a new land management system in Korea.

The land management programs of the Town of Ramapo, near New York City, and the City of Petaluma in northern California (Cullingworth 1997) can serve as examples that might prove useful for creating a new land management strategy for Korea. In 1969, Ramapo adopted a kind of phased growth program, which is seen as a forerunner of UGM (Garvin 1996). In examining various development practices, the Ramapo program took as its starting point consideration of whether adequate public facilities and services were available to sustain urban development. The facilities and services considered in this evaluation process included water resources, rain drainage, parks and recreation facilities, schools, roads, and police and fire departments.

While Ramapo adopted a points-based land management system that focused primarily on the availability of public facilities and services, in 1972 the City of Petaluma introduced an annual gross development quota. Petaluma's new program only allowed construction within the city's designated urban growth boundary. The city's annual gross building construction quota was 500 "development units" (that is, single housing units that must be within projects of five units or more) allowance was subdivided into housing and construction areas. This program was ruled illegal in a district court for being exclusionary, since it could limit the inflow of low-income people into the city; however, the ruling was later overturned in a higher court. Since then, many other cities, including Boulder, Colorado, have adopted similar programs.

Following Ramapo and Petaluma in the 1970s, many more land management schemes have appeared in the United States that address such questions as growth scale, timing, environmental impacts, and finance. These have arisen due to increased interest in issues relating to urban expansion, air pollution, greenbelt preservation and the decline of farmland, and increasing energy consumption. Among a wide variety of such schemes are annexation, urban growth boundaries, and farmland preservation. Effective evaluation programs have been widely adopted as a way of enforcing developer exaction and impact fees. Many programs have also applied the Petaluma concept of annual gross development allowances for built development. A limitation of the Petaluma model is that it is feasible only when there is a balance between housing supply and the rate of population increase. If housing supply does not match population growth, it leads to higher housing costs and an increase in unauthorized housing; however, there would be no justification for such programs in the opposite case. Therefore, an adapted form of the Ramapo model is currently widely used. Some local governments are forcing developers to supply basic public utilities, such as roads, parks, and clean water supply and sewerage systems. Furthermore, they are linking the timing of development with the current availability or development of such public facilities and services.

DeGrove (1992) proposes a three-stage model for the development of UGM policies to date. The first stage, which developed in the 1970s, emerged from environmental concerns. UGM at this stage was largely based on public interest in the environment and natural resources. These environmental concerns

began in the 1950s and culminated in the 1970s. The second stage of UGM focused on the broader issue of enhancing quality of life. Unlike in the 1970s, UGM in this second stage focused on such issues as infrastructure availability, balanced development, environmental impacts, selective economic development, and affordable housing. Efforts were made to pursue a compact growth pattern in order to prevent unplanned expansion of urban areas. The last stage of UGM, which began in the 1990s, aims to balance the needs of economic growth, job creation, and protection of ecosystems (Lee et al. 1996).

Recently many US states, including California, Florida, Oregon, Washington, and Georgia, have adopted UGM to effectively manage land near rapidly expanding urban areas and protect the natural environment (Cho 1999b).

### **3. Strategies for national land management**

#### **3.1. Basic principles**

The purpose of a UGM policy is to ensure a dynamic balance between development and preservation; that is, between the need for development and the availability of public facilities and services; between additional need for public facilities and services and financial resources; and between growth and equity (Chinitz 1990). This dynamic balance can only be maintained when there is unified coordination between local governments and metropolitan region governments in deciding the location and timing of development and evaluating the adequacy of public facilities and services. In addition, to make a UGM program comprehensive, it is necessary to appropriately incorporate various forms of growth management programs and subsequent exaction fees.

Until now, Korea has only focused on establishing development-restricted zones or enforcing exaction fees rather than on creating a comprehensive growth management program. Furthermore, these development-restricted zones have been controlled and managed separately from exaction fee programs.

In seeking a comprehensive land-use management plan that will limit unnecessary development that causes environmental harm and over-burdening of public facilities and services, this paper proposes the following four underlying principles: first, maximize the use of land resources only on the condition that destruction of natural resources is kept to a minimum, there is flexible response to land-use demand, and future demand for land resources is considered. Second, develop a broad metropolitan region control plan to coordinate the land management programs of both local and metropolitan region governments. Third, only permit development proposals that are within the provision capability of public facilities and services, while also bearing in mind associated taxes on developers that can be used for such public goods. Fourth, manage urban growth through a growth management program that respects local characteristics and accords with the central government's urban development policies.

Based on these principles, the authors propose the following four land management strategies: (1) establishment of a national land-use structure and urban growth boundaries based on a zoning system; (2) metropolitan region control systems for urban growth boundaries; (3) development permission systems based on the availability of public facilities and services; and (4) land development management under growth phasing programs. These strategies are described in more detail below.



### **3.2. Land management plans**

#### **Strategy 1: Establishment of national land-use structure and urban growth boundaries based on a zoning system**

There is a need to reclassify various zoning schemes under current land-use regulations. The main focus of this reclassification should be revision of the bifurcated urban vs. non-urban zoning system into urbanization areas, urbanization-restricted areas, and conservation areas. For conservation areas, the framework, objectives, and management plans should be made clear. Likewise, for urbanization areas, there is a need to specify the scope, procedures, and methods of development in order to make things clear to those who manage national land use and to prospective land developers.

Under this comprehensive land management program, development proposals in urbanization areas should be permitted only when they satisfy the detailed land-use plans of both local and central governments. No development in urbanization-restricted areas should be allowed, except when strict guidelines drawn up by the central or local governments are satisfied. Conversely, zoning procedures and management of conservation areas should be solely handled by the central government, but when necessary, local governments may work out detailed management plans. Both central and local governments should clarify the framework for establishing preservation areas and provide management guidelines for them.

Decisions on the zoning of different sites and when development may be permissible on them should be based, first of all, on a land evaluation program that includes a large-scale land-use survey, and on social, economic, and material considerations. The results should be used as the basis for classifying land into the three types of area.

Urbanization areas may be composed of existing urban areas and semi-urban areas. The boundaries of urbanization areas should correspond to urban growth boundaries. This will help to separate urbanization-restricted areas and conservation areas from urban growth boundaries. Urbanization areas can be further zoned for different urban uses (residential, commercial, or industrial) and should be managed through detailed land-use plans. In the case of greenbelt areas designated under the current Urban Development Acts, their new zoning will depend on their location. If a greenbelt area is inside urban growth boundaries, it should be zoned for urban uses, while if it is outside urban growth boundaries it should be zoned as an urbanization-restricted area or conservation area. To enhance the quality of the environment in areas near roads and human traffic throughways, and to preserve important public facilities and services, a scheme should be launched that helps parks and greenbelts to maintain their original functions.

Urbanization-restricted areas should include some parts of greenbelt areas in existing urban areas, semi-urban areas in non-urban areas, and semi-agricultural and forest areas. If development is necessary in these areas—in other words, when these areas need to be zoned into urbanization areas—urban growth boundaries should first be changed, then these urbanization-restricted areas can be incorporated into urbanization areas and rezoned for urban use through a detailed land-use plan.

Conservation areas, some parts of semi-agricultural and forest areas in non-urban areas, agricultural and forest areas, and non-urban greenbelt areas, should never be zoned into urbanization areas.

## **Strategy 2: Adoption of metropolitan region control systems for urban growth boundaries**

Most metropolitan local governments are concerned only with development within their own administrative boundaries. They do not pay much attention to the impacts that their policies might have on surrounding areas. In other words, they do not consider the question of externalities. Therefore, it is important to coordinate local governments' policies with larger metropolitan region development goals and standards.

Many urban development projects are characterized by conflicts in impact, which result when a local government initiates a development project with impacts that spread beyond its administrative boundaries. In some cases, the benefits of the development may be confined to a city or county, but its negative impacts may reach beyond those boundaries; in others, the negative effects of a development may be confined within the city or county, while its benefits may be shared with other regions (Bollens 1992). In particular, issues relating to large-scale developments—NIMBY facilities,<sup>2</sup> pollution regulation, and public transportation, for example—often result in conflicts of interest among neighboring local governments. In such cases, it is extremely difficult for any one local government to solve such problems on their own, and would benefit from management of the development projects from a broad regional perspective.

For this reason, a metropolitan region government or the central government needs to intervene in local governments' land management policies in order to protect development areas and surrounding environments from any poorly planned development. Central government or metropolitan region governments should serve as the main instrument of nationwide land management rather than solely acting as arbiters in disagreements between local governments. Central government should come up with a basic plan that helps systematic growth management. Each metropolitan region government should provide a broad unified management program that accords with the central government's management plan and coordinating local governments' interests and policies.

Central government or the relevant metropolitan region government needs to re-evaluate local governments' policies and local plans to resolve any conflicts with the central government's plan. Also, the metropolitan or central government needs to coordinate local governments' capital improvement programs and urban development plans. More specifically, a higher-level local government or the central government should discourage local governments from launching development projects in general when there are not enough public facilities and services available (Cho 1999a).

For this kind of broad management to succeed, a metropolitan region government or central government must set up a special task force mandated to review and offer advice on any development plans from local governments. Local governments must be given an opportunity to revise their plans. If they do not heed the advice of the metropolitan or central government, financial support to plans of local governments may be cancelled.

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2 That is, facilities that local residents greet with the response "Not in my back yard!"

The land management program suggested above presupposes that areas both inside and outside of urban growth boundaries are considered as a single space, and land management plans for those areas must be structured from a broad metropolitan region perspective.

### **Strategy 3: Development permission system based on the availability of public facilities and services**

The current land-use regulations in Korea do not specify requirements for development of public facilities. Although there are various exactions and profit-return policies for development, they target only certain developers. Also the existing profit-return methods are not sufficiently effective.<sup>3</sup> Therefore, Korea should establish more concrete and specific standards governing the location and scale of public facilities and services, and a more comprehensive and long-term public facility development plan that reflects both Korea's past and its future.

In this context there is a growing demand for the adoption of adequate public facility requirements (APFR). It should be made clear to developers that when there are not enough public facilities and services available, or a development project creates additional demand for them that cannot be met, the project will not be permitted. Since no city or area in Korea currently has adequate public facilities or services, this policy may serve as an indirect means of regulating the location and timing of development.

In the United States, one representative state-level planning code with an APFR is Florida's Growth Management Act,<sup>4</sup> which has a "concurrency provision" that requires facilities and services to be available concurrent with the impacts of development. Local governments draft local comprehensive plans that include clear guidance on concurrency requirements for each type of public facility and service.

The public facilities whose adequacy is considered in this scheme include main roads between areas, access roads to major roads, rainfall drainage, clean water supply, sewerage, solid waste disposal, parks, schools, and police and fire departments. Local authorities may add additional facilities in their comprehensive plans, or waive certain requirements to promote urban infill or redevelopment.

When a development proposal is denied for lack of available public facilities, the developer may take one of the following actions: postpone the development project; provide the necessary public facilities and services; reduce the scale of the development so that its impact on public facilities and services falls below specified levels; or change the site of the development. In his way, APFR influences the timing, location, and density of development (Lee 1996).

The new Urban Development Acts in Korea take another approach, obliging developers to share the costs of meeting the additional demand for public facilities and services that their developments will

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3 For example, if an apartment complex developer is forced to provide land for one elementary school per 2,500 housing units or above and land for a city-block office per 3,000 housing units or above, the developer can submit a development plan of less than 2,500 housing units and avoid the fee exaction for infrastructure or public facilities.

4 Chapter 163, Part II, Florida Statutes, The Local Government Comprehensive Planning and Land Development Regulation Act. Follow hyperlink from <http://www.dca.state.fl.us/fdcp/DCP/complanning/comprehensiveplanning.htm>.

5 Regional Planning Guidance was introduced when a comprehensive planning guidance was needed after 1985's revision of the Local Autonomy Law nullified countyship in London and six other cities and the former scheme of structure plan and local plan in those areas was simplified into unitary development plans (for more information, see Korea Research Institute 1999).

create. This may even apply to additional demand for facilities and services outside the development area. For example, the developer of an urban development project must share the costs of building new roads if the development overloads the existing main roads, as well as contributing to the costs of such facilities as rainfall drainage and sewerage from the development areas, additional water-treatment plants, traffic lights at nearby intersections, and additional schools and police and fire-prevention facilities as needed.

The law in Korea does not specify what portion of the costs the developer should share. It is therefore important for any new UGM program to make clear what portion of such costs developers must cover, both inside and outside the development area, including detailed guidelines on cost sharing. This policy can be enforced through impact fees or connection fees. Local governments should establish standards for the cost-sharing plan, and consider development applications according to these standards.

However, the validity of any policy that forces developers to cover or share the costs of additional public facilities and services may be disputed. These policies may raise housing prices and put extra financial burdens on low-income people. They may also slow down industrial production by raising costs at industrial complexes. Therefore, this policy is welcomed only when additional support is given to construction of housing for low-income people and industrial complexes.

#### **Strategy 4: Land development management under growth phasing programs**

There are certain limitations in managing development only through policies that require adequate public facilities. For this type of policy to work, a thorough and accurate examination and estimation is needed of the additional demand for public facilities and services created by the new development. Furthermore, this process must be conducted every time a new development application is submitted. While this type of program is quite effective in maintaining the quality of public facilities and services, it is hardly effective in controlling growth speed, because additional development is always allowed as long as the existing public facilities and services can tolerate it.

Therefore, means are needed to control the scale, location, and timing of development. Standards need to be established for gross growth allowances that are in accordance with central government's urban development policies and the demand for new development; the size of land available for development, urban environmental conditions; and availability of public facilities and services. Additionally, priorities are also needed for different areas and types of development. Decisions should be made based upon these priorities when a new development proposal is submitted. Below are two examples from the United States of schemes that combine development timing management with APFR.

*Montgomery County planning system:* A yearly established annual growth policy serves as the main growth management framework for all public service-related development projects. This planning system divides the county into 17 "policy areas" and identifies adequate development levels for each area, taking into consideration development allowance capacity and a variety of other policies. A "staging ceiling," the maximum annual growth allowance, is set for each policy area. Along with this, a strict scheme for preservation of agricultural land is enforced, giving careful consideration to how the scheme interacts with such factors as land use, economy, traffic, housing, public service-related facilities, natural environment, and financial policies.

*Westminster planning system:* This system calculates a certain community's capacity to provide public services for a certain period of time based on "service commitment" (SC) units—one SC unit is the level of public service provision required by a single housing unit—and assigns the calculated SC units to the following six types of development: (a) active housing zone development; (b) other housing zone development; (c) non-housing zone development; (d) service contracts with those who reside outside the concerned service area; (e) government-sponsored housing construction, small-scale development projects, or other development projects; and (f) contingent development projects or any development project for public use. This program gives priority to type (a) and (b) housing development projects, considering the possible financial losses to developers or financial impacts on the city that denying the proposals might have. In the case of type (c) developments, the program gives priority to proposals that are designed to induce base economic industries, since these increase job opportunities for the local community.

This paper proposes a growth-phasing land management program as a fourth strategy, to ensure gradual, planned urban growth by properly managing the scale, timing, method, and location of development. This program would seek to manage urban growth systematically by estimating the appropriate scale of development within the economic, social, and environmental capacity of any given urban area, and by supplying adequate public facilities and services based on such an evaluation.

Growth-phasing programs are generally used for areas inside urban growth boundaries (urbanization areas). They give priority to development proposals that are sited in accordance with urban redevelopment strategies, and develop first those areas where it will have the largest development impact. The timing of development must be decided by the availability of public facilities and services. Public facility development projects financed by local governments and government-funded corporations must be launched within urban growth boundaries and be provided under a growth-phasing program.

## **4. Individual management tools for areas close to urban growth boundaries**

### **4.1. Inside urban growth boundaries**

The purpose of development management inside urban growth boundaries is maintaining the quality of the built environment. To achieve this, a comprehensive unitary management program has to be established that will replace the existing land management programs. This paper proposes a comprehensive management program for the areas inside urban growth boundaries, modeled on Germany's Federal Building Code (*Baugesetzbuch*), which is an example of a no-development-without-prior-planning policy.

*The Baugesetzbuch*, introduced in 1987, covers 13,000 municipalities. Each municipality prepares its *Bauleitplan* (urban land-use plan), as and when necessary. This plan comprises a preparatory land-use plan (*Flächennutzungsplan*, or F Plan)—which gives basic guidance on general land-use designations within the urban growth boundary and contains other pertinent information, such as on public facilities

and services—and the legally binding land-use plan (*Bebauungsplan*, or B Plan), which is developed out of the F Plan and contains legally binding land-use designations for land within the municipality. For the purpose of considering applications for development projects, the territory is divided into development-permissible areas (that is, inside urban growth boundaries) and undesignated outlying areas (that is, outside urban growth boundaries), where development is restricted. Development-permissible areas are divided into specific land-use areas (*Baugebiete*). In already built-up areas, any development must be in harmony with the immediate environment; development of other development-permissible areas must exactly satisfy the criteria established for them in the B Plan. The B Plan regulates land use for land plots the size of one house (5–10 ha), providing detailed guidelines for each plot, such as permissible types and density of building, land use, type of development, and standard criteria for making decisions on planning applications both in areas where construction is allowed and in areas where it is not (where some construction of buildings may be allowed for agriculture, forestry or aquaculture; these areas are similar to the agricultural and forest areas in Korea designated by the National Land Use Act). Thus the B Plan can both restrict and promote development. Since all construction projects are developed according to the B Plan, this plan is of crucial importance.

The strict regulation of development severely limits landowners' rights. Thus, German citizens generally do not wish to own land unless they really need it. Unlike in Korea, they cannot change the zone allocations of their land and cannot develop it unless it is earmarked for development in the B Plan. Since there is no development without planning, Germany has not suffered from haphazard development and the privatization of development profits (Choi 1999).

In managing development inside urbanization areas, the Korean Government must establish a comprehensive land-use plan similar to Germany's Federal Building Code and manage areas according to the plan. Firstly, the Government needs to establish a comprehensive land management plan, perhaps called the Urban Development Act. This act needs to establish strategic municipal land-use plans similar to Germany's B Plans and allow only development prescribed by the plans.

The idea of zoning regulated under a municipal land-use plan with imposed building restrictions may well replace or supplement the existing zoning system in Korea. To make land use more flexible in the country, it is necessary to include the concept of land-use density. Overall urban development plans must be brought under the municipal land-use plan, where detailed guidelines for individual development projects can be set out. Under this plan, local governments would have to consider the availability of public facilities and services when making decisions on development project applications, as well as having to manage development sites, timing, and scale through a phased development program. The Urban Development Act and all local government municipal land-use plans must therefore include public facility requirements and growth phasing programs

#### **4.2. Outside urban growth boundaries**

In principle, no urban development projects should be allowed in the areas outside urban growth boundaries. It is important to have all development projects come under a unitary public land-use plan. This section examines the United Kingdom's development control system and the United States'



subdivision regulation system, and proposes a revised land-management system for areas outside urban growth boundaries that is suitable for the Korean case.

The current land-use planning system in the United Kingdom was established under the Town and Country Planning Act of 1947 (revised in 1990). Local urban and rural development plans drawn up by local governments under this act are guided by National Planning Guidance, which is published in the form of Planning Policy Guidance notes (PPGs) and Regional Planning Guidance notes (RPGs); national policies and guidance can also be found in a number of other sources.

Under Planning Policy Guidance note 12 (PPG12), published in 1992, county councils (province-level authorities in most non-metropolitan areas) draft 15-year "structure plans," providing a strategic framework for development in the county, while district councils are responsible for local plans, which must conform with the relevant structure plan, and contain detailed guidance for land-use, including the type, location, and boundaries of development allowed in each area.

The basic concepts of all county land-use management plans are based on guidance from National Planning Guidance in PPGs and RPGs,<sup>6</sup> which reflect current priorities in central government policy. Some of the major issues they cover are: (1) housing and the number of new buildings that are permitted by local governments; (2) greenbelts, natural environment, and street preservation; (3) rural economy; (4) town economy and business development projects for job creation; (5) traffic, roads, and other public facilities and services of high strategic importance; (6) preservation and excavation of mineral resources; (7) waste disposal and improvement of soil quality; (8) sightseeing, leisure, and recreation; and (9) power and its distribution (Kim and Suh 1992).

The US land-use planning system consists of an unbinding master plan and a binding zoning system. The land use zoning system, the main framework of US land-use management, is strictly enforced through detailed zoning divisions. Programs such as land subdivision control, official mapping, and building codes have been adopted as land-use regulations, building on this zoning system.

The US land subdivision control system, which aims to regulate land around urban areas, is similar to Germany's *Baugesetzbuch*. The subdivision control system was adopted at around the same time as the zoning system. It is used when a landowner applies to divide his or her land holding into more than two units for the purposes of transfer or development. While Korea's zoning system does not go much further than spatial division of land, that of the United States is capable of three-dimensional control of land, including its use and the density of development that is permissible on it. A subdivision review process examines the size and location of the land and evaluates the availability of public facilities and services in the proposed development areas. The US subdivision control system has been used effectively in regulating the development or conservation of undeveloped land located around urban areas.

In Korea, the main goals of a land management system for areas around urban growth boundaries should be guided by the principles of sustainable development and environmental conservation. In addition, there should be a balance between land use and availability of public facilities and services. For this purpose, the development management plans of different local governments must be unified through a comprehensive unitary land management program, and any permission for development must



be granted only following strict guidelines that consider infrastructure availability and development allowance capacity.

To effectively manage areas around urban growth boundaries, the Korean Government must provide guidance similar to Britain's PPGs and RPGs. Following such guidance, metropolitan region governments should establish regional plans similar to the United Kingdom's structure plans. Likewise, under the regional plan, local governments should come up with land-use plans similar to the United Kingdom's local plans. The regional plan also needs to provide guidelines on decentralized development in areas around urban growth boundaries.

A developer who launches a land development project in Korea should submit a proposal that is in line with the local government's land management policies and plan for scrutiny by the local government. In examining the proposal, the local governments should consider the location, timing, and arrangement of development, as well as the availability of public facilities and services, using a system similar to the United States' subdivision regulation. At the same time, the local government must assess the use and density of development and its impacts on the surrounding environments from a three-dimensional perspective.

The whole land-use management system for areas around urban growth boundaries should be based on the principle that any development in these areas should be limited, and that development applications should be approved only when they do not harm the natural environment.

## 5. Conclusion

Development and conservation are not necessarily opposing forces. Thorough development of areas that need to be developed helps to thoroughly preserve areas that should be preserved, while thorough preservation of areas that need to be preserved helps to thoroughly develop areas that should be developed.

This paper proposes a comprehensive land management program for Korea that aims to enhance the effectiveness of land management within urban growth areas, and at the same time to manage areas outside urban growth boundaries through controlled development, thereby facilitating both development and conservation in areas within and outside urban growth boundaries.

This paper also suggests approaching urban development projects from a broad regional planning perspective, considering the availability of public facilities and services, managing land through phased development programs, and forcing developers to contribute part or all of the costs of meeting additional demand for public facilities and services. In addition, adoption of development impact fees should also be considered.

Seen from a landowner's point of view, any effort to maximize the value and effectiveness of the land in publicly approved development areas raises the question of equity; some land will necessarily become more valuable than other land according to the kind of development that is permitted on it. The social and economic issues that this raises could effectively eliminate public support for the concept of planned land management. To make such an urban growth management system a success, a social consensus

about limiting landownership has to be reached. Also, a socially acceptable program has to be established that separates the right to use land from the right to develop it, so that landowners retain their right to keep land under its current use, while the public sector holds a certain portion of the decision-making power on its development.

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*Research Note*

# International Experience of Public-Private Partnerships for Urban Environmental Infrastructure, and its Application to China

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Public-private partnership-based services could be one of the better solutions for developing urban environmental infrastructure—which includes sewage treatment and municipal solid waste disposal services—in developing countries. Due to the low availability of funds for investment in the public sector and operating inefficiencies in government-run utilities, public-private partnership (PPP) can help to provide environmental services by calling on private-sector investment and managerial and technical skills. The Chinese government is facing a “capital bottleneck” and low efficiency in the existing government-run system for developing urban environmental infrastructure (UEI). To achieve the environmental targets under the Tenth and Eleventh Five Year Plans (2001–2010), the Government needs to draw up financial strategies and implement financial mechanisms that include PPP. There is no substantial experience of establishing PPP systems in most developing countries, including China. This study identifies the role of PPP, and examines the necessity of introducing the PPP system in China. It also clarifies the reform process in the UEI sector, existing policies, and important options for PPP-based projects and services. The study focuses on key issues like target setting, pricing regulations and tariff policy design, policies for promoting PPP, and contractual arrangements. It is based on international experiences and seeks to examine how these can be applied in China in order to enhance UEI implementation capacity.

*Keywords:* urban environmental infrastructure, public-private partnership, tariff, China, Asia.

## 1. Introduction

Urban environments have been deteriorating over the years in Asia. The major reason is insufficient government spending on environmental infrastructure to meet the increasing demand that has resulted from high population influxes, rising living standards, and economic activities. However, funding deficiencies and the low efficiency of existing systems have been recognized as barriers to expanding and/or maintaining urban environmental infrastructure (UEI)—which includes environmental services like wastewater treatment, and municipal solid waste (MSW) disposal. Around the globe, targets for

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annual investment in water and sanitation are expected to grow to \$75 billion by the year 2025 (Cosgrove and Rijsberman 2000). Achieving these investment targets will require innovative financing solutions. The urgent need to access financial and technical capability in UEI, coupled with the trends of globalization and privatization, has encouraged governments to establish public-private partnerships (PPPs) to deliver urban environmental services and, consequently, to improve urban environments.

Under an ideal PPP for UEI, the government's main role is regulator, while the private sector brings financial resources, technical capability, and entrepreneurship to provide the environmental services. The consumers, including both households and businesses, pay appropriate charges to make provision of these services financially viable for the provider. Due to the nature of these services as public goods requiring substantial investment, the government may provide some direct or indirect subsidies to relieve the burden on poorer consumers and to check the abuse by the private sector of the natural monopolies they are given. However, the process of private-sector participation tends to go faster than relevant administrative and financial reforms in the field of UEI. Some projects are being carried out without clear understanding of PPP, appropriate institutional frameworks, and implementation capacity; for such projects, targets will be difficult to achieve.

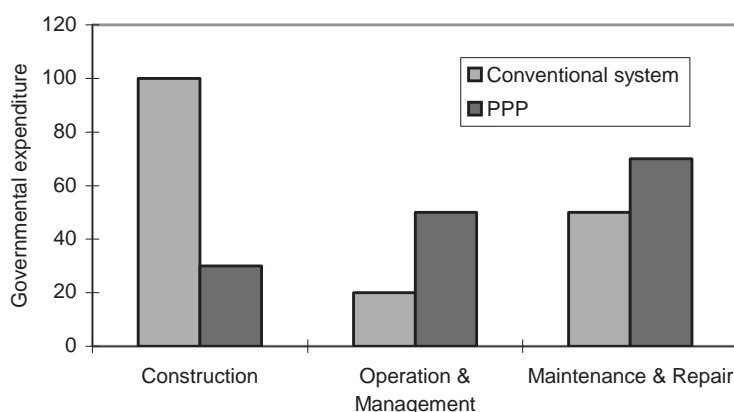
China has a tremendous demand for UEI, and most cities are experiencing increasing strain on their physical and financial capacity to deliver adequate UEI services. Ambitious targets requiring large investments to improve UEI are set under China's Tenth Five Year Plan (2001–2005). Methods to procure the necessary funds, as well as to identify appropriate roles for the public and private sectors, have become some of the most important policy issues in China. This paper focuses on several major issues relating to the establishment of PPP systems, to support the Government's future policy-making.

## **2. The need for public-private partnerships**

### ***2.1. Expansion of construction funds and improvements in efficiency***

Two approaches could be considered in drawing up a long-term financing and investment plan for UEI development that can adequately cope with projected economic development. The first one is to diversify financial sources from government-run systems, and elaborate a long-term repayment plan. Construction costs could be covered by a combination of various methods: national and local bond issues; loans from foreign governments or multilateral financial agencies; and policy-based schemes, including the Water Revolving Fund in the United States and loans from government-run banks. However, many developing countries do not allow local governments to access capital through issuance of municipal bonds, because of the possibility of losing control of local public finances.

The second method is to open the market to the private sector, as has already been done in France, the UK, and some Southeast Asian and Latin American countries, under a PPP system. In this system, the government moves from being the direct service provider to being supervisor and manager, creating the regulatory framework, setting up the necessary institutional structures, setting tariffs, and providing subsidies and guarantees; while the private-sector partner takes on the responsibility of sharing the



**Figure1.** Comparison of government expenditure flow in conventional government-run UEI projects and PPP

financial burden, introducing technical innovations, and/or management. Funds are raised through loans from commercial banks, stocks, and corporate bonds.

In the case of PPP, the government, or residents, undertake over the long term to share payment in the form of service fees related to the amount of wastewater or solid waste being treated to the private-sector partner. Expenditure over the whole project life-cycle (construction and operation for a certain period) is calculated as accurately as possible beforehand, these costs are spread equally over the fiscal years of the life-cycle, and a payment plan is formulated according to the government's financial capability. If the government has a problem immediately accessing funds, it can leave expensive construction to the private-sector partner (see figure 1). Thus, even if economic development remains low and financial capacity is weak, it is possible to construct UEI by leveraging future revenue from services. Moreover, since calculation of profitability based on charge incomes is performed by the private sector, which is generally more skilled in making such calculations compared with the public sector, improved efficiency can be expected.

Government-run systems experience "public sector failure" after long operation, for two reasons: (1) uncontrolled expansion of public works with high construction costs create a budget deficit; and/or (2) services become highly inefficient in terms of the human resources they engage, corruption, obsolete technology, and inadequate tariffs leading to higher losses. In the case of the great Buenos Aires, Argentina, water supply and sewerage system, for example, the two most favorable bids for privatization came in at 27 percent below the tariffs being charged at that time by the public sector (ESCAP 1997). PPP not only overcomes shortages of funds in the public sector, but also solves the problems of "public sector failure" and provides cheaper and higher-quality public services.

PPP requires formulation of a suitable tariff system from the start. Rational use of pricing mechanisms can also have the effect of encouraging citizens to adopt environmentally friendly consumption patterns, such as saving water and waste reduction, from an early stage of economic development, contributing to sustainable development in Asian countries. Furthermore, it is expected that the technological demands

associated with UEI will bring about improvements in environmental technology and promotion of environmental businesses in Asian developing countries, and these could become key industries promoting economic development. For these reasons, many international organizations are promoting PPP:

- UNDP: “(PPPs) are an effective means of establishing co-operation between public and private actors and to bundle financial resources, know-how and expertise to address these urban environmental needs. PPPs offer alternatives to full privatization, combining the advantages of both the public and the private sector.” (UNDP 2002)
- World Bank: To support such efforts, the World Bank established the Partnerships Group to identify and fortify current and future strategic development alliances. “Partnerships must be inclusive and straddle the main categories of development actors—governments, private sector, civil society, and aid agencies.” (Partnerships Group 1998). Such partnerships provide the basis for on-going participation from a wide range of players—which can only help to sustain development projects (World Bank 2003).
- ADB: On PPPs, ADB policy pronounces that “global experience indicates that public responsibility and ownership are often best blended with private management.” (<http://www.forum-adb.org/RESOURCES/Briefers/02-03.pdf>).
- OECD: “Another challenge concerns the supply of safe drinking water and sanitation at reasonable cost to all... Considerable water infrastructure expenditure will also be required at a time when central government subsidies are being reduced. Growing contributions from the private sector through public private partnerships (PPP) can be expected.” (<http://www.oecd.org/dataoecd/15/53/2968153.pdf>).

## 2.2. *Why does China need PPP?*

By 2002, only around 22.3 percent of the total volume of sewage produced nationwide was treated, and only 20 percent of garbage was disposed of safely. China will face a great challenge in water pollution prevention and control in the next 20 years.<sup>1</sup> Under the Government’s environmental protection plan for the Tenth Five Year Plan period, by 2005, 45 percent of all urban domestic wastewater should be treated, and the rate should reach 60 percent in cities with populations larger than 500,000. Capacity for sanitary treatment and disposal of urban solid waste should be 150,000 tons per day. In order to realize the above objectives, hundreds of billion RMB will be needed to construct treatment facilities for urban domestic wastewater, and 45 billion RMB will need to be invested in the construction of treatment facilities of domestic solid waste. The need to speed up construction of UEI is a driving force for developing appropriate new financing mechanisms.

The following could be considered as reasons why China needs to develop PPP.

Firstly, local governments are playing an increasing role in UEI construction and operation, but their financial capacity cannot meet the huge demand due to the lack of a system of subsidies from central

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1 Forecasts for rising urban domestic sewage discharge are given in table 1.



**Table 1.** Environmental pressures due to urbanization in China

	1995	2000	2010	2020
Total population (100 million persons)	12.11	12.66	13.46–13.92	14.30–14.90
Urban population (100 million persons)	3.52	4.56	6.20–6.40	7.90–8.20
Rate of urbanization (%)	29.4	36	46	55
Discharge amount of urban domestic sewage (100 million tons/year)	140	221	322	500
Discharge amount of MSW (100 million tons/year)	0.91	1.21	2.17–2.24	3.55–3.66

Source: Ge et al. 2003.

government as well as to the limited flexibility that local governments are allowed to utilize their own revenues. For some localities, the problem of insufficient funding for construction of UEI will be very serious; for example, according to calculations using the OECD's FEASIBLE model<sup>2</sup> by the OECD and the Chinese Academy of Environmental Planning, the shortfall of capital for the construction of 14 sewage treatment plants and sewerage networks in Sichuan province will be 70 percent of total required investment from 2000 to 2020. The participation of any economic entities<sup>3</sup> besides public agencies should be encouraged in the construction and operation of the facilities, in order to attract private investment. The current situation of the local credit market is as follows:

(i) Bank loans play a key role in China's financial system, accounting for 90 percent of the total financing volume. Policy banks like the State Development Bank of China function as the major financing source for the development of UEI, but UEI represents just one small component of their lending. The policy-based approach of establishing a "Public Environmental Trust Fund" with money from the social security fund is still being studied. Following recent reforms to deregulate the financial sector, the People's Bank of China will not command commercial banks to make special loans; the low profits, unsatisfactory cost recovery, and long-term investments inherent in UEI projects make it difficult to obtain loans from commercial banks.

(ii) The Budget Law prohibits the issuance of municipal bonds; thus corporate bonds are used to finance UEI projects instead.

(iii) Treasury bond investment has played a significant role in accelerating the construction of UEI, but there are also problems with this, as the use of treasury bonds is too broad and the supervision of projects funded by treasury bonds is not adequately effective (CCICED 2003).

(iv) The stock market and corporate bonds are playing an increasing role. It is necessary to invite private companies as new investment bodies and utilize social capital to finance UEI in order to meet investment targets.

<sup>2</sup> The FEASIBLE model was developed by the OECD to calculate costs and financing of UEI.

<sup>3</sup> In China, economic entities besides the public sector include state-owned enterprises, collective enterprises, private enterprises, foreign-funded enterprises, joint ventures and others, whose content exceeds the private sector, as frequently mentioned in global forums.

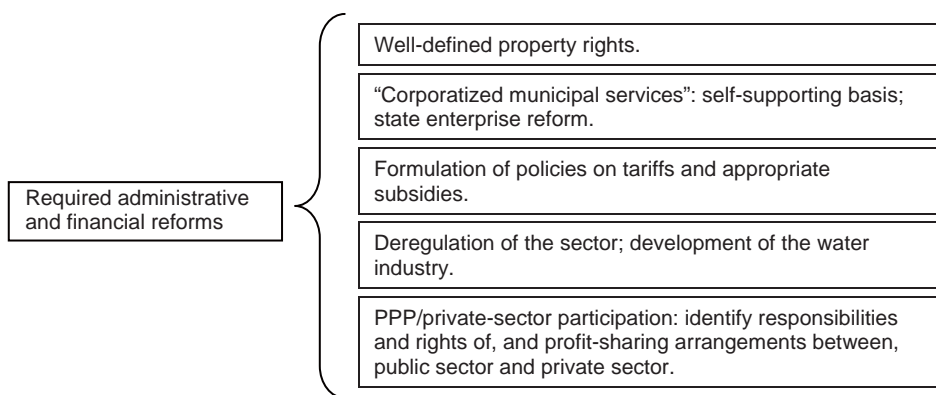
Secondly, in China, the Government has been the main source of funding for construction of UEI facilities, with government-affiliated non-profit organizations<sup>4</sup> responsible for their operation and management. This type of government monopoly excludes institutional competition, which in turn contributes to the problem of low investment efficiency. Enterprises<sup>5</sup> can undertake commercialized management of existing facilities.

Thirdly, introducing advanced environmental technology from foreign countries, as well as developing domestic environmental technology, could be achieved through deregulation and privatization of the UEI sector. It would be in harmony with the national policy of developing environmental technology and promoting environmental businesses in China. China has a major market for UEI; output of environmental industry is projected to increase by 14–17 percent per year between 2000 and 2015 according to the China Association of Environmental Protection Industry. It represents a good opportunity for both foreign and domestic companies. In particular, as domestic companies are facing saturation in the industrial pollution control equipment market, UEI is seen as a new market to which the private sector is responding positively.

### 3. Implementation of PPP projects in China

#### 3.1. Development of relevant policies for PPP

In establishing PPP in UEI development in China, an important role of central government will be to establish a national UEI development vision and paradigm that encourages private-sector participation. But this will be very complex in China; the expansion of PPP will need to be accompanied by reforms of the administrative and financial systems to promote development of a market economy (see figure 2).



**Figure 2.** UEI sector reform process in China

<sup>4</sup> Briefly, a category of public services operated according to governmental mechanisms, whose finance is provided by the Government, and whose human resources are managed by the Government.

<sup>5</sup> The enterprises referred to include, among others, enterprises established on the foundations of reformed government-affiliated non-profit organizations (e.g., state-owned or state-holding enterprises).

To achieve this, since 1999, the Government has issued seven sets of policy guidelines on: promoting private-sector participation; reforming existing management and operation systems; setting up a charging system; deregulation, including granting concessions; opening the market to foreign companies; decisions on preferential policies; and safeguarding the market by strengthening supervisory management. From the point of view of enforcement, however, the sheer number of these guidelines may detract from their effectiveness since they may cause confusion and thus reduce their authoritativeness.

Local government should play a key role in implementation of PPP projects; this role would include:

1. Drafting a local UEI development plan;
2. Carrying out comparative studies of whole-life costs and benefits of government-run systems and PPP systems;
3. Acting as planner, regulator, manager, monitor, negotiator, incentive provider, and evaluator;
4. Making financial arrangements using subsidy, national or local bonds, and tariffs for achieving cost recovery;
5. Disclosure of information to the public and absorbing ideas from the public to promote public services.

Most local governments in China are interested in involving the private sector, but most of them have no experience relevant to implementing PPP.

### **3.2. *Implementation of PPP projects in China***

Various project options exist for PPP, each of which differs in the role assigned to the private sector, business risks, and profitability. Four of these—management contracts, build-operate-transfer (BOT), joint ventures and transfer-operate-transfer (TOT)—are applicable to China.

- 1) Management contracts: The public sector retains ownership and responsibility for funding and construction of facilities, and entrusts operation and maintenance of existing facilities to private companies. This is low-risk for the government and promotes technology transfer, introduction of private-sector management know-how and improvements in efficiency and management of the facility. Management contracts cannot bring in funds from the private sector, but can reduce operating costs. Although competition between participating companies is high, there are few merits in introducing private-sector capital. Such management contracts generally have terms from eight to 15 years.

**Box 1. Management contract for sewage treatment plants in Long Tian and Sha Tian townships of Shenzhen City**

The construction of two sewage treatment plants in Shenzhen City—Long Tian (total treatment capacity: 60,000 tons per day; gross investment: 28.5 million RMB) and Sha Tian (total treatment capacity: 5,000 tons per day; gross investment: 8.8 million RMB)—was funded by local administrations at the city, district, and township levels. To relieve the administrations of the burden of operating and maintaining the plants, as well as to improve management efficiency, the city and district governments authorized the township administrations to put operation and management of the two sewage treatment plants out to tender, in order to find one enterprise with high standards and professionalism to operate and manage each plant. Through a nationwide public bidding process, a strong combination of two companies, Shenzhen Bi Yun Tian Environmental Protection Corporation and Anhui Guozhen Environmental Protection Science and Technology Co., Ltd., was finally chosen as the contractor for the two plants, with a contract period of 15 years. According to our estimates, the monthly operation and maintenance cost of the two plants was originally over 500,000 RMB. Under the management contract, a monthly fee of only 400,000 RMB is paid to the contractor, saving more than 1.2 million RMB annually and greatly reducing financial pressure on the government. On the other hand, the contractors believe the projects can still be profitable after paying for technological improvements and introducing management innovations.

Source: Pei et al. 2003.

- 2) Build-operate-transfer: This is an effective method for project funding, and is often used in China because of the many new facilities that have to be constructed. In the BOT option, after a private-sector contractor builds the facility, they then also operate and manage the facility during a fixed period, after which responsibility is transferred to the public sector. Here, ownership of the facility stays with the public sector, while the private sector partner has responsibility for investment, construction, and operation and management. There are many actual examples in each country, and experiences have also been gained in BOT projects in China for management of economic infrastructure such as power plants, highways, and water supply, which are expected to be profitable. Many BOT or concession contracts are for periods of 20 or 30 years. In order for management of the facility to go smoothly during the whole period of the contract, government policy and plans must not undergo major changes. Sudden changes of direction in government policy pose a big risk for the private sector in developing countries. Adjusting a BOT contract is complicated, and many past experiences show that it can lead to many difficulties in terminating the contract. Moreover, although close co-operation is required between regional environmental management and infrastructure construction, little co-operation should be expected from the private sector.

**Box 2. Wenzhou Dong Zhuang refuse incinerator power generation plant**

Wenzhou City produces 400,000 tons of household refuse per year, and this amount increases by about 8–10 percent annually. Two existing landfill sites have already reached their full capacities, and there are no appropriate locations in the city for new landfills. For this reason, Wenzhou City has decided to enter into a BOT contract with a private-sector contractor to build and operate a new refuse incinerator power generation plant. Gross investment required for this project is 90 million RMB, which will be provided by the private company Wei Ming Environmental Protection Engineering Co., Ltd. This contractor will build the plant and manage, operate, and maintain it for a period of 25 years (not including the two-year construction period), and then transfer ownership of the plant to the city government, without any compensation. The plant is designed to dispose of 320 tons of municipal garbage per day, and to generate 25 million kWh of electricity annually. The total investment for the first phase of construction is 6.5 million RMB. Daily treatment capacity in this phase will be about 160 tons, generating a total of 9 million kWh of electricity annually; which, deducting power expenditure of 2 million kWh per annum required for operating the plant, is all available for sale. Besides this, the municipal government pays 73.8 RMB per ton of garbage disposed of. After deducting running and depreciation costs, the project is expected to net a significant annual income, and its payback period is predicted to be 12 years.

Source: The authors, from a field survey 13–14 May 2002, in co-operation with the State Environmental Protection Administration of China.

- 3) Joint venture: The local government and one or several private companies enter into a joint venture. The local government's share in the venture could be part of a government-owned facility, the land on which it is built, the human resources, or other forms of capital. The investors own shares, and provide services based on the terms of their partnership contract. Joint ventures combine the advantages of the private sector—dynamism, access to finance, knowledge of technologies, managerial efficiency, and entrepreneurial spirit—with the social responsibility, environmental awareness, and local knowledge of the public sector. Public-sector and private-sector partners share all responsibility related to investment and management. This should lead to improved efficiency of investment decision-making; development of innovative technologies and solutions; greater innovation and flexibility at the project planning stage; and other benefits. Early dialogue between the public- and private-sector partners can help to reduce the transaction costs associated with more traditional tendering processes. In China, joint ventures have frequently been formed between the local public sector and multinational corporations.
- 4) Transfer-operate-transfer: Under this arrangement, the government transfers the assets and the franchise rights in a government-constructed environmental pollution treatment facility to private-sector investors through open tender, based on the capital rating of the facility. After purchasing the treatment facility and the franchise rights, the investors form a project

company to own, operate, and maintain the facility during the period of the contract, allowing them to obtain a return on their investment and make profits from service charges. On the expiration of the contract, the project company transfers the facility, in good condition, back to the government without any compensation. Essentially, TOT means that government leases the UEI facilities to the project company, which pays the lease price as a lump sum rather than in periodic payments. TOT contracts allow the government to collect substantial lump sums, which can then be invested in new UEI construction projects. Shenzhen City declared that TOT contracts would be sought for the the municipal sewage treatment plants (one was completed in 2000; the other is still under construction and to be completed before the end of the Tenth Five Year Plan period in 2005) built by the government (Pei et al. 2003). The key issues here are proper valuation of assets before the facility transfer and ensuring appropriate return on investment.

### **3.3. *Challenges in implementing PPP***

There are two major challenges the Chinese government faces in implementing PPP. The first is that central and local governments in China tend to misunderstand their role in implementing PPP. Under neither the existing system nor a PPP system should the government partner expect to cover all costs through charge income and revenues. Private-sector participation does not mean that the government's role becomes smaller, only that it changes—government should play the more important role of encouraging private-sector investment and of ensuring provision of high-quality services at a lower cost burden to citizens. The second challenge is setting up an appropriate public monitoring and management system. This is challenging because of the serious lack of capacity, in both central government and local governments, in implementing PPP. Setting up such a system should include the following policy design tasks: development of an enterprise performance assessment system; development of pricing regulations and tariff design; resolution of project-based management issues, like standardization of risks for risk management, contractual arrangements, etc.; promotion of public awareness and information disclosure; and institutional development for implementation.

## **4. Important procedures for implementing PPP, and their application in China**

### **4.1. *Setting targets to develop integrated solutions***

Setting appropriate criteria is the key for meaningful performance evaluation. For PPP UEI projects, quantitative and qualitative indices are developed as criteria for evaluation; we suggest the following indices: prevention of degradation of the urban environment; achievement of improvements in living standards and reduction of poverty; financial improvements; efficiency; equity; technological innovation; improvement of the political system; and social participation (see table 2). These indices are used to set targets for such projects. In addition, in China, the State Environmental Protection Administration (SEPA) or the Ministry of Construction should establish standards for certification and

technical evaluation, and provide authoritative technological information for local governments and enterprises to improve the effectiveness of PPP.

**Table 2.** Indices to evaluate the effectiveness of PPP projects for UEI

	Indices (quantitative or qualitative)
UEI improvement	<p>Service extension (extension of pipelines); maintenance of existing pipelines and facilities;</p> <p>Supply of safe water; improvement of rate and throughput of appropriate treatment of sewage and solid waste;</p> <p>Reduction in amount of wastewater discharged into rivers, lakes, sea, and groundwater; improvement of quality of discharged water.</p>
Financial improvement	<p>Introduction of domestic and foreign private-sector capital, covering of public-sector deficit by private-sector funding.</p>
Efficiency (cost-effectiveness and value for money)	<p>Increase in number of installed water and sewage meters; reduction in rate of non-income water (such as water lost through leakage in the system);</p> <p>Introduction of a tariff system; improvement in collection rates through provision of an efficient tariff collection/payment system;</p> <p>Increase in the number of customers served per employee;</p> <p>Space saving at the treatment site; rationalization of land use;</p> <p>Reduction in energy consumption per unit production;</p> <p>Reduction in total project cost (implementation of value-for-money assessment).</p>
Technological innovation	<p>Increase in investment for technological innovation;</p> <p>Provision of relevant equipment, such as computerized control systems, data-processing systems, and high-precision meters;</p> <p>Development of environmental technologies, such as resource-recycling technologies (water recycling, sludge and incinerator ash recycling, and waste-to-energy).</p>
Political system improvements	<p>Improvement in transparency of economic activities; dispelling public distrust of politics;</p> <p>Improvement in management efficiency and project operating capabilities of central and local governments.</p>
Social participation	<p>Increase in the scale of financing for UEI coming from social capital, utilizing banks and securities markets;</p> <p>Promotion of environmental business as a part of industrial activities: increase in number of companies participating in this field;</p> <p>Providing new opportunities for laid-off workers, while minimizing the social impacts of personnel cuts;</p> <p>Promotion of environmentally friendly practices, including water saving and solid waste reduction by local residents.</p>
Equity	<p>Attracting companies to areas with low economic levels, through incentives; expansion of services to such areas by reallocating resources; narrowing gaps in environmental infrastructure between areas;</p> <p>Special provisions for people with low incomes in tariff collection;</p> <p>Thorough implementation of public bidding and standardization of project processes.</p>



## 4.2. Pricing regulation and tariff policies

Pricing regulation and tariff policy design is the most important area for achieving financial sustainability of UEI.

### a. Pricing

Optimal economic efficiency of public goods can be achieved if the prices are in accordance with the principles of marginal opportunity cost. Warford (1996) has discussed this at length in the context of

$$AIC = \frac{\sum \frac{I_t + R_t - R_0}{(1+i)^t}}{\sum \frac{Q_t - Q_0}{(1+i)^t}}$$

water pricing. He breaks down the price into three components. The first is the marginal production or private cost, which is a direct cost incurred by the service provider. The second component is marginal user cost, which includes the forgone cost of reduced future consumption due to the current exploitation of non-renewable resources with irreversible effects. The third component is marginal component cost, which is cost of production in the private sector, due to capital indivisibility, could be practically estimated by calculating the average incremental cost (AIC) as follows:

where  $I_t$  represents the investment cost (investment costs are usually considered to be the initial costs incurred during the first phase of installation; however, some replacement costs or additional installation costs may be required over the lifetime of the utility). Recurrent or operation and maintenance costs ( $R$ ) are from year zero ( $R_0$ ) to the end of project (in most projects, operation and maintenance costs start with the start of production; however, some fixed recurring costs may be incurred from the beginning of the construction and installation phase). The incremental volume of water/wastewater is represented by  $Q_t - Q_0$ , while the interest rate is represented by  $i$ .

Estimations of marginal user cost may involve various uncertainties, as discussed by Jeremy Warford (1996). However, the most convenient way to make such estimations is to add a premium for depletion of resources in the first component, marginal production cost. The third component, marginal environmental cost, is basically externalities involved with production and consumption of water. Non-market valuation techniques (contingent valuation, hedonic pricing, and so on) could be used to calculate this component.

### b. Tariff design

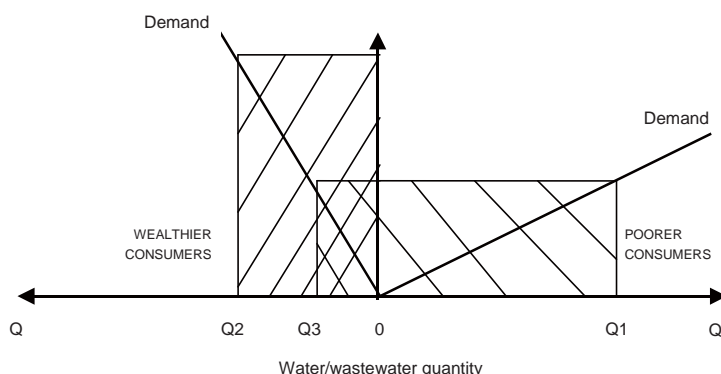
Translating the estimated prices of public goods into tariffs is the most difficult task at hand. Even in Japan, the tariffs on wastewater can only meet one-third of the private costs of wastewater management. (Private costs only reflect the up-front costs of treatment and do not include externalities.) This is the most crucial aspect for the policy-makers, as they have to balance the financial and social aspects of a project. It has been established that water is an economic and social good and it should not be provided free of charge (Black 1998). Moreover, Kolstad (1999) suggests that without a price system, the

polluters (consumers) do not “see” the damage caused by the pollution they emit; and if the polluter pays a price for every unit of pollution, this corrects market failure, at least in theory. Society includes rich as well as poor households, and these public services are meant for all. Because of this, cross-subsidy has traditionally been the most common way of adjusting the tariffs. There are various ways to calculate for this adjustment depending on the targeted revenue, as is shown by Majumdar (1990).

The first challenge in setting a tariff structure is to “get the prices right.” The arguments made by Kolstad do not take into account the socio-economic differences among consumers, and treat everyone on the same scale. However, urban environmental infrastructure and services are not a market good, rather a public good that should reach everyone in the community. Therefore, cross-subsidies or indirect subsidies from other revenue sectors should make this commodity affordable for all the people, at least up to minimum required levels. This has led to the concept of basic charges for a minimum level of service and then a system of progressive or regressive rates on the additional consumption. Another issue is identifying the different socio-economic groups in the community, either through income tax returns or through their housing and other indicators of living standards. Different tariffs are then set for different socio-economic groups in the community. However, this is a difficult system to implement and can have many loopholes that allow people to evade full charges. A progressive rate is applied widely now, in particular in water-short cities.

A recent assessment of water and wastewater services (Yepes 1999) shows that cross-subsidies have adverse economic, financial, and other effects, which often are not quantified or appreciated. First of all, the variable tariff rates used to generate the targeted revenue may send the wrong signals to different groups of consumers, who may then adjust their consumption accordingly. In many developing countries, wide income disparities place the majority of the population in two extreme groups: poor and rich. Figure 3 is based on that concept, and shows the impacts of differentiated user charges for these two groups. The group of poorer consumers is being charged less, so the services are being supplied to them at a loss, up to a total quantity of Q1. This loss should be compensated by cross-subsidy from the profits generated by selling up to quantity of Q2 to the rich group at a higher price. However, the poor group might find that water/wastewater is very cheap, and exploit it to the maximum; they would not have any incentive to conserve water. On the other hand, the rich group may find this commodity to be rather costly and may reduce their consumption to quantity Q3, on the principles of economic efficiency. Thus the outcome of the cross-subsidy may not be optimal for the welfare of society.

For private goods, market demand studies are useful, allowing one to plot a demand and supply curve and thus arrive at an ideal price that balances production costs with the prices consumers are willing to pay. However, for public goods like water supply and wastewater, market studies are difficult to do due to the monopolistic nature of the goods. Non-market valuation techniques, including stated preference (contingent valuation (Mitchell and Carson 1989)), revealed preference (averting behaviour method (Dickie et al. 1986); hedonic property valuation based on location of houses with/without access to the facilities (North and Griffin 1993), and the cost-of-illness method for health expenditures and lost labor due to sickness as a result of environmental consequences (Chestnut et al. 1997) are commonly adopted to ascertain willingness to pay for public goods. Some such studies are based on mineral bottled water or vendor charges. However, these prices are not realistic, as only a fraction of the community consumes



**Figure 3.** Revenue under cross-subsidy

bottled water, while people from poorer communities who purchase water from vendors tend to be using the services below their normal demand.

Contingent valuation seems to be a better method for developing countries to ascertain demand and willingness to pay in the area of UEI (Whittington 1998, Memon and Matsuoka 2001). Studies such as Whittington et al. (1990) and Altaf et al. (1993) show that people are willing to pay more for adequate utilities than they are currently paying for substandard utilities. Hence, higher prices can be charged if the quality and quantity of the services are improved. This objective is in line with public-private partnerships, as they are supposed to improve the standard of services. Thus, a contingent valuation study should be conducted to draw a new demand curve for water/wastewater services.

This willingness-to-pay study can be designed based on well-established formats, as described in Mitchell and Carson (1989). The results of the study can be evaluated to assess their validity, based on sensitivity analysis, as discussed in Mushtaq and Matsuoka 2002. The study could be applied to rich and poor alike, as income is the basic indicator, with some conditions, to show variations in willingness to pay; higher-income groups normally show higher willingness to pay, as long as they trust that they will get the promised level of services. It is very important in designing this study to follow a proper format in order to avoid all bias and obtain valid results.

The second challenge in establishing a pricing structure is building in flexibility to cope with differences between predicted and actual revenue. In Figure 3, predicted revenue from both groups of consumers is in line with the total revenue target for the service to break even. However, in this case, those consumers paying higher prices may either adjust their demand or try to find other, cheaper, alternatives. Hence, the actual revenue may fall short of the predicted revenue and may cause losses to the operator. Because of this possibility, minimum throughput guarantees from the Government are required by private operators.

The third challenge is fee collection. From the poorer consumers paying lower fees, monthly revenue per household may be so low that there is little incentive to collect it. The overhead costs of issuing bills and collecting fees may even exceed the actual revenue that can be collected. On the other hand, the

higher charges that richer consumers must pay may provide incentive for corruption; in developing countries this is the worst problem in most tax collection departments.

All of this suggests that cross-subsidization often makes it harder to reach economic and financial objectives, rather than supporting social justice. Then how to proceed? The best option may be to estimate demand using willingness-to-pay studies and then compare this demand curve with the supply curve of the utility. If there are losses, then the Government can subsidize them from other revenue sectors like income tax. However, if there is a substantial gap between the wealthier and poorer groups of consumers in the community, then the same willingness-to-pay studies can help to draw different demand curves for the different groups based on socioeconomic and geographical (slums vs. wealthier housing) divisions, as the different consumption levels and patterns may justify differentiated pricing. The loss that this creates should not be cross-subsidized by increasing prices in richer areas beyond the residents' willingness to pay; rather the subsidy can once again come from other sectors.

The other important aspect of tariffs in the UEI sector is concerned with the number of agencies involved. For example, in Bangkok, separate organizations are responsible for water supply: the drinking water of the Bangkok Metropolitan Administration (BMA) is supplied by the Metropolitan Water Works Authority (MWA) which is a state enterprise and sanitation and drainage is supplied by the Bangkok Metropolitan Authority (<http://www.csis.org/e4e/Mayor31Pawabutr.html>). In most Thai cities, water supply tariffs are the responsibility of the Ministry of Interior via metropolitan or provincial water authorities, while wastewater treatment charges are collected by the Ministry of Science, Technology and Environment via the Pollution Control Department and the Wastewater Management Authority. The most suitable approach is to make one organization responsible for collecting tariffs for both services, as this will not only save overhead charges but will also save confusion among many consumers who are not used to paying such charges, especially wastewater treatment charges.

Tariff design for PPP-based environmental infrastructure should not to be left to the private-sector partners, as UEI contracts are natural monopolies, and the private sector may exploit this fact to maximize their profits. Hence, government should set the tariffs based on careful assessment, including of their impacts on affordability and consumption levels. The United Kingdom has adopted an incentive-based price cap system to ensure the best value to customers (see box 3). The Office of Water Services (OFWAT) was established to regulate the water services sector, including the tariffs charged by the water companies.<sup>6</sup>

The following recommendations are made to the Chinese government based on international experiences in designing tariff policies:

- (1) When subsidy is unavoidable, make a clear subsidy plan, disseminate it among civil society, and ensure transparency;
- (2) As far as possible, avoid using cross-subsidy and instead utilize funds from the social security system and tax system to provide the necessary support;

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<sup>6</sup> OFWAT was established to: 1) enable well-managed private-sector partners to finance the delivery of water services in line with relevant standards and requirements; 2) provide incentives for these partners to improve efficiency and service delivery; and 3) review private-sector partners' charges, practices and service delivery, using an efficient and transparent process.

### Box 3. Setting price controls in the UK water industry

The price setting process used in the United Kingdom is as follows:

- (1) Identify a group of comparable companies;
- (2) Identify a set of efficiency measurements;
- (3) Identify inputs, outputs, and environmental variables;
- (4) Collect data on a consistent basis;
- (5) Conduct analysis of the data;
- (6) Calculate efficiency differences between companies;
- (7) Generate efficient cost projections for each company;
- (8) Set X from difference between actual and efficient costs.

The annual charge increase that private-sector partners can make is limited by the licenses under which they operate. Each company must provide an audited statement to the water sector regulatory body, (OFWAT), which shows that, averaged out, increases in standard charges have not exceeded the price cap. The cap is calculated as  $RPI + K + U$ , where RPI is the percentage increase in the Retail Price Index in the year to the November before the year in which charges are being reviewed; K is the price limit set by OFWAT for each company for each year to reflect any change in charges that it needs to make, over and above inflation, in order to finance the provision of services to customers (K can be a negative number); and U is the amount of K not taken up in previous years. Price caps each year will, therefore, vary between companies. K factors include four elements: revenue requirement (operating costs + capital charges + taxation + return); base revenues; incentives; and financial ratios.

Revenue requirement vs. base revenues = "K": Means to compare results from revenue requirements with the base revenues.

$$K = f(P_0 + Q + S + V - X)$$

$P_0$  to reflect past over-performance

Q = responsibility for quality

S = enhanced service exp

V = supply/demand balance exp

Source: Pollitt 2003; Hansen 2003..

- (3) In any project with private-sector participation, consider adopting an incentive-based price cap system to promote efficient business practices—this can also help to solve tariff-based bidding, as was found in Manila (see below);
- (4) Allow different tariff rates for different companies and in different areas;
- (5) Combine water supply charges and water treatment charges in one bill; these payments should be collected every two months in order to reduce administrative costs;
- (6) Ensure that the annual government financial report shows clearly how the charges have been used, and maintain a high level of transparency in financial management;

- (7) Because the number of PPP projects is increasing with the opening up of the UEI market, build public-sector capacity in the area of price regulation in order to allow better monitoring of private-sector partners' performance.

### 4.3. Development of policies to promote PPP

Policies for promoting PPP can be broadly classified into three fields: institutional management, development of financial methods, and management capacity building. Table 3 presents details of these three fields.

**Table 3.** Policy development for promoting PPP

Policy field		Necessary content
1. Institutional arrangements	Formulation of legal and regulatory framework	<ul style="list-style-type: none"> <li>• A comprehensive legal framework that guarantees to the private sector the right to enter and be active in the public works sector;</li> <li>• Regulations concerning the respective roles of the public sector and the private sector in PPP, and deregulation of private-sector activity;</li> <li>• Specific regulations concerning UEI, including consideration of environmental preservation;</li> <li>• Regulations concerning the respective roles of central and local government—transfer of authority, the character of local government, etc.;</li> <li>• Guarantees from the central government of long-term stability for PPP policy—guarantees of institutional stability, mitigation of risk through system change;</li> <li>• Appropriate pricing policies and structures.</li> </ul>
	Formulation of operating rules	<ul style="list-style-type: none"> <li>• Regulations concerning conditions and criteria for entry of a company;</li> <li>• A model contract, regulations on flexibility in contracts;</li> <li>• Introduction and regulation of a competitive bidding system for PPP contracts;</li> <li>• Maximum degree of autonomy and full cost recovery at public service agency/utility level;</li> <li>• Regulations concerning supervision and monitoring of private-sector partners;</li> <li>• Regulations concerning monitoring of positive environmental impacts of enforcement of rules.</li> </ul>
	Planning by central and local government	<ul style="list-style-type: none"> <li>• Target setting and drafting of a development plan for UEI (for example, incorporated into national five-year plans);</li> <li>• Securing of policy continuity.</li> </ul>
2. Formulation of financing methods	Securing of government revenue	<ul style="list-style-type: none"> <li>• Source of secure revenue for implementation of the business which the public sector takes charge of—specifying financial resources, issuance of national and municipal bonds, and use of overseas development assistance;</li> <li>• Enhancing local financial capacity.</li> </ul>
	Financial support from the government to the private sector	<ul style="list-style-type: none"> <li>• Grants: business fund assistance, compensation for losses, low-interest loans;</li> <li>• Preferential policies: tax exemption, reduced tax rates;</li> <li>• Support for secure funds; support for issuance of corporate bonds or stocks presentation;</li> <li>• Support for access to low-interest loans.</li> </ul>

	Methods for securing profitability for a private-sector partner	<ul style="list-style-type: none"> <li>• Management based on long-term profit calculations;</li> <li>• Offer management contracts for long periods;</li> <li>• Formulation of a tariff system, and securing of charge income;</li> <li>• Acceptance of joint implementation projects by highly profitable companies—for example, joint business for water supply and sewage treatment, or as one element of a community development project, etc.);</li> <li>• Permission for private-sector partners to use public property such as land or buildings; exemption of rental fees;</li> <li>• Guarantees by the government;</li> <li>• Simplification of procedures for bidding, contract issuance and negotiation, etc.</li> </ul>
3. Management capacity building	Risk management	<ul style="list-style-type: none"> <li>• Efforts to improve management capacity in both the public sector and the private sector;</li> <li>• Efforts to improve risk management capacity;</li> <li>• Surveillance by citizens and NGO; information disclosure; transparency preservation.</li> </ul>
	Organizational adjustments	<ul style="list-style-type: none"> <li>• Establishment of an organization to oversee necessary adjustments and manage the institutions, for example the BOT Center in the Philippines (see below).</li> <li>• Expanded role of consultants.</li> </ul>

Source: based on Chang and Memon 2003.

Framing appropriate rules and regulations is the most important task in promoting PPP, and it might be done before implementing sectoral reforms. It is necessary to address in legislation and in implementation of rules and regulations goals and guiding principles dealing with government powers and individual rights in order to identify the details of organizational responsibilities; formulating non-negotiable conditions, such as stable institutional management, developing a guarantee system; contractual structure; and a procurement process that minimizes risk. But some developed country experiences tell a different story; some countries have developed their regulatory system after the sectoral reforms. The timing of introducing regulatory measures has thus been found to be not so important during the UEI sector reform process.

Urban environmental infrastructure is required for environmental improvement of a city, and UEI needs vary across cities. It is better to allow local authorities to use their discretion in deciding which approach or system they should introduce, rather than putting it under the uniform control of central government, since cities need to be able to construct and maintain their UEI system in the way best suited to local environmental conditions, and to shoulder the burden of expenses. However, there is a need for a monitoring mechanism to check on lapses in management.

Proper implementation of these laws and regulations would necessitate the establishment of new public service agencies—or strengthening of existing agencies—with adequate capacity in enforcement of the laws and regulations and in monitoring the performance and compliance of private-sector partners. These institutions should be financially self-reliant and entirely independent from political interference and all other vested interests. They should operate with a single set of procedures and principles consistent with national policies and socio-economic developmental goals.



It is also necessary to establish a specific governmental agency to regulate and supervise the activity of private-sector partners in order to reduce the risks involved in projects. The UK Treasury established a task force to assist local governments in implementing the new concept of privatization of water services under its Private Finance Initiative (PFI). It comprised a policy team and a project team; the policy team considered policy-related problems—standard contract and procedures etc.—and the project team reviewed, made recommendations on, etc., concrete project proposals. A PPP specialist from the private sector also participated in the task force project team. The inclusion of such a special consultant was necessary to take into account duties of both public and private-sector partners, financial management, measures to mitigate risk, and related regulatory system and a policy for a well-functioning contract and technologies used. It is most logical that a neutral consultant organization (or company) performs design and review of PPP contracts. In the Philippines, the BOT Center was established as a non-profit organization. While the BOT Centre supports the activities of the private sector, it also performs regulation and supervision for business risk mitigation. Moreover, the involvement of a special and neutral consultant to take on all responsibilities—modality of co-operative financing, financial management, risk-mitigation measures, providing guidance to government on the formulation of an appropriate legal framework and regulatory systems, government policy, etc.—is required for appropriate formulation of a contract. In particular, involvement of such a consultant is important for local governments with insufficient know-how. The ease with which there can be collusion between public- and private-sector entities poses a risk. Surveillance by third parties, such as the citizenry, NGOs, specialists in project evaluation, and consultants, is required to prevent favoritism between parties. Civic concern and information disclosure are key.

As important financial resources, international development funds and other sources of international development assistance (ODA) must not only continue their conventional efforts but must also play a new role to support participation of the private sector. From now on, their major supporting activities should be providing support to macro-level system design and policy planning in administrative and financial reform in the fields of national and regional water and waste policies, as well as support to micro-level policy planning in the implementation stage and improvement of local government capability. At the more practical level, effective support includes creation of enabling environments for project financing, supplying information based on international experiences, consulting and advising on project formation, implementation of seminars and training courses, and transfer of know-how through pilot or model projects.

#### **4.4. *Contractual arrangements***

##### **a. Formulation of attractive contracts**

To promote private-sector investment in UEI, private companies should be offered attractive deals. These deals should include benefits and guarantees to make investment in UEI comparable with other business opportunities available. However, it is difficult to draw a direct comparison between PPP opportunities and other business opportunities, as the nature of the investments is quite different and PPP is a very recent development in China, where many factors have not yet been fully realized. The major differences are due to the nature of investment in infrastructure projects, which is characterized by

large sums being sunk into them with long payback periods. This is the reason why the public sector, with scarce resources, cannot make the investments on its own, and why the private sector cannot invest in this risky business without guarantees and favorable contract terms and conditions.

The risks for the private sector are manifold; for example, the recovery of tariffs is sometimes a political issue and there may not be enough help from the judicial system to recover charges or terminate services to communities. The rate of inflation is much higher than the rate of pay increases in most developing countries; hence, consumers' capacity to pay can change within a few years, threatening operators' profits. Foreign currencies usually appreciate at much higher rates than the RMB, widening gaps between revenue collected in local currency and funds borrowed in foreign currencies.

These risks can be avoided by provision of appropriate incentives from government, including hedging for foreign exchange risk, minimum-throughput guarantees for sale and revenues, judicial and political protection, tax incentives, partnerships (in which the Government provides land and other services), and banning the powerful role of unions, which most often seem to be a cause of inefficiency in public corporations. Judicial and political protection is the most important factor in developing countries, as political stability provides an overall guarantee for private-sector investment, and effective laws and judicial systems provide security for the investment. In addition, minimum-throughput guarantees in terms of units to be sold (water supply, wastewater treatment, or solid waste management) and the associated revenues also ensure a minimum level of revenue for operators. Tax incentives or tax holidays can provide an incentive and the operator can thus obtain higher net profits, which may be comparable to other investment alternatives in the private sector. The provision of land and services on a priority and concession basis is also an incentive for operators. Therefore, a combination of incentives, regulations, and political and judicial guarantees should be used to make an attractive contract. Flexibility in the application of concession contracts is critical to this success, as it is difficult to make reliable projections for some factors, for example in demand and in foreign exchange rates.

## **b. Selection of options**

There are a variety of contract types for public-private partnerships. The selection of the best available option depends on the intended outcome; if there is inefficiency in operation and maintenance that needs to be improved; and if the public utility is to be run on a lease basis in order to improve operating efficiency, or will be investment and management of the utility under BOT or under full-utility concessions. There are different types of management contract, as in some places only operation and maintenance is required from the private sector, with annual payments made to the operator, while collection of tariffs would be the sole responsibility of public agencies; in other cases, tariff collection may also be the responsibility of the same or a separate private operator. Similarly, lease contracts are made between a private operator and a public agency to take over an existing utility, which might need some improvements. Then the operator can operate the utility and pay a share of the annual profits to the public agency.

All these contractual arrangements may carry different types of construction, material, and revenue risks and guarantees; hence each contract may focus on a different set of government priorities for specific goals, including attracting foreign direct investment, technology transfer, and capacity

development, as operators will hand over the utilities after a certain number of years under the terms of the agreement. Credit support is mainly provided by a third party, which may be an international agency like the International Finance Corporation (IFC), as the risks are high in UEI due to lower profits and longer payback periods as well as difficulties in implementing user charges in comparison to private-sector investments and also in comparison to other infrastructure projects like telecommunications, power supply, and transport.

In China, significant economic variations among cities and regions make it difficult to recommend any one contractual type for all UEI development projects. Operation and maintenance (O & M) contracts may be best for cities where facilities are already constructed but their efficiency is relatively poor (in terms of cost per unit of production). If efficiency is improved through an O & M contract, then huge savings can be made, which will lower subsidies or tariffs. On the other hand, in the near future, introduction of a mixed system, in which the municipality owns the system and a private company runs the system, will increase after the transfer of facilities to local governments: this “after-management” arrangement is now in place in France.<sup>7</sup> Most Chinese cities are at the stage of facility construction. There are many BOT and joint-venture projects being carried out in the area of sewage treatment and municipal solid waste incinerator plants. Private-sector finance for construction projects is the most appropriate option because construction of these plants is a major task. BOT contracts would be better in cities like Beijing, where local governments want to improve the quality and quantity of services by building more and better treatment plants. Concession models may be better in cities where income levels are high, income disparities are not wide, and there is social acceptance of the concept of communities paying the private sector for public goods. To better identify which types of contract are appropriate for different cities or regions, some additional research into indicators will be required.

Low tariffs do not help in reaching water conservation targets. Experiences in Manila show that it is necessary to analyze the entire content of a bid, not just choose the bid that offers the lowest tariff rates. A cost-based formula, based on average cost per unit of production, may not take into account the potential for cost savings due to economies of scale. Moreover, a uniform tariff structure for all the customers may not be a viable or efficient option for resource allocation, as has been shown by experiences in Macau, where there is a uniform tariff for all consumers, as the city’s economy is rich and they can bear the subsidies easily (Chang and Memon 2003).

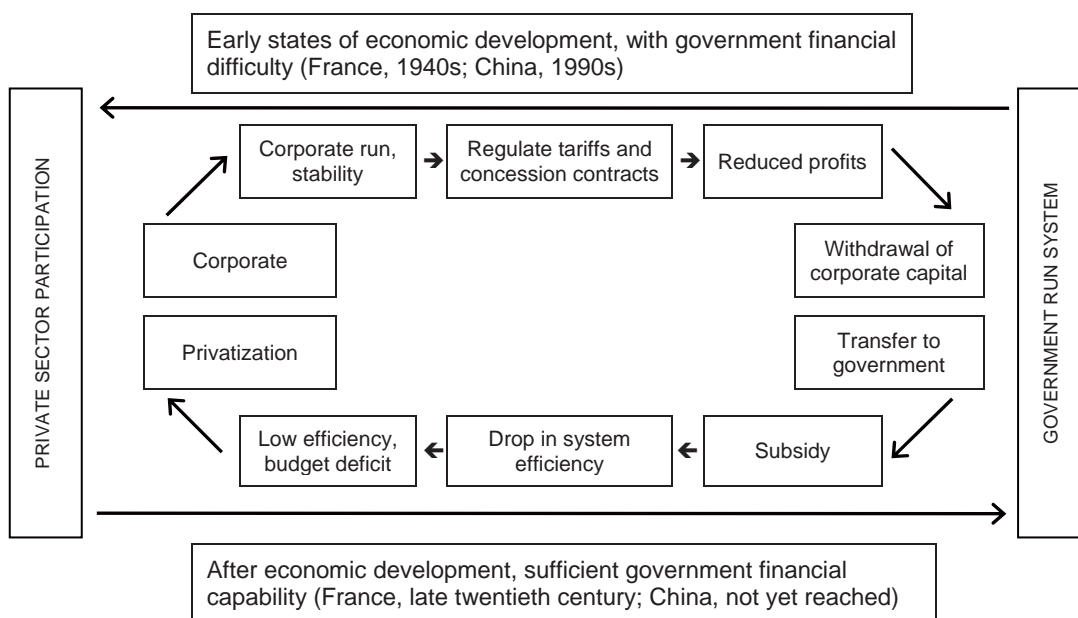
#### **4.5. The French PPP model and its applicability to China**

Sewage treatment infrastructure in France was developed in the 1940s using private capital under concession contracts, since neither the state nor municipalities had adequate funds at that time. The challenge was to build the facilities fast enough to get sufficient revenue back from the customers connected to the networks in order to invest it in construction of new UEI. China faces the same problems as France did in the 1940s, as it is in the early stages of economic development and the Government has financial difficulties. On the other hand, China can call on long experiences of repeated “public sector failure” and “market failure” in developed countries in order to ensure that it finds the

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<sup>7</sup> Lessons for China from UEI development experience in France are discussed in section 4.5.

right balance. China is approaching the solution of “public sector failure,” and as yet has no experience of “market failure” (see figure 4). The French experience shows a good balance between publicly and privately operated utilities, which solved these two problems; public operation and private operation have coexisted. In the latter part of the twentieth century, municipalities in France had more financial resources at their disposal and were more socialist-oriented, so they created water utilities by themselves. The balance between public and private operation has also been lately reinforced because of strong demand from society for public operation of UEI.



**Figure 4.** Development process of sewage treatment facilities in France

Balancing public and private involvement in UEI provision is quite important because public operation represents real competition to private companies. Municipalities also provide data that can be used to compare publicly operated with privately operated utilities. However, municipalities who operate UEI by themselves are protective of their production capacity data, while private companies keep their data confidential for strategic reasons. The management framework used in France can provide a scenario and a good reference-point for China. There are three main ways that French local utilities are currently managed. The municipality may both provide investment in and operate the utility: this is the *municipal corporation* type of management contract. Conversely, a private company may be required for both investment and operation: this is the *concession* type. Between these is a mixed system, in which the municipality is in charge of the assets and a private company is in charge of operation and maintenance: this is the *affermage* type. Affermage contracts allow a private operator to deliver services with a greater degree of freedom than is possible with a management contract. Currently, private

operators supply 55 percent of the population with sewage treatment services (Bonnet 2002). In most cases, the management system is the *affermage* type. This French model can be considered as a future vision for China, because the relationship between the public sector and the private sector, and the available project options, are similar.

## 5. Conclusions and recommendations for China

Public-private partnership can increase the coverage of urban environmental services and thus improve urban environments. The goals of efficiency and equity, along with dynamic economic impacts on environmental industries, may also be achieved if PPP is planned and implemented well.

PPP-based projects and services could be a viable option to achieve the target of UEI development in China. However, careful design and implementation of PPP projects can only guarantee to meet this objective over the long term. The Government, with the help of stakeholders—mainly beneficiaries and people or organizations otherwise affected by such projects, along with international development agencies, donors, and the private sector—should address various issues before embarking on large-scale use of PPP, including the following: putting in place the appropriate legislation, regulatory framework, and institutions; building public awareness to generate social acceptance of PPP; disseminating publicly on all aspects of PPP; analyzing and understanding diversity in and between cities; taking a long-term perspective for the public interest; ensuring mechanisms are in place to resist the formation of monopolies and cartels; ensuring a clear shared understanding of the goals and the roadmap. Governments have to also ensure that, if technology transfer is one of the objectives of PPP, then black box syndrome is avoided. BOT projects are supposed to be transferred back to the public sector after the contract period; hence, governments may explicitly put a clause on technology transfer in the agreement.

This study attempts to analyze the policy implications of, and implementation process for, PPP-based projects and services, with a special focus on assisting the Chinese government in formulating financial strategies and establishing financial mechanisms for UEI. The key outcomes of the analysis are:

- (1) It is important to identify the appropriate roles and responsibilities of the public-sector and private-sector partners. PPP-based projects and services should satisfy the interests of both groups in order to realize optimum efficiency in construction and operation/management and effectiveness of the projects and services to contribute to overall urban environmental management. The ideal role-sharing between public and private sectors should be based on optimizing social welfare by reducing the risks to each partner. For this reason, various risks under PPP-based projects and services should be allocated to the partner that can best handle that risk, whether private sector or public sector.
- (2) Private-sector participation does not in itself ensure success unless there is a good combination of competent and qualified concessionaire, capital, local knowledge, appropriate technology and expertise, and regulatory framework, including regulations on tariffs.
- (3) The primary need is to strengthen legislation on PPP for UEI. In addressing issues such as corporatization, opening of the market through deregulation, providing access to the private sector by creating an enabling policy environment, tariff policies, and preferential taxation, it

might be appropriate that the Government brings all the current views on PPP from different organizations, investors, and scholars, and of individual public-sector departments into one integral ordinance issued by the State Council ("Ordinance on the Promotion of PPP of UEI Services"). This ordinance should be designed to improve the authority and feasibility of enforcement and ensure sound development of PPP. Following the reform process of China's public utility sector, the Government should plan to establish a special law on PPP for public utilities, including UEI.

- (4) Establishment of a public monitoring and management system to assess enterprise performance is recommended for state-owned enterprises, collective enterprises, private enterprises, foreign-funded enterprises, and joint ventures. It is also recommended to develop quantitative and qualitative indices as criteria for evaluation of prevention of urban environment degradation. Furthermore, targets for raising living conditions and bringing improvements to reduce poverty could also be achieved through improved financial management, efficiency of the services (minimal cost to society), technology innovation, and social participation in performance evaluation, and establishing a monitoring and reporting system for enterprise activity for local governments. In order to prevent non-compliance and secondary pollution, the UEI facilities may be regarded as pollution sources and be included in the monitoring schemes of local environmental protection bureaus.
- (5) As far as the common risks are concerned, political and legal risks could be dealt with at the national level through legislation or commitments. Social, economic, and environmental risks could be better dealt with at local level.
- (6) It may be a good idea to categorize China into several geographical or socio-economic zones. Regional-level policy development is required in China due to the wide economic disparities. In China's eastern region, where most of the cities can recover full costs through user charges, the fundamental conditions are in place for intensive PPP-based UEI development. In contrast, the conditions for promotion of PPP in western China are much less favorable. However, government-affiliated businesses in charge of operating sewage-treatment facilities and solid waste disposal services should be transformed into independent corporations operating on commercial principles. If the user charges are insufficient to attract private funds, the Government can provide financial subsidies. Existing and new facilities constructed by the Government may be contracted out or leased out to such corporations. The TOT model could be used to facilitate cost recovery, then BOT contracts or joint-ventures could be gradually introduced. For specific PPP models, experiences in the eastern region can be analyzed to formulate policies for the western region. On the other hand, preferential policies could be fully utilized to provide extra incentives to the private sector to finance UEI projects in poor regions. Some regions, in particular the western region of China, have been identified as areas that require special assistance for development and could benefit from implementation support for these types of activity. The financial, technical, and managerial risks could be effectively mitigated by forming appropriate joint venture companies, which can take on the risks and are in the best position to mitigate them.

- (7) It is recommended that policies and techniques are developed to mobilize China's large base of personal savings for financing new infrastructure projects through domestic capital markets. It is necessary to encourage strong domestic banking and domestic businesses to take a leading role in PPP-based initiatives.
- (8) Providing training on relevant knowledge and technology would improve the capacity of local governments to implement PPP in UEI construction and operation. The training program should be designed for both local governmental officials and corporate managers. The content of the training program may include: relevant government policies on PPP in urban wastewater treatment and solid waste disposal; financing for UEI; models for PPP and their related advantages and risks; sample contracts for different models such as BOT, joint venture, and management contracts; key technologies for urban wastewater treatment and solid waste disposal; and supervision and management of PPP (CCICED 2003). Implementation of pilot activities might be helpful to provide a foundation for PPP-based projects as well as dissemination of the information to various stakeholders.
- (9) It is necessary to establish an impartial organization and a consulting company for contract management. City governments need to engage high-quality advisers to plan and implement the entire process.
- (10) Sanitation and water supply should be combined as one package for the purposes of PPP, and consumers should be obliged to purchase both water and sewerage connections simultaneously.

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*Research Note*

# Financing Renewable Energy in India: A Review of Mechanisms in Wind and Solar Applications\*

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Development of markets for, and large-scale use of, renewable energy products and technologies have been hindered by their high up-front capital costs; the renewable energy industry's inadequate access to credit; subsidies for fossil fuels; and low purchasing capacity among potential consumers. While conventional funding and financial instruments such as capital subsidies, donor grants, and tax rebates and similar fiscal incentives have been able to achieve a certain level of penetration, the large-scale use and commercialization of renewable energy products and technologies requires innovative approaches to the selection and delivery of financial instruments and mechanisms. This research note explores four instruments that are likely to be primary sources of finance for the development and commercialization of renewable energy technologies and products in the mid to long term: government finance; international funding (including the Clean Development Mechanism); private-sector finance (including financing through energy service companies); and micro-credit and community-based finance. The challenge of financing is addressed under a life-cycle approach, which looks at financing mechanisms for the phases of: (1) research and development; (2) demonstration; (3) early commercialization; and (4) demand-driven commercialization on two renewable energy sectors that are particularly relevant for developing countries: solar and wind power. Case studies from India are examined in each of the four categories of financing. Findings to date indicate that these four categories all play different roles at different stages of the life-cycle, not only individually, but also in combination. The research so far also shows that the roles of these four financing mechanisms are technology-specific.

*Keywords:* Renewable energy, energy finance, India, wind power, solar power.

## 1. Introduction

Developing markets for, and large-scale use of, renewable energy products and technologies have been hindered by the high up-front capital costs; the renewable energy industry's inadequate access to credit; subsidies for fossil fuels on the one hand; and low purchasing power among potential renewable energy consumers on the other. Approaches for addressing these barriers have generally centered on conventional funding and financial instruments such as capital subsidies, donor grants, and tax rebates

\* The research note presents preliminary findings from research undertaken on the subject of Innovative Financing for Renewable Energy Development as part of the RISPO (Research on Innovative and Strategic Policy Options) project, under the framework of the Asia-Pacific Environmental Innovation Strategies Project (APEIS). APEIS is a joint research project involving around 20 research organizations in the Asia-Pacific region.

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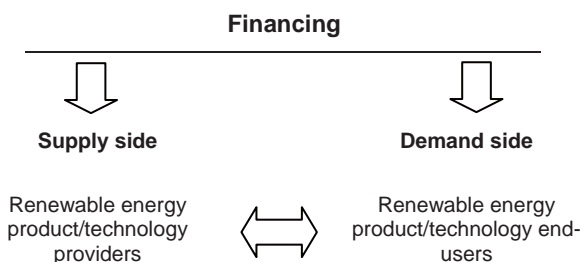
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and similar fiscal incentives. For people with low income, aid and grants have long been regarded as the most viable funding mechanisms. In a number of cases, donor governments have made proposals and provided funding to recipient governments. The latter select target communities and a contractor to undertake the installation and necessary training. Lack of maintenance and servicing have often resulted in the failure of projects using this approach.

While the above mechanisms have been able to achieve a certain level of penetration for renewable energy products and technologies, experience has shown that renewable energy development on a large and sustainable scale is only possible if it is not solely dependent on development aid or government subsidy. Other financing models involving private-sector finance and end-user contribution should play an increasing role. In addition to identifying new sources of finance, exploring innovative forms of delivery is another key issue. This paper explores four such financial instruments that are likely to be primary sources of finance for the development and commercialization of renewable energy technologies and products in the mid to long term. These are: government finance; international funding (including the Clean Development Mechanism (CDM)); private-sector finance (including financing through energy service companies); and micro-credit and community-based finance. The aim is to identify innovative mechanisms that: (1) bring down the high initial costs; (2) increase renewable energy's competitiveness against traditional fossil fuels; (3) reduce the transaction costs<sup>1</sup> of renewable energy products and technologies; and (4) ensure sustainability without public aid and direct subsidy.



**Figure 1.** Linkages between financing and the demand and supply sides in relation to renewable energy products and technologies

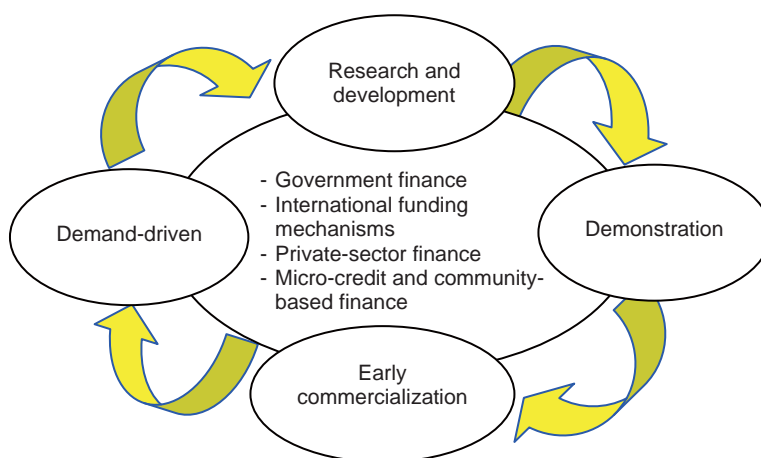
With regard to financing, there appears to be a relationship of interdependence between the deployment of renewable energy products and technologies and their market demand. The availability of financing for research and development as well as for manufacturing is crucial for reducing the high costs of the systems. Similarly, adequate consumer finance enhances affordability and stimulates further demand, which in turn leads to further development of the renewable energy industry.

Given this inter-linkage between industry and market growth on the one hand and price reduction on the other, in this study the challenge of financing is addressed under a life-cycle approach, which looks at financing mechanisms for the stages of: (1) research and development, (2) demonstration, (3) early commercialization, and (4) demand-driven commercialization. Under this approach, the respective roles of the different financial instruments are examined, as well as their interaction at each stage of the cycle.

<sup>1</sup> Transaction costs here mean all the costs, besides the cost of the technology itself, that are required for taking technology and/or products to the user, including marketing, advertising, and awareness creation.

This is done by reviewing selected past and ongoing projects and programs and other financing initiatives in the four categories of financing selected. Cases studies are examined from India, which is one of the leading developing countries in the area of renewable energy.

Though there are many renewable energy technologies that have potential in developing countries and are currently in use, this study focuses on the financing of grid-connected wind power and off-grid solar photovoltaic (PV) power projects. For grid-connected wind power, detailed case studies were undertaken in the states of Tamil Nadu and Karnataka. Studies of the off-grid solar power sector covering decentralized applications (comprising solar home lighting systems (SHS) and photovoltaic-based mini-grids) were undertaken in the states of Rajasthan and West Bengal respectively.



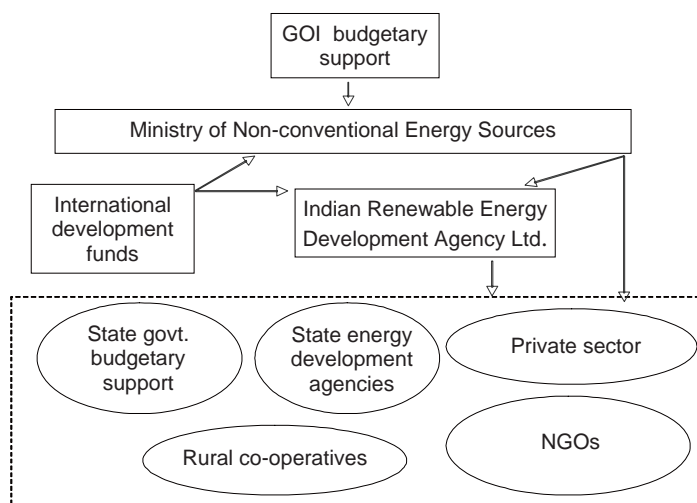
**Figure 2.** Renewable energy life-cycle flow chart

## 2. Renewable energy in India: policies, institutions, and financing

Renewable energy policy in India is driven by the need for energy security; diversified and growing energy needs; the presence of large unserved and poorly-served populations; abundant renewable resources; and opportunities under clean climate initiatives. The Ministry of Non-conventional Energy Sources (MNES), set up in 1992,<sup>2</sup> is the Government's nodal agency for all matters concerning the promotion of non-conventional/renewable energy. Complementing the efforts of the MNES at the central level, state governments add manpower and financial resources to promote the renewable energy programs in their respective states through state nodal agencies (SNAs); these are involved in designing, implementing, and supporting renewable energy programs. The MNES co-ordinates with the SNAs by providing policy guidelines as well as finance, either allocated as subsidies or given under other programs. These programs are often implemented with the involvement of the Department of Rural Development, state electricity boards, community-based organizations, non-governmental organizations (NGOs), and others. In order to provide concessional financial support to the renewable energy sector,

<sup>2</sup> The Department of Non-conventional Energy Sources (DNES), established in 1982, was upgraded to a ministry in 1992.

the MNES has set up a financial institution, viz., the Indian Renewable Energy Development Agency Ltd. (IREDA).



**Figure 3.** Financing institutions and mechanisms in India's renewable energy sector

The Government has been pursuing a multi-layer strategy for promoting renewable energy, especially through the private sector. Components of the strategy include:

- Provision of budgetary resources by the Government for demonstration projects;
- Encouraging the involvement of industry and the scientific establishment in indigenous research and development for new and emerging technologies and improvement of available technologies; and promoting access to technology development elsewhere, thereby avoiding reinventing the wheel;
- Extending institutional finance through IREDA and other financial institutions for commercially viable projects, with private sector participation; and external assistance from international and bilateral agencies;
- Promoting private investment through fiscal incentives, tax holidays, depreciation allowances, facilities for wheeling and banking of power for the grid, and remunerative returns for power supplied to the grid; and
- Allowing one hundred percent foreign direct investment in manufacturing as well as setting up of power projects.

As of March 2003, the achievements in terms of installed capacity for grid-connected wind energy systems and for solar PV stand at 1,807 MW and 121 MWp respectively. Further, the Government is keen on increasing the share of renewable energy in the country's installed power generation capacity by an additional 10,000 MW by 2012. A draft of the renewable energy policy statement has been submitted by MNES for approval. Within the long-term vision, this policy statement seeks to set out the major application areas and near-term targets for the period up to the end of the Eleventh Five Year Plan

in 2012. One of the major application areas is the electrification of 18,000 remote villages. In another initiative, the Ministry of Power (MoP) has set up a mission called REST—for Rural Electrification Supply Technology—the basic objective of which is it to accelerate complete electrification of all villages by 2012 using local renewable energy sources and decentralized technologies.<sup>3</sup> Such target-oriented programs, along with the introduction of the Electricity Act 2003,<sup>4</sup> which come into force on June 2, 2003, are expected to facilitate development of the renewable energy market in India.

The Electricity Act 2003 has several provisions favorable to renewable energy, including rural electrification. It provides for local generation and distribution of electricity by *panchayats* (formally elected village-level governing bodies), rural franchisees, NGOs, and user associations by involving local communities in managing electricity distribution. Under the proposed open-access scheme expected to be in place by the middle of 2004, independent power producers (IPPs) can set up renewable energy power plants for captive use, third-party sale, power trading companies, and for own transmission and distribution in both rural and urban areas. The Act also directs central government to prepare national electricity and tariff policies that include renewable energy-based power, and the MNES is currently in the process of developing the same for renewable energy. The most important feature—and the highlight—of the Act is that it empowers the state electricity regulators to promote renewable energy and to specify a percentage of the total consumption of electricity in the area of a distribution licensee that the licensee should aim to purchase from renewable energy sources. This is considered a major boost for promotion of the renewable energy sector in India. In this liberalized electricity market, the financing mix for renewable energy is likely to change, as new financing institutions and new mechanisms are expected to appear. These and related issues will be discussed in more detail in the full research paper that will be written at the conclusion of the current research.

### 3. Case studies and financing roadmap for off-grid solar PV

#### 3.1. Case studies

The review of financing for research and development, demonstration, and early commercialization was supported by a detailed literature search, interviews, and discussions. For the commercialization stage, a few case studies were undertaken covering projects that present a sustainable and replicable model of financing. The cases were selected on the basis of their capacity to promote financing by end-users themselves as well as on their contribution to the development of a system of operation and maintenance at the community level.

##### a. Solar PV mini-grids, a combination of government and community financing—Sunderbans, West Bengal

The case study of solar PV-based mini-grids in Sunderbans describes a model of combining government and community financing to promote renewable energy in India. Since PV technology is very expensive, it is often beyond the reach of poor people even if credit facilities are available. On the

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3 As of March 31, 2003, 72,715 villages were yet to be electrified.

4 Full text available at the Ministry of Power, India, website: <http://powermin.nic.in/>.

other hand, PV is also the most user-friendly and field-matured technology to be used in remote locations for developmental applications such as for the provision of electricity for the basic needs of lighting, communication, clean water supply, education, primary health services, and a few commercial activities. Since village electrification is primarily considered to be a social responsibility of the Government, funding for such projects mainly comes in the form of government subsidies. This presents yet another dilemma, as the unfavorable cost-economics of PV technology do not always justify their use. The funding pattern of Sunderbans mini-grid projects is an attempt to overcome this problem in a unique manner based on a fee-for-service approach that matches the paying capacity of the user to the level of services provided, and an effective use of varied developmental funding for setting up the utility. West Bengal Renewable Energy Development Agency (WBREDA), the state agency for executing off-grid electrification projects, has leveraged an MNES subsidy (central funding) to take care of the initial cost of the generating unit, while WBREDA's own resources (state funding) and local developmental funds were mobilized to lay the distribution networks. Revenue collection from the sale of electricity, which is done through the account of the co-operative society in the rural bank, provides for the lifetime costs of the operation and maintenance of the facility. The combination of the central subsidy for renewables, state subsidy, and local area development funds is in the ratio of 70:20:10. Each consumer invests about US\$45 towards application fees for receiving the connection and internal wiring. The monthly fixed tariff is about US\$2.50 for consuming 18–20 kWh of electricity. The financing arrangement is complemented by a unique institutional structure involving the technology provider, local entrepreneurs, and the community for operation and maintenance, sale of electricity, billing, and revenue collection. Transparency in transactions, involvement of multiple stakeholders in planning and managing the scheme, and consumer satisfaction are the backbone of this institutional structure.

#### **b. Developing a market-oriented institutional and financial model for decentralized solar systems—Rajasthan, Uttaranchal**

This case study addresses the limitations of delivery mechanisms currently practiced in conventional government subsidy-driven programs. A unique institution called the Energy Service Network (ESN) has been the focus of Uttam Urja, a project for implementation of renewable energy technology systems in rural areas through NGOs. The ESN is an entrepreneurial model conceived by The Energy and Resources Institute (TERI) and funded by the India-Canada Environment Facility. The project focuses on developing a grassroots ESN comprising local NGOs, dealers, and retailers of commonly used electronic gadgets. These local enterprises offer custom-made products and services in remote rural areas. Currently, the setting up of the ESN is being facilitated and co-ordinated by TERI, which is focusing on enhancing the capacity of the network's members. Once the ESN has been established, it will consolidate its network with existing financial intermediaries and manufacturers of solar home lighting systems. The project addresses the limitations of the subsidy regime, particularly with respect to technology customization and innovative delivery mechanisms. It presents a package of energy products and services to rural people rather than providing just the technology, as has been the case in various other initiatives undertaken by the Government. The delivery of such a package has necessarily involved the provision of easy credit; customized products; and quality repair, maintenance, and advisory services through building and engaging local capacity and local economies.



### **c. Financing solar PV systems through rural finance institutions—Karnataka, Kerala, and Andhra Pradesh**

The business model of SELCO-India, a solar energy service company (ESCO) operating in southern India since 1995, aims to develop an innovative consumer finance scheme through rural credit institutions, with loans available from local banks and co-operatives, along with a sales, installation, and maintenance network in the villages. Since most end-users in rural areas cannot afford to buy a solar PV system up-front, this business model allows staggered payments over a three to five-year period, with loans provided by rural financial institutions. SELCO offers a lease-to-own scheme wherein the consumer pays one-quarter of the system cost up-front, while the rest is given to him or her by the financial institution as a loan at 12.5 percent interest per annum. An important and effective part of SELCO's strategy has been to form tie-ups with financial institutions like the Syndicate Bank to provide loans for solar PV systems. One such partner is the Malaprabha Grameen Bank (MGB), a rural development bank with 200 branches in Dharwad and Belgaum districts of Karnataka, known for its innovative micro-credit schemes.

Where no other type of financing is available, SELCO has set up its own financing arm offering loans at a low interest rate, with IREDA re-financing 2.5 percent per annum using low-cost World Bank funds available through the photovoltaic lending program of IREDA. As rural customers are at the lowest level of the financing ladder, doorstep financing through rural financial institutions (registered farmers' cooperative societies or cooperative banks) contributes to reducing the borrowing transaction costs, thus increasing affordability for rural customers. The SELCO financing scheme has succeeded in responding to consumer willingness to pay for better lighting services by providing financing adapted to the repayment capability of rural people. Central to the approach has been the successful partnership developed with rural financing institutions and local solar entrepreneurs and technicians. This builds confidence, on the side of both lenders and borrowers, in the viability of the technology and its business profitability.

### **d. Consumer financing for solar PV systems through low-interest bank lending—UNEP Solar Power Initiative**

This \$7.6 million initiative was launched in March 2003 between the United Nations Environment Programme (UNEP) and two of India's largest banking groups to help 18,000 southern Indian households finance clean and reliable electricity from solar power. The UNEP program is made possible with support from the United Nations Foundation (UNF) and the Shell Foundation.

Under the UNEP program, households are able to purchase SHS at an interest rate of approximately 5 percent per annum, compared with the normal consumer lending rates of 11–12 percent. The Syndicate Bank and Canara Bank offer new low-interest loans under the program, which is aimed at buying down the financing cost of SHS. These two banks are credited with introducing many of the most innovative rural financial products through an extensive network of rural branches and through linkages with self-help groups in Karnataka and Kerala.

### 3.2. *Financing roadmap for off-grid solar PV*

The roadmap to commercialization of decentralized solar applications (for example, solar lanterns, home lighting systems, street lights, water pumps, and decentralized power plants supplying both AC and DC electricity) in India has gone through three phases: research and development; demonstration and technology push; and early commercialization or market transformation. It is now entering a fourth: the demand-driven phase.

During the *research and development* phase, India undertook a national-level effort to develop and promote technologies that were relevant to the needs of the Indian population, while simultaneously undertaking a detailed resource assessment exercise. Academic and research institutions, state and central government agencies, and others were involved in basic development and promotion work supported by a dedicated fund at the national level. Focus was on systems such as solar lanterns and solar PV water pumps.

The *demonstration and technology push* phase concentrated on field trials, demonstrations, post-installation evaluation, training and workshops, support to the industry, testing and certification, and so on. The aim of all these activities was to create a national-level infrastructure to bring the technologies into the mainstream, and thus institutions such as the Rural Electrification Corporation and energy development agencies were roped in. Most of the activities in this phase were supported by full government subsidies. International aid and donor funding also supported some pilot projects.











The next phase, *early commercialization* or market transformation, essentially concentrated on the identification and removal of barriers to widespread utilization of renewable energy technologies. Specific steps were taken on policy aspects, quality control, market support infrastructure, and others to facilitate this. The highlights of this phase were focus on product development; availability of finance for entrepreneurs and customers; and setting up of hardware supply and after-sales service networks. The subsidy-driven efforts in this phase were supplemented by initiatives such as the Photovoltaic Market Transformation Initiative of the International Finance Corporation (IFC), providing consumer finance, working capital, and risk sharing (for example, payment default guarantees) to the entrepreneurs. Other initiatives such as project finance from the World Bank Line of Credit through IREDA and innovative delivery schemes such as fee-for-service models using mini-grids, with the SNA taking the role of an ESCO, also provided a push to this phase.

The decentralized solar market is now slowly moving towards a *demand-driven commercialization* scenario, where manufacturers are offering product and financing packages that are tailor-made for specific categories of consumers. While providing for the basic energy needs of the rural population is considered the thrust area for the Government, the private sector is emerging as a key player in the delivery of energy products and services through commercial approaches such as ESNs. Innovative concepts such as enterprise development on both the supply and demand sides, as well as micro-financing through self-help groups, are slowly taking shape. This phase is also seeing the removal of subsidies on some popular products such as solar lanterns, which are now being sold on their own merits. While the CDM is emerging as a new instrument for financing commercially attractive projects,

development programs such as electrification of remote villages are being planned with a combination of central and state-level funding.

Product customization and innovations in delivery mechanisms required for the village electrification program are promoted through a joint government-industry-NGO action research phase, for example, under the REST mission of the Ministry of Power. Hence, the roadmap to commercialization sees a cyclic process where the funding and financing mechanisms become attuned to the requirements of a particular phase. Table 1 summarizes the above discussion.

**Table 1.** Evolving financing roadmap of decentralized solar energy (residential/community sector)

Life-cycle phase	Financing instruments			
	Government finance	International funding mechanisms	Private-sector finance, including ESCOs	Micro-credit and community-based financing
Research and development				
Demonstration				
Early commercialization				
Demand-driven commercialization				

## 4. Case studies and financing roadmap for grid-connected wind power

The financing roadmap for grid-connected wind power is discussed below, following a similar approach to that for off-grid solar PV.

### 4.1. Case studies

#### a. Public-sector financing (through IREDA) for wind power development—Tamil Nadu

India has witnessed an exponential growth in its wind power sector. Synergy between various factors—viz., promotional policies of the Government, a conducive environment for private sector involvement, supportive financing instruments, access to technology, and institution and capacity building—have been the critical instruments fuelling this growth. Among the states where wind energy could be viable, Tamil Nadu has taken the lead in exploiting this potential. Since 1985–86, the Tamil Nadu State Electricity Board (TNEB), the state utility, has successfully implemented grid-connected wind farms under demonstration projects with MNES support. The success of these demonstration projects has attracted record private investment in the wind sector. The TNEB has further facilitated investment by identifying potential sites, developing infrastructure (grid evacuation, grid connection, sub-station facilities, and so on) for implementation of GWEGs (grid-connected wind electric

generators), and announcing attractive state-level policies for wheeling and banking of power, third-party sales, and so on. Fiscal and financial incentives from the MNES, coupled with financing from IREDA, has further boosted the progress of installation of GWEGs in Tamil Nadu. IREDA's achievement in financing wind power projects is remarkable. IREDA has financed 210 grid-connected wind power projects aggregating to 475 MW in Tamil Nadu alone, which is 22 percent of the wind power projects it has financed in all of India. The cumulative installed capacity in Tamil Nadu is 895 MW,<sup>5</sup> representing 53 percent of India's installed capacity in the wind sector.

#### **b. Wind-power development by the private sector, a combination of the CDM and public-sector financing—Karnataka**

The Clean Development Mechanism, a recent international financing tool for additional revenue from climate-friendly projects that is one of the flexibility mechanisms of the Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC), has drawn attention from the private sector for leveraging the financial viability of wind energy projects. Enercon (India) Ltd. has proposed implementing a 15 MW grid-connected wind power project in the state of Karnataka, based on the CDM. Enercon participated in the Royal Dutch Government's public procurement tender, CERUPT, and its project has been selected for supplying certified emissions reductions (CERs). The project is located in Vanivilas, falling within the Jogimatti wind zone. The projected revenue from CERs is US\$1.2 million<sup>6</sup> for 10 years, with total CERs generation of 0.24 million over 10 years, at a rate of €5.35<sup>7</sup> per CER credit. The total investment in the project is US\$16 million. The project proposes to achieve financial closure from IREDA with a debt-to-equity ratio of 2.38. The project also envisages an advance payment from CERs revenue to the tune of 50 percent of the total revenue from CERs on a discounted basis, which will serve as a part of the project equity. Though the financial viability does not improve substantially with the CER credits (CER revenue is at the rate of only Rs.0.15/kWh), it is still attractive to Enercon (India) Ltd. to go ahead with such a project because it offers several benefits; advance payments are expected to supplement the equity and improve cash flow, and partially cover the risk of delayed payment by the utility and/or the assumed annual increase in the power tariff. Further, the revenue from CERs for wind power projects has the potential to cover annual operation and maintenance costs. Hence, the equipment manufacturers are presently developing the concept of a free annual maintenance contract for the private investor who would thus not need to worry about expenditure on operation and maintenance. In turn, the private investor would authorize the equipment manufacturer to develop a CDM project and earn CER credits for its wind farms. Windmill manufacturers and promoters in India are also looking forward to such opportunities under the CDM.

#### **4.2. Financing roadmap for grid-connected wind power**

*Research and development* is normally the starting phase of any sectoral development. The MNES combined the objectives of rapid commercialization and phased indigenization of wind energy technology in India from the initial stage. Government funding for research and development led to the

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<sup>5</sup> As of September 2002.

<sup>6</sup> Based on a conversion rate of US\$1 = 48 Rs.

<sup>7</sup> Based on a conversion rate of €1 = 50 Rs.








creation of a massive wind resource database and development of grid-connected wind electric generators within the country. Even at present, government funding is available for research and development for both of these activities, but is now targeted at developing high-end wind energy technologies with better efficiency and performance. Thus it is critical to have government funding support for research and development during the initial stage as well as during technology development stages.

*Demonstration phase:* The MNES made relentless efforts in encouraging state governments to implement grid-connected wind energy generator projects and provided grants for the same. These demonstration projects were successful in showcasing the Government's objective in commercializing the wind power sector, proving the techno-economic viability of wind power projects, and attracting the private sector to invest substantial sums.

*Early commercialization phase:* Wind power is about to take off as a successfully commercialized technology in India. Financing was difficult in wind power projects during the initial phase of development. The MNES's efforts in establishing a public-sector financing entity, IREDA, provided the right opportunity for private companies to avail themselves of long-term soft loans for implementing wind power projects. IREDA played a pivotal role in staging the implementation of GWEG projects on a larger scale in the country. This initiative convinced other private financing institutions and nationalized banks of the viability, and even attractiveness, of supporting the wind energy sector. Of late, they have entered the market and have already funded a number of successful wind power projects. Recently, the CDM has attracted private companies to implement wind power projects and access additional revenue by selling CERs to developed countries to meet their binding UNFCCC emission reduction targets. CDM as a financing tool has yielded a few projects for Indian companies, though it is yet to create adequate impact among investors in India as it is still in the nascent stage.

*Demand-driven commercialization phase:* It is expected that the MNES will phase out subsidies and other incentives once the wind power sector reaches full commercialization, and that the role of private finance will grow in the funding of larger-scale wind power projects. International funding mechanisms such as the CDM are expected to supplement the efforts of private financiers. As this process takes place, the role and scope of government funding is changing. In the initial stages, the MNES alone was funding research and development activities, but now private sector equipment manufacturers have also started investing in research and development. However the private sector's investment is directed towards developing high-end GWEGs, viz., mega-sized turbines, large-sized rotor blades, reactive power-free electrical systems, and so on. The MNES remains a major source of funding for wind resource assessment to identify more potential sites for implementing wind power projects, including offshore projects. Table 2 summarizes the above.

**Table 2.** Evolving financing roadmap of grid-connected wind power (industrial sector)

Life-cycle phase	Financing instruments			
	Government finance	International funding mechanisms	Private-sector finance, including ESCOs	Micro-credit and community-based financing
Research and development				
Demonstration				
Early commercialization				
Demand-driven commercialization				



















## 5. Discussions and conclusion

The findings of this research to date indicate that government finance, international funding mechanisms, private-sector finance, and community-based finance all play different roles at different stages of the renewable energy development cycle, not only individually but also in various combinations. The research also shows that the role of these four financing mechanisms is technology-specific and varies depending on whether wind or solar applications are considered. The authors would like to alert readers to the fact that this research note only aims to identify the role of the various financing instruments at the different stages of the cycle. It is hoped that a quantification of the share of financing from the respective financial instruments, as well as drawing of policy conclusions on what category of finance best addresses specific barriers at each stage of the cycle, will be provided when the research is completed. Informed by the Indian experience, an innovative financing mix could then be envisioned for other countries that are initiating policies for a sustainable and demand-driven renewable energy development strategy.

### Government financing

Government financing has been crucial at all phases of development of both off-grid solar and wind power, except for the full commercialization of wind power. For solar energy, the technology is still beyond the reach of many potential customers and many new market segments are constantly opening where government support is required. In fact, the solar power sector is currently going through two parallel stages: demand-driven commercialization and a subsidy-driven, socially-oriented rural electrification market for which Government support is crucial. Removal of subsidy can only be envisaged in terms of gradual policy change. As a result, the innovation that can be observed with

**Table 3.** The role of different financing sources in the cycle: comparison of solar energy (decentralized; residential/community sector) and wind energy (industrial sector)

Life-cycle phase	Financing instruments			
	Government finance	International funding mechanisms	Private-sector finance, including ESCOs	Micro-credit and community-based financing
Research and development	 			
Demonstration	 			
Early commercialization	 	 	 	
Demand-driven commercialization		 	 	

Key:  = solar energy;  = wind energy.

respect to government finance is in the area of modes of delivery. This involves innovative combinations of central government subsidy with local development funds and end-user fees, as in the Sunderbans solar PV mini-grids case; or a combination of subsidies with loan-ownership models. A parallel study being undertaken in China reveals a new mode of delivery relying on competitive bidding among potential suppliers of solar systems in seven western provinces (Xinjiang, Qinghai, Gansu, Inner Mongolia, Shaanxi, Sichuan, and Tibet), with the objective of finding the optimal use of government subsidy. Bidding among potential suppliers of PV systems there has led to a reduction in the price of village power systems from about US\$20/Wp to about US\$15/Wp.<sup>8</sup>

### International funding mechanisms, including the Global Environment Facility and CDM

For solar power applications, international funding mechanisms have been involved in demonstration, early commercialization, and full commercialization, but not in research and development and product/technology development phases. One of the possible reasons is that the goals of research and development at macro level are common irrespective of where it is taking place. To elaborate further, the focus of global research and development is on new materials, improved processing, and fabrication techniques and on new solar cell designs to reduce the cost of the technology. Such investment-oriented research and development usually takes place in industrialized countries only. Foreign aid and investment are received either for the demonstration of a product, with a hidden agenda of technology push, or for the commercialization stage, where a certain level of return is assured. The same arguments hold good for the wind power sector, except for the fact that the Government of India took the lead in the demonstration stage of wind power development and hence foreign aid has not been so significant. It is noteworthy that while international funding mechanisms such as the Global Environment Facility

8 "Up-grading renewable electrical energy program for village levels in China by use of government financing and bidding based on market regulation," RISPO Good Practices Inventory, <http://www.iges.or.jp/APEIS/RISPO/inventory/db/pdf/0040.pdf>.



have initially focused on financing demonstration projects, recent initiatives such as the UNEP Solar Power Initiative have come to be involved on the side of consumer financing, with the objective of facilitating access to commercial lending from banks.

### **Private finance, including energy service companies**

Private finance, including from energy service companies, only comes at the stages of early or demand-driven commercialization for both solar and wind power sectors. Private-sector finance has been most prominent in the solar power sector, where consumer financing schemes are being developed for various applications. For a large share of the market in rural areas, private sector finance comes in the form of lease-to-own models wherein the consumer pays part of the system cost as an up-front payment and the rest is covered through loans by financial institutions, or through financing schemes designed by energy service companies themselves. Direct consumer access to lending by financial institutions appears to be limited. Manufacturers and distributors generally serve as go-between institutions between end-users and financial institutions in facilitating access to loans. In the wind power sector, private financiers have been involved in large-scale projects both by Indian project developers and through joint ventures. Once the private sector is involved, it invests in product customization as it sees the direct linkage between growth of a particular market and development of suitable products for that market. The wind power sector has already witnessed this phenomenon; it is also starting to be seen in some small pilot projects in the solar power sector.

### **Micro-credit and community-based finance**

Micro-credit and community-based finance have not played any role in the development of wind power applications. This is understandable, because communities only invest once they are the owners of a scheme. Since this study has only looked at grid-connected wind power projects, there have been no instances where a community has directly benefited by these projects. Unlike decentralized solar PV, grid-connected power projects are owned by the state, utility, or project developer, and their investments are considered as either government or as private sector. As for decentralized solar applications, community-based financing comes into play in various forms—in combination with government subsidy, as in the Sunderbans PV mini-grids case, or through loans from banks and rural finance institutions. Since the high up-front costs still make solar power systems unaffordable for low-income communities that can only rely on micro-credit and community financing schemes, leveraging local finance would still have to be considered as part of a financing package involving some form of public or international financing. Alternatives would include staggered financing schemes through lease-to-own models.

As stated in section 3, this research has not reached a stage where strategic policy options can be introduced. At the present stage, it has examined the existing financing options with respect to the various stages of the production–commercialization life-cycle. The research should now attempt to analyze the implications of policy instruments such as the liberalization of the energy market for these financing mechanisms. The interactions of these two streams should point at strategic policy options that would facilitate innovative financing mechanisms for the development of the renewable energy sector. Given that a similar study is also being undertaken in China, it is hoped that the final comparative

analysis will provide insights into specific policy measures and country-specific circumstances that explain achievements in removing the financial barriers for the development of renewable energy.



### Current Development

# Harmonizing Trade and Environment in Recent Free Trade Agreements in the Asia-Pacific Region

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Since 1999/2000, the Asia-Pacific region has been experiencing a boom in regional and bilateral free trade agreements, with the result that trade regimes are increasingly taking place in the context of FTAs and regional economic integration. Consequently, many of the key issues in the ever-growing interface between trade and environment have surfaced and need to be addressed at the level of these bilateral and regional trade agreements. This paper reviews approaches to the integration of trade and environment in recent free-trade agreements concluded in the Asia-Pacific region, with a view to identifying substantive provisions and procedural and institutional mechanisms that have been used. In addition, the paper looks at the extent to which the approach to trade and environment in Asia-Pacific free trade agreements differs from or follows that under the World Trade Organization.

Keywords: Free trade agreements, environment, World Trade Organization, Asia-Pacific, Doha Declaration.

Increasing global economic interdependence and the process of trade liberalization are leading to growing pressure on the environment and the use of natural resources. As a result, there is an ever-growing interface between trade and environmental conservation. This relationship generally revolves around three issues:

- The environmental impact of trade and trade policies;
- The potential effects of environmental measures on trade flows; and
- The use of trade measures to achieve environmental policy aims.

It is widely recognized that trade and environment can be mutually supportive. However, such a mutually supportive relationship should not be assumed to be automatic; rather, it is policy-driven. One essential condition for making trade and environment mutually supportive is to ensure that the process of trade liberalization through free trade agreements (FTAs) is preceded, accompanied, and followed by an integrated assessment of its environmental, economic, and social effects, and that adequate policies are put in place for preventing potential negative effects while enhancing positive ones. Moreover, it should be ensured that the process of trade liberalization runs parallel with the development and strengthening of effective and non-protectionist environmental legislation at national and international levels. Bilateral and regional trade agreements present a framework propitious to achieving these

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objectives, especially because the identification of positive synergies among trading partners, as well as convergence and/or co-operation, should be easier at bilateral and regional levels than at the multilateral level.

Free trade agreements are preferential trade agreements (PTAs) in which tariffs are eliminated entirely on the goods produced in the member countries, while countries maintain their own tariff structures with non-members. PTAs in which all members adopt a common external tariff structure are called custom unions. Custom unions imply a common trade policy, which means that member countries negotiate on trade issues as a single entity with non-members. PTAs concluded in the Asia-Pacific region, either bilateral or regional, are FTAs where tariffs are eliminated among member countries, but countries maintain their tariff structure vis-à-vis non-members. The increasing interest in bilateral and regional agreements is partly related to concerns over the inability of the newly established World Trade Organization (WTO) to take forward the trade liberalization agenda in a manner acceptable to all of its member countries. Despite the enthusiasm generated by the Fourth WTO Ministerial Conference held in Doha, Qatar, in November 2001, the failure of the Fifth WTO Ministerial Conference in Cancún, Mexico, September 2003 has helped to raise the profile of bilateral and regional agreements as an alternative avenue for trade negotiations.<sup>1</sup> This trend has increased particularly since some of the major global trade players, including the United States, openly indicated their intention to pursue further trade liberalization through bilateral agreements.<sup>2</sup> Whether FTAs already in existence or currently under negotiation would substitute or supplement the mechanisms of the WTO is a question for debate. What is clear, however, is that the FTAs would have significant impacts on global trade liberalization and the building of trade rules at the regional and global levels, including in areas where multilateral negotiations are in deadlock—which include rules on the relationship between trade and environment.

The integration of trade-related environmental concerns into FTAs is necessary for an approach that balances trade and investment liberalization with the needs of environmental conservation. This paper reviews approaches to the integration of trade and environmental concerns in recent FTAs concluded in Asia-Pacific, with a view to identifying the substantive provisions and procedural and institutional mechanisms that have been used in the various agreements. In addition, the paper looks at the extent to which the approach to trade and environment in Asian FTAs differs with that under the World Trade Organization. Trade and environment regimes in existing agreements are considered in terms of their implications for future FTAs as well as for future courses of action in the context of the WTO.

This paper examines the following regional and bilateral free trade agreements: the Agreement on the Common Effective Preferential Tariff Scheme for the ASEAN Free Trade Area (AFTA),<sup>3</sup> the SAARC

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1 The Fifth WTO Ministerial Conference failed because of disagreement between developed and developing member countries on whether negotiations should start on investment, transparency in government procurement, competition and trade facilitation. The First WTO Ministerial Conference held in Singapore between 9 and 13 December 1996 launched exploratory work on these four issues. Because of the link to the Singapore Ministerial, the four issues became known as the "Singapore Issues".

2 US Trade Representative Robert B. Zoellick has indicated that the United States' trade strategy includes advances on multiple fronts, including aggressively pursuing bilateral and regional trade agreements (Robert B. Zoellick, "America will not wait for the won't-do countries," *Financial Times*, September 22, 2003, London edition 1). Some observers regard the US policy of pursuing bilateral deals as a strategy to keep development goals out of US trade policy and avoid pressure for reform from the majority of WTO member countries in agriculture and other policy areas.

3 Adopted on January 28, 1992.

Preferential Trading Arrangement (SAPTA);<sup>4</sup> the Agreement between New Zealand and Singapore on a Closer Economic Partnership (ANZSCEP);<sup>5</sup> the Agreement between Japan and the Republic of Singapore for a New Age Economic Partnership (JSEPA);<sup>6</sup> the Agreement between the EFTA States and Singapore;<sup>7</sup> the Singapore-Australia Free Trade Agreement (SAFTA);<sup>8</sup> the United States-Singapore Free Trade Agreement (USSFTA);<sup>9</sup> and the Republic of Korea-Republic of Chile Free Trade Agreement.<sup>10</sup>

## 1. Trade and environment in the context of the WTO

The protection of the natural environment was first recognized by the multilateral trading system (MTS) as a legitimate public policy objective when the original General Agreement on Tariffs and Trade (GATT) was signed in 1947. However, it was only after the 1992 World Summit on Environment and Development in Rio de Janeiro that the relationship between trade and environmental policies became more explicit, during the Uruguay round. The word *environment* was explicitly mentioned in the preamble to the Marrakesh Agreement Establishing the World Trade Organization (WTO 1994a) and in the provisions of several agreements of the WTO. These agreements include a major revision of GATT, known as GATT 1994, which became the WTO's principal rule-book for trade in goods (WTO 1994f).

### 1.1. Environmental provisions in WTO agreements

#### a. The agreement establishing the World Trade Organization

The Preamble to the Marrakesh Agreement Establishing the World Trade Organization enounces that relations among member countries in the field of trade and economic endeavor should be conducted with a view to:

raising standards of living, ensuring full employment and a large and steadily growing volume of real income and effective demand, and expanding the production of and trade in goods and services, while allowing for the optimal use of the world's resources in accordance with the objective of sustainable development, seeking both to protect and preserve the environment and to enhance them and for doing so in a manner consistent with their respective needs and concerns at different levels of economic development.

#### b. Article XX of GATT 1994

Article XX of GATT 1994 provides a general exception that allows member countries to take measures that would otherwise be inconsistent with their obligations. Under the present normative set-up of the WTO, GATT article XX(b) and article XX(g) are the most relevant provisions with regard to

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<sup>4</sup> Adopted on April 11, 1993.

<sup>5</sup> Adopted on November 14, 2000.

<sup>6</sup> Adopted on January 13, 2002.

<sup>7</sup> Adopted on June 26, 2002.

<sup>8</sup> Adopted on February 17, 2003.

<sup>9</sup> Adopted on May 6, 2003.

<sup>10</sup> Adopted on February 15, 2003.

environment and trade. Article XX(b) enables the adoption of measures necessary to protect human, animal or plant life or health. Article XX(g) covers exceptions relating to the conservation of exhaustible natural resources.

The article states that nothing in the GATT:

... shall be construed to prevent the adoption or enforcement by any contracting party of measures:

(b) necessary to protect human, animal or plant life or health; ...

(g) relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption; ...

### **Box 1. Environmental provisions in selected WTO agreements**

#### *Agreement on Technical Barriers to Trade*

The TBT is intended to ensure that regulations, standards, testing and certification procedures do not create unnecessary obstacles to producers and exporters. However, it enables every WTO member to take:

measures necessary to ensure the quality of its exports, or for the protection of human, animal or plant life or health, of the environment ... at the levels it considers appropriate, subject to the requirement that they are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail or a disguised restriction on international trade ...

In order to prevent too many different standards, the TBT encourages countries to use international standards where these are appropriate, but it does not require them to change their levels of protection as a result.

The Committee on Technical Barriers to Trade receives notifications on environmental measures related to a variety of issues such as energy, genetically modified organisms, organic crops, pesticides, fertilizers, and hazardous wastes.

#### *Agreement on the Application of Sanitary and Phytosanitary Measures*

The SPS sets out the basic rules that permit governments to maintain appropriate sanitary and phytosanitary protection, while reducing possible arbitrariness of decisions. The SPS requires that sanitary and phytosanitary measures be “applied only to the extent necessary to protect human, animal or plant life or health.” Measures to ensure food safety and to protect the health of animals and plants should be based as far as possible on scientific principles and should not be maintained without sufficient scientific evidence (article 2.2). Safety measures should not arbitrarily or unjustifiably discriminate between countries where identical or similar conditions prevail, and should not be applied “in a manner which would constitute a disguised restriction on international trade” (article 2.3). The SPS allows limited freedom to apply the “precautionary principle” to deal with scientific uncertainty. The Committee on Sanitary and Phytosanitary Measures addresses notifications of measures relating to the protection of human, animal, or plant life or health.



The introductory paragraph (chapeau) of article XX cautions that such measures should not be applied “in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade ...”

Environmental provisions are contained in a number of other agreements of the WTO, including the Agreement on Agriculture; the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS) (WTO 1994b); the Agreement on Subsidies and Countervailing Measures; the Agreement on Technical Barriers to Trade (TBT) (WTO 1994c); the Agreement on Trade-Related Intellectual Property Rights (TRIPS) (WTO 1994d); the General Agreement on Trade in Services (GATS); and the Agreement on Government Procurement.

## **1.2. *Environmental institutions in the WTO***

The WTO's Committee on Trade and Environment (CTE) is the main mechanism responsible for co-ordinating policies in the field of trade and environment within the WTO; however, it cannot exceed the competence of the multilateral trading system, which is limited to trade policies and those trade-related aspects of environmental policies that may significantly affect trade for its members. The CTE was created following the adoption of the Ministerial Decision on Trade and Environment in Marrakech, Morocco on April 15, 1994 (WTO 1994e) and has the following mandate:

- a) to identify the relationship between trade measures and environmental measures, in order to promote sustainable development;
- b) to make appropriate recommendations on whether any modifications of the provisions of the multilateral trading system are required, compatible with the open, equitable and non-discriminatory nature of the system ...

The CTE is open to the entire WTO membership, and a number of intergovernmental organizations have observer status in its meetings. At the Fourth Ministerial Conference in Doha, ministers instructed the CTE to focus particularly on three issues in implementing all items of its work program: the effects of environmental measures on market access, the relevant provisions of the TRIPS agreement, and labeling requirements for environmental purposes (WTO 2001, para. 32). The CTE reported on its work on these issues to the Fifth Ministerial Conference.<sup>11</sup>

## **1.3. *Trade and environment in the Doha round of multilateral trade negotiations***

The declaration of the Fourth WTO Ministerial Conference (WTO 2001), known as the Doha Declaration, marked a turning point in the evolution of the interface between trade and environment within the WTO. The Doha Ministerial was the first time that the environment was part of the negotiating agenda agreed to by WTO members at the multilateral level. While the Doha Declaration presents significant opportunities to take forward environmental concerns in the WTO, it was self-limiting in several ways. For example, although the Declaration instructs the CTE to work on the

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<sup>11</sup> World Trade Organization Committee on Trade and Environment, Report to the Fifth Session of the Ministerial Conference in Cancún—Paragraphs 32 and 33 of the Doha Ministerial Declaration, WT/CTE/8 July 11, 2003.

identification of issues that require clarification and to make recommendations on the desirability of future negotiations, the Declaration stresses that the outcome of this work as well, as the negotiations carried out, shall not add to or diminish the rights and obligations of members under existing WTO agreements, nor alter the balance of these rights and obligations. Thus, the possible outcomes of any negotiations are significantly limited.

Nevertheless, the Doha Declaration is still regarded as a step forward in harmonizing the relationship between trade and environment at the multilateral level. Besides the instructions to the CTE mentioned above, the main environment-related provisions in the Doha Declaration are concerned with the following:<sup>12</sup>

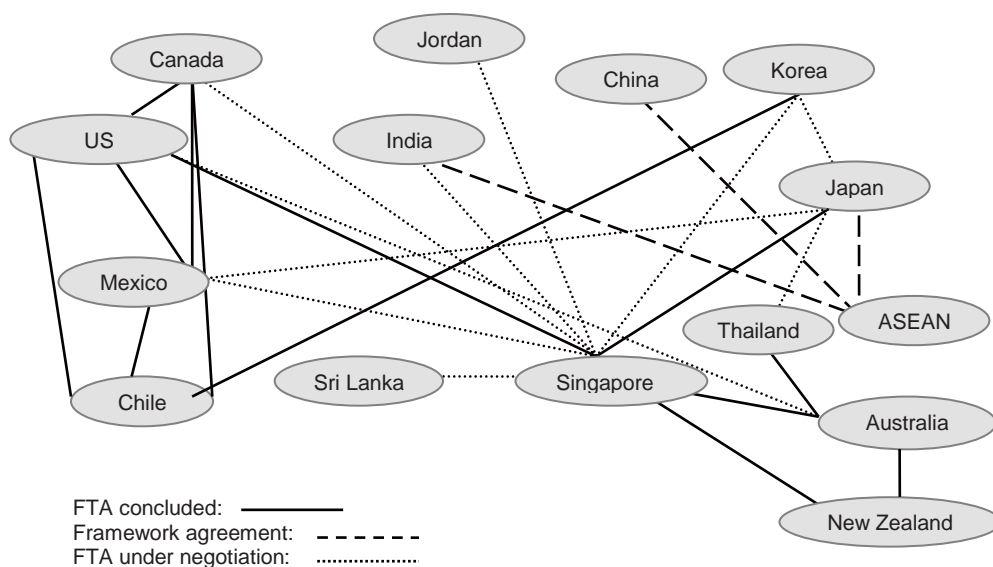
- Negotiations on the relationship between WTO rules and the specific trade obligations in multilateral environmental agreements (MEAs), and procedures for information exchange and observer status with MEA secretariats (para. 31);
- Negotiations on the reduction or elimination of tariff and non-tariff barriers to environmental goods and services (para. 31);
- Negotiations on WTO disciplines on fishery subsidies, and the need for clarification and improvement (para. 28);
- Examination of the relationship between the TRIPS Agreement and the Convention on Biological Diversity by the TRIPS Council (para. 19; see also the instruction to the CTE mentioned above);
- Reviewing the environmental and development aspects of the negotiations with the objective of having sustainable development appropriately reflected, with the CTE and the Committee on Trade and Development acting as forums for debate (para. 51);
- Co-operation between the WTO and relevant international environmental and development organizations (para. 6); and
- Agriculture negotiations where so-called non-trade concerns will be taken into account (para. 13).

At the Fifth Ministerial Conference in Cancún, WTO member countries were due to decide whether negotiations should be held on the effects of environmental measures that impede market access and on those situations in which the elimination of restrictions and distortions would benefit trade, environment, and development (para. 32); on labeling requirements for environmental purposes (para. 32); and on the relationship between the TRIPS Agreement and the Convention on Biological Diversity (paras. 19 and 32).

The Cancún Ministerial was dominated by agriculture and the “Singapore Issues” (investment, transparency in government procurement, competition, and trade facilitation), with environment low on the agenda. WTO member countries came close to consensus (in the second revision of the Draft Cancún Ministerial Text submitted by the conference chairperson on September 13; WTO 2003) on the issue of inviting the secretariats of the United Nations Environment Program (UNEP) and United Nations Conference on Trade and Development (UNCTAD) and of those multilateral environmental

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<sup>12</sup> For a detailed analysis of the sectoral issues in the Doha Declaration, see Charnovitz 2003.



**Figure 1.** Web of FTAs concluded or under negotiation in the Asia-Pacific region (not exhaustive)

agreements invited thus far, to be observers in the CTE's Special Session, and for the duration of the negotiations. Talks among heads of delegations also seem to have come close to consensus on the issue of gene patenting of animals and plants, the Convention on Biological Diversity, and the protection of traditional knowledge. Eco-labeling was among the more difficult issues. With the collapse of the negotiations at Cancún, all these issues for negotiation were left as they were at the end of the Doha Ministerial.

#### 1.4. *The momentum of FTAs in Asia*

For most of the period prior to 1999, Asia had stayed on the fringes of the movement towards concluding regional and bilateral agreements on trade. With a few exceptions, such as AFTA, formed in 1992 among member countries of the Association of Southeast Asian Nations (ASEAN)<sup>13</sup> and SAPTA, concluded in 1995 by the South Asian Association for Regional Cooperation (SAARC),<sup>14</sup> FTAs in the sense of article XXIV of the 1994 GATT, which forms part of the WTO agreements, were almost nonexistent in the region. It was only in 1999 and 2000 that government-level negotiations and studies began to gather momentum. Since then, several bilateral agreements have been concluded between countries in the region as well as with countries from other regions. Several proposals for FTAs are now under negotiation, involving not only individual countries, but also regional groupings such as ASEAN. Figure 1 presents a web of some of the FTAs already concluded or under negotiation in the Asia-Pacific region at the time of writing. It is worth noting that the increase in the number of FTAs has run parallel with the increase in imports and exports (see figure 2).

<sup>13</sup> Member countries of ASEAN are Indonesia, Malaysia, the Philippines, Singapore, Thailand, Brunei Darussalam, Viet Nam, Laos, Myanmar, and Cambodia.

<sup>14</sup> Member countries of SAARC are Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka.

## 2. Trade and environment in FTAs concluded in Asia-Pacific

In most FTAs concluded in Asia-Pacific, parties go well beyond their WTO commitments in terms of tariff concessions. However, while negotiators within the WTO have been increasingly shifting their agendas towards issues other than tariffs—such as environmental protection, intellectual property rights, labor standards and competition policies—FTAs in Asia-Pacific, with the exception of the recent bilateral agreements such as USSFTA, have concentrated on issues related to trade liberalization per se. For example, the ASEAN FTA seeks to eliminate tariff and non-tariff barriers among member countries through progressive reduction of tariffs, elimination of import duties, and trade facilitation measures. It provides for binding commitments towards trade liberalization but has only a single exception covering environment.<sup>15</sup> Likewise, SAPTA aims to promote and sustain mutual trade and economic co-operation among the Contracting States but covers no issues related to environment. Similarly, the Asia-Pacific Economic Cooperation (APEC),<sup>16</sup> though not an FTA as such but rather a forum that promotes trade and investment liberalization on a non-binding basis, concentrates on matters aimed at improving economic prosperity for its member countries. This approach treating the environment as an external dimension to trade—environment being generally incorporated into the general exception clause often labeled following article XX of the 1994 GATT—was a common feature of early FTAs in Asia-Pacific. With few exceptions, the so-called new age FTAs (JSEPA, SAFTA, ANZSCEP) have expanded their scope beyond the issue of tariff reduction towards electronic commerce, trade facilitation, broadcasting, and so on, but not towards environment. These agreements have trade and investment expansion as their main objectives.

The low profile of environmental issues in negotiations for FTAs is related to the fact that FTAs are a relatively new phenomenon in Asia-Pacific, and as such they are primarily viewed as opportunities for faster-paced liberalization of trade and investment than would have happened through multilateral negotiations; therefore, priority is given to issues of trade and investment concessions. The limited inclusion of environment into FTAs is related to another concern: the effects of environmental policies on trade. Many developing economies perceive the inclusion of environmental concerns in trade negotiations as a form of “green protectionism” by more developed countries, who they believe may be using environmental standards as non-tariff trade barriers or to otherwise harm developing countries’ international competitiveness. This perception has partly resulted from cases of restriction against Asian goods in northern markets on the grounds of environment health safeguards.

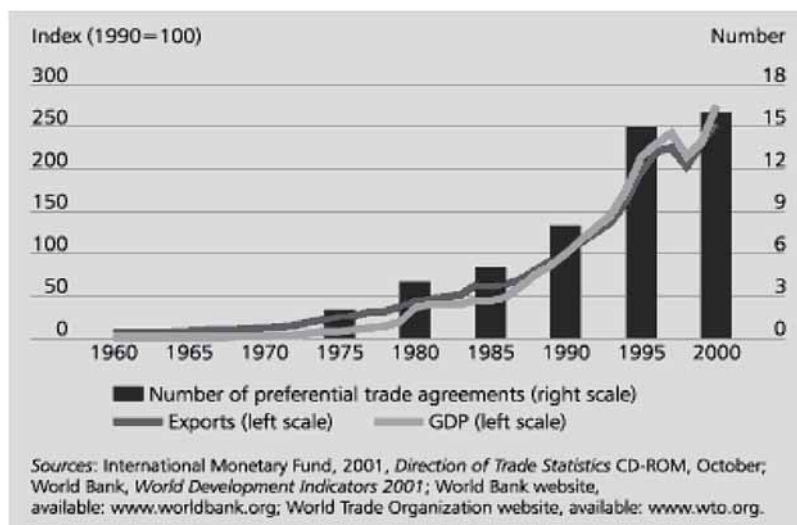
Since the establishment of the Dispute Settlement Body of the WTO, only a handful of disputed cases related to environment have actually reached settlement.<sup>17</sup> Among these figure landmark cases

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15 “Nothing in this Agreement shall prevent any Member State from taking action and adopting measures, which it considers necessary for the protection of its national security, the protection of public morals, the protection of human, animal or plant life and health, and the protection of articles of artistic, historic and archaeological value.”—Agreement on the Common Effective Preferential Tariff Scheme for the ASEAN Free Trade Area, article 9, general exceptions.

16 APEC was established in 1989 as a forum for facilitating economic growth, cooperation, trade, and investment in the Asia-Pacific region. It has 21 member economies which are: Australia; Brunei Darussalam; Canada; Chile; People's Republic of China; Hong Kong, China; Indonesia; Japan; Republic of Korea; Malaysia; Mexico; New Zealand; Papua New Guinea; Peru; the Republic of the Philippines; the Russian Federation; Singapore; Chinese Taipei; Thailand; United States of America; and Viet Nam. <http://www.apec.org/>.

17 Some of the cases disputed under GATT 1994 article XX that have involved Asian countries include the case brought by the United States against Thailand, *Thailand Restrictions on Importation of and Internal Taxes on Cigarettes*, BISD 37S/200,



Source: Asian Development Bank, 2002, Figure 3.2.

**Figure 2.** Asian and Pacific merchandise exports, GDP, and number of preferential trade agreements, 1960–2000

involving Asian countries such as the *Shrimp/Turtle* case (*United States—Import Prohibition of Certain Shrimp and Shrimp Products*),<sup>18</sup> in which India, Pakistan, Malaysia and Thailand challenged a US law prohibiting imports of shrimp from countries where the government did not obligate fishing boats to install turtle exclusion devices (TED) in order to prevent accidental catching and killing of sea turtles during shrimp fishing. The decision of the Appellate Body held that the environmental policy incorporated in US law fell under article XX(g) (see text below), and was exempted from the GATT disciplines. However, the Appellate Body condemned the United States for not doing enough to negotiate with East Asian countries to reach a compromise whereby this issue could have been resolved through an international agreement, and for applying its import measures in a discriminatory manner.<sup>19</sup>

adopted on November 7, 1990. Under the 1966 Tobacco Act, Thailand prohibited the importation of cigarettes and other tobacco preparations, but authorized the sale of domestically manufactured cigarettes; moreover, cigarettes were subject to an excise tax, a business tax and a municipal tax. The United States complained that the import restrictions were inconsistent with GATT article XI:1, and considered that they were justified neither by article XI:2(c) nor by article XX(b). It also argued that the internal taxes were inconsistent with GATT article III:2. Thailand argued, *inter alia*, that the import restrictions were justified under article XX(b) because the Government had adopted measures that could only be effective if cigarette imports were prohibited and because chemicals and other additives contained in US cigarettes might make them more harmful than Thai cigarettes. The Panel found that the import restrictions were inconsistent with article XI:1 and not justified under article XI:2(c). It further concluded that the import restrictions were not “necessary” within the meaning of article XX(b). The internal taxes were found to be consistent with article III:2.

18 Appellate Body Report and Panel Report, WT/DS58, adopted on November 6, 1998, case brought by India, Malaysia, Pakistan, and Thailand.

19 The Panel considered that the ban imposed by the United States was inconsistent with GATT article XI (which limits the use of import prohibitions or restrictions), and could not be justified under GATT article XX (which deals with general exceptions to the rules, including for certain environmental reasons). Following an appeal, the Appellate Body found that the measure at stake did qualify for provisional justification under article XX(g), but failed to meet the requirements of the chapeau of article XX, which defines when the general exceptions can be cited. The Appellate Body therefore concluded that the US measure was not justified under article XX of GATT.

Environment-related grounds have also been used in a number of other cases against exports of Asian goods, which have resulted in consultations among concerned parties under the WTO dispute-settlement mechanisms.<sup>20</sup> The use of environmental measures as grounds for prohibiting imports has likely contributed to generating a cautious approach to the issue of environmental exceptions in many Asia-Pacific countries, which in turn has affected the way environmental concerns are dealt with in FTAs.

## 2.1. Trade and environment models in Asia-Pacific

There are three common models for integrating environmental concerns into an FTA:

- A. the inclusion of *environmental provisions* in the preamble and/or text of the agreement (common to most FTAs);
- B. the inclusion of a specific *chapter on environment* (for example, the USSFTA, United States-Jordan FTA); and
- C. the adoption of an *environmental side agreement* (for example, the North American Free Trade Agreement, NAFTA).

In Asia-Pacific, concluded FTAs have followed either the first or second models; none has followed the NAFTA model.

The relationship between trade and environment concerns not only the effects of environmental measures on trade in goods and services and investment, and vice versa, within a single FTA, but also the relationships between the FTA in question and other agreements, in particular the relationships with regional or multilateral environmental agreements. Technical co-operation on environmental matters appears to be a feature of several agreements. In certain cases, this technical co-operation is subject to specific side agreements, even when the main agreement had only a few substantive provisions relating to the environment.

### a. Environmental provisions

#### *Provisions relating to environmental protection and sustainable development*

General provisions related to environmental protection and sustainable development are enounced in the preambles or the objectives of agreements when parties aim at broader goals beyond trade and investment liberalization. The Preamble to the Agreement Establishing the WTO (WTO 1994a) states that the WTO has the objectives of:

raising standards of living, ensuring full employment and a large and steadily growing volume of real income and effective demand, and expanding the production of and trade in goods and services, while allowing for the optimal use of the world's resources in accordance with the objective of sustainable development, seeking both to protect and preserve the environment and to enhance them and for doing so

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<sup>20</sup> These include the request for consultations dated October 18, 2002, from the Permanent Mission of the Philippines to the Permanent Mission of Australia and to the chairman of the Dispute Settlement Body, regarding certain measures affecting the importation of fresh pineapple fruit. The measure in question required that fresh pineapple fruit from the Philippines, the Solomon Islands, Sri Lanka, and Thailand, among other requirements, be de-crowned and subjected to pre-shipment methyl bromide fumigation as conditions for importation into Australia. The Philippines' request for consultation was later joined by another request from Thailand dated November 5, 2002.

in a manner consistent with their respective needs and concerns at different levels of economic development.

The concepts of sustainable development and environmental protection are prominent in the United States-Singapore FTA. The USSFTA states in its Preamble that "...economic development, social development, and environmental protection are interdependent and mutually reinforcing components of sustainable development, and that an open and non-discriminatory multilateral trading system can play a major role in achieving sustainable development." The agreement further reaffirms "...the importance of pursuing [trade liberalization] in a manner consistent with the protection and enhancement of the environment, including through regional environmental co-operative activities and implementation of multilateral environmental agreements to which they are both parties." The Republic of Korea-Chile FTA also includes clear language with regard to sustainable development. The Parties state that the "... Agreement should be implemented with a view toward raising the standard of living, creating new work opportunities, and promoting sustainable development in a manner consistent with environmental protection and conservation."

However, these two agreements stand out as exceptional in this regard; the objectives of sustainable development and environmental protection are hardly mentioned in the preambles and objectives of most FTAs concluded in Asia-Pacific.

*General exceptions relating to environmental protection and the conservation of natural resources*

General exceptions similar to those set under the WTO (GATT 1994 article XX) are found in a number of Asia-Pacific FTAs (SAFTA, the EFTA-Singapore FTA, JSEPA, USSFTA, ASEAN FTA, and the Framework Agreement on the ASEAN Investment Area)<sup>21</sup>. Some of these agreements virtually reproduce the WTO provisions, whereas some others go beyond them.

AFTA: The general exceptions under AFTA are provided for in article 9 of the Agreement on the Common Effective Preferential Tariff Scheme for AFTA, which states that:

Nothing in this Agreement shall prevent any Member State from taking action and adopting measures, which it considers necessary for the protection of its national security, the protection of public morals, the protection of human, animal or plant life and health, and the protection of articles of artistic, historic and archaeological value.

Article 9 covers exceptions related to the protection of human, animal, or plant life and health (similar to GATT 1994 article XX(b)), but it does not include provisions related to the conservation of exhaustible natural resources (GATT 1994 article XX(g)). The Framework Agreement on the ASEAN Investment Area features a similar approach.

JSEPA: The general exceptions in the JSEPA reproduce GATT 1994 article XX. These exceptions are found in several chapters of the Agreement, including chapter 2, article 19 (trade in goods); chapter 7, article 69 (trade in services); and chapter 8, article 83 (investment).

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21 The ASEAN Framework Agreement on the ASEAN Investment Area was adopted October 7, 1998. Full text of the agreement is available at: <http://www.aseansec.org/6466.htm>.



USSFTA: GATT 1994 Article XX and its interpretive notes are incorporated into the USSFTA, *mutatis mutandis*, for provisions on national treatment and market access, rules of origin, customs procedures, textiles, and technical barriers to trade (article 21.1). One additional feature of the USSFTA is that it contains a provision clarifying that the two parties understand the provisions of GATT 1994 article XX(b) to include “environmental measures necessary to protect human, animal, or plant life or health,” and article XX(g) to apply to “measures relating to the conservation of living and non-living exhaustible natural resources,” which would enable this disposition to cover, *inter alia*, air and water, as these are now understood to be exhaustible natural resources.

Republic of Korea-Chile FTA The chapter on investment (chapter 10) contains a general exception (article 10.18) that states:

Nothing in this Chapter shall be construed to prevent a Party from adopting, maintaining or enforcing any measure otherwise consistent with this Chapter that it considers appropriate to ensure that an investment activity in its territory is undertaken in a manner sensitive to environmental concerns.

## **b. Chapter on environment**

The conclusion of the United States-Jordan FTA<sup>22</sup> was the first time that a trade agreement included in its corpus a specific chapter addressing the issues of trade and environment and trade and labor. It has since produced a cascade effect, at least for other agreements concluded between the United States and third countries. This was the case in the USSFTA.

USSFTA: The USSFTA set a major precedent for Asia-Pacific by being the first FTA concluded in the region to address environmental issues in a specific chapter on environment (chapter 18). It also contains a number of environmental provisions in other chapters, including in the chapter on investment. Chapter 18 of the USSFTA precludes Parties from failing to effectively enforce their environmental laws through a sustained or recurring course of action or inaction and in a manner affecting trade between the Parties (article 18.2.a). The chapter commits each party to ensure that judicial, quasi-judicial, or administrative proceedings are available under its laws to sanction or remedy violations of its environmental laws as well as appropriate and effective remedies or sanctions which may include compliance agreements, penalties, fines, imprisonment, injunctions, the closure of facilities, and imposition of the cost of containing or cleaning up pollution (article 18.3).

Republic of Korea-Chile FTA: The Republic of Korea-Chile Agreement does not have a chapter explicitly dealing with environment. However, it includes two chapters on environmental issues, dealing respectively with sanitary and phytosanitary measures (chapter 8) and standards-related measures (chapter 9). Chapter 8 covers sanitary and phytosanitary measures that may, directly or indirectly, affect trade between the Parties. This chapter draws upon the WTO Agreement on the Application of Sanitary and Phytosanitary Measures. Chapter 9 includes among its objectives guaranteeing the protection of human health or safety, animal or plant life or health, or the environment. It is interesting to note that

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22 The United States-Jordan FTA was signed on October 24, 2000 and entered into force on December 17, 2001. It is the first trade accord to which the United States is a party that includes provisions prohibiting the easing of domestic environmental and labour regulations for the purposes of enhancing trade. The North America Free Trade Agreement, between the United States, Canada and Mexico, includes both environmental and labour side agreements, but unlike the United States-Jordan Agreement, these do not appear directly in the text of NAFTA and as such are not subject to the same disciplines.

environmental provisions contained in the United States-Chile FTA, concluded a few months after the Korea-Chile Agreement, are far more ambitious than the provisions in chapters 8 and 9 of the Korea-Chile agreement.<sup>23</sup> The same applies to the earlier Chile-Mexico FTA, signed on October 1, 1998.

## **2.2. Technical co-operation on the environment**

Technical co-operation on the environment is an area in which FTAs concluded in Asia-Pacific have gone beyond what is provided for under GATT 1994 and other WTO agreements.

ASEAN FTA: The ASEAN FTA does not have a specific mechanism for environmental co-operation. However, ASEAN has a number of co-operative plans, programs, and agreements in the field of environment. These include sectoral as well as multisectoral co-operative initiatives: ASEAN environmental programs (for example, ASEAN sub-regional environmental programs since 1977), the Hanoi Plan of Action,<sup>24</sup> the ASEAN Agreement on the Conservation of Nature and Natural Resources,<sup>25</sup> and ASEAN Agreement on Transboundary Haze Pollution.<sup>26</sup>

ASEAN Senior Officials on the Environment (ASOEN) is the main institution responsible for formulation, implementation, and monitoring of regional programs and activities on environment. It has three subsidiary working groups: the Working Group on Nature Conservation and Biodiversity; the Working Group on Coastal and Marine Environment; and the Working Group on Multilateral Environment Agreements.

The fact that environment is dealt with as a sectoral area of regional co-operation separates it from the trade-environment relationship. As a result, there is no direct inter-linkage between trade and environment in the sense of disciplines of mutual effect. However, it can be said that in terms of both its policy framework and its institutional mechanisms to achieve environmental policy goals, the ASEAN model has advantages for environmental protection.

JSEPA: The JSEPA contains a chapter on co-operation in the field of science and technology, including life sciences and environment. Modalities of co-operation are specified in an Implementation Agreement. Article 31 (b) of the Implementation Agreement lists the forms of co-operative activities, which are:

- (i) exchange of information and data;
- (ii) joint seminars, workshops, and meetings;
- (iii) visits and exchange of scientists, technical personnel, or other experts; and
- (iv) implementation of joint projects and programs.

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23 The United States-Chile Free Trade Agreement was signed on June 6, 2003 (full text of the agreement available at: <http://www.ustr.gov/new/fta/Chile/final/index.htm>). It includes a chapter on environment. The environmental provisions include commitments by each Party concerning effective enforcement of its environmental laws, establishing and maintaining high levels of environmental protection, and not weakening environmental laws to encourage trade or attract investment. The FTA establishes an Environment Affairs Council to implement the environment chapter and to serve as a high-level forum to discuss environmental issues and concerns, with opportunities for public input at the Council's meetings. If either Party fails to effectively enforce its environmental laws, through a sustained or recurring course of action or inaction, in a manner affecting trade between the Parties, the other Party can seek enforcement through dispute settlement procedures, including the use of monetary assessments backed by the suspension of trade benefits.

24 Text available at: <http://www.aseansec.org/8754.htm>.

25 Adopted on July 9, 1985. Full text available at: <http://www.aseansec.org/6080.htm>.

26 Adopted on June 10, 2002. Full text available at: [http://www.aseansec.org/agr\\_haze.pdf](http://www.aseansec.org/agr_haze.pdf).

USSFTA: The USSFTA commits the Parties to pursue co-operative environmental activities, including those pertinent to trade and investment and to strengthening environmental performance, such as information reporting, building enforcement capacity, and establishing environmental management systems. These are to be undertaken under a Memorandum of Intent on Co-operation in Environmental Matters between the Government of Singapore and the United States (article 18.6). Public involvement, including through the use of public-private partnerships, is expected to play a role in co-operative environmental activities.

### **2.3. Relationship with multilateral environmental agreements**

Free trade agreements concluded in Asia-Pacific rarely make reference to MEAs, although the issue has received much attention in discussions at the policy level. Japan's submission to the WTO CTE<sup>27</sup> has been highly praised for analytically addressing the question of the linkages between trade agreements and MEAs (see Charnovitz 2000). Even so, reference to the relationship with MEAs has not been prominent in FTAs concluded by Japan, including the JSEPA. Japan's paper for the WTO CTE points out the complexity of MEAs, which contain many trade measures beyond those that are specific trade obligations.

The USSFTA is the most far-reaching FTA concluded in the Asia-Pacific region in terms of addressing the relationship between the trade obligations it sets and MEAs. The preamble to the USSFTA reaffirms the importance of pursuing the objectives of the Agreement "in a manner consistent with the protection and enhancement of the environment, including through regional environmental co-operative activities and implementation of multilateral environmental agreements to which they are both parties." Article 18.8 of the USSFTA, which is related to the relationship between the Agreement and environmental agreements, is more specific in its wording: "The Parties recognize the critical role of multilateral environmental agreements in addressing some environmental challenges, including through the use of carefully tailored trade measures to achieve specific environmental goals and objectives." However, although it underlines the issue in its text, the USSFTA does not set out any substantive obligations in respect of the relationship between itself and MEAs. Rather, the Parties take note of the agreement by WTO members to negotiate on the relationship between existing WTO rules and specific trade obligations set out in MEAs,<sup>28</sup> and "shall consult on the extent to which the outcome of those negotiations applies to this Agreement."

### **2.4. Environmental reviews and environmental reporting**

Environmental reviews have been introduced as a means of assessing the environmental impacts, both positive and negative, of trade agreements. Such environmental reviews can be carried out *a priori* (that is, before the agreement is adopted) or *a posteriori* (after the agreement has entered into force).

While Singapore has concluded five FTAs—with New Zealand, Japan, the EFTA, Australia, and the United States—the agreement with the United States is the only one that has involved a formal and open

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<sup>27</sup> Japan 2002. With respect to discussions at the WTO level, the Japanese submission concludes that trade measures recommended by a Conference of MEA parties, but not specifically required in the MEA, ought not to be covered in the WTO negotiations.

<sup>28</sup> The mandate for such negotiations is set forth in paragraph 31 of the Doha Declaration (WTO 2001).

process of environmental review. The USSFTA went through environmental impact reviews published in the United States by the Environmental Protection Agency and in Singapore by the Ministry of the Environment. The reason for this lies partly in US regulatory requirements for integrating environmental concerns into trade agreements. As a requirement of section 4(a) (ii) of US Executive Order 13141, *Environmental Review of Trade Agreements*,<sup>29</sup> reviews of the environmental effects of trade agreements entered into by the United States are mandatory. According to the Order, "[t]rade agreements should contribute to the broader goal of sustainable development," and "[e]nvironmental reviews are an important tool to help identify potential environmental effects of trade agreements, both positive and negative, and to help facilitate consideration of appropriate responses to those effects whether in the course of negotiations, through other means, or both."

Executive Order 13277 (2002), under the US Trade Act of 2002, delegates certain authorities and assigns certain functions to the US trade representative and provides that the president shall conduct environmental reviews consistent with Executive Order 13141 and its relevant guidelines and report on such reviews to the House Committee on Ways and Means and the Senate Committee on Finance.

Under the US environmental review process, a draft environmental review is prepared and released during the course of negotiations to provide policymakers and negotiators with information concerning potentially significant environmental issues. The public is invited to make comments on the draft environmental review. A final environmental review is released after the trade agreement is concluded, describing the environmental review process and the US Government's conclusions regarding the agreement's potential environmental impacts. The final environmental review is also subject to public comment.

## **2.5. Procedural and institutional mechanisms**

### **a. Environmental institutions**

Several Asia-Pacific FTAs have set up institutional mechanisms relating to the environment, in particular for environmental co-operation. Environmental institutions generally operate on the basis of action plans that are adopted separately from the main agreement. Under ASEAN, environmental institutions include ASOEN, the Meeting of the ASEAN Environment Ministers, and the ASEAN Secretariat. ASOEN's co-operation programs and projects are guided by the ASEAN Strategic Plan of Action on the Environment. The environmental institutions under ASEAN operate parallel to the institutions dealing with trade. While the approach of having parallel institutions pursuing equally important mandates may contribute to enhancing the profile of environment in overall co-operation, it could also result in weak functional linkages, thus leaving the question of harmonization unsolved. Yet whether such an approach is preferable to an institutional structure with a small committee on environment within an institution primarily devoted to trade is a question for debate.

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<sup>29</sup> Executive Order 13141, *Environmental Review of Trade Agreements* (text available at: <http://www.ustr.gov/environment/execo.pdf>), was signed on November 16, 1999, under the Clinton administration. The Order institutionalizes the use of environmental reviews as a policy tool to assess potential environmental effects of trade agreements, both positive and negative, and to help facilitate consideration of appropriate responses where effects are identified. Agreements that require environmental review are: (i) comprehensive multilateral trade rounds; (ii) bilateral or plurilateral free trade agreements; and (iii) major new trade liberalization agreements in natural resource sectors. The Order provides for opportunities for public input.

Under APEC, there is no separate working group specifically for environmental issues. Environmental issues are highlighted as subjects for existing working groups such as those on energy and human resource development. The prominence of environmental issues on the agenda of APEC is, however, growing. Environment or sustainable development ministers from APEC countries have started meeting more regularly and have identified three environmental areas to prioritize in the APEC work program: creating sustainable cities, clean production, and protection of the marine environment.

The chapter on the environment in the USSFTA provides for the establishment of a joint committee to supervise the implementation of the Agreement, including on environmental issues. The chapter instructs the committee to consider at its first meeting each Party's review of the environmental effects of the Agreement and provide the public the opportunity to voice their views on those effects. The chapter also calls for establishment of several mechanisms in the implementation of the Agreement, as follows:

- The Parties shall form a subcommittee consisting of government officials to discuss matters related to the operation of the Chapter on Environment (Institutional arrangements);
- Each Party shall develop or maintain procedures for dialogue with its public concerning the implementation of the Chapter on Environment to ensure the opportunities for public participation in the discussion (Opportunities for public participation);
- The Parties shall pursue co-operative environmental activities (Environmental co-operation);
- The Parties shall make every attempt to arrive at a mutually satisfactory resolution of the matter and may seek advice or assistance from any person or body they deem appropriate (Environmental consultations).

## **b. Dispute settlement**

Most regional and bilateral FTAs in Asia-Pacific take a co-operative and non-litigious approach with regard to implementation and enforcement; the agreements provide mechanisms for co-operation while specific aspects of implementation are defined unilaterally. For the matter of settling disputes, most FTAs call for recourse to a dispute settlement body similar to that of the WTO, through the selection of a dispute settlement panel.

## **3. Conclusion**

- In most FTAs concluded in Asia-Pacific, parties go well beyond their WTO commitments in terms of tariff concessions. However, while negotiators within the WTO are increasingly shifting their agendas towards issues other than tariffs—environmental protection, intellectual property rights, labor standards, and competition policies—with the exception of recent bilateral agreements such as the USSFTA, FTAs in Asia-Pacific have concentrated on issues related to trade liberalization per se.
- Environmental concerns are generally addressed as part of general exceptions in the FTAs concluded in Asia-Pacific. Most of these FTAs have followed the approach of GATT 1994 article XX,

concerning exceptions related to the conservation of exhaustible natural resources and the protection of human, animal, and plant resources.

- Most ongoing negotiations towards the conclusion of FTAs do not reflect the evolution with regard to linkages between trade and environment represented by the Doha Declaration. Obligations remain confined to the traditional approach of listing environment as one area of co-operation and the inclusion of general exceptions in line with GATT article XX. However, there is an emerging trend in some of the so-called new-age agreements, which are taking a more integrative approach to trade and environment, in terms of both substantive provisions and procedural provisions. In certain areas, these agreements have even gone beyond what is provided for under the WTO in balancing trade and environmental obligations.
- One striking common characteristic of FTAs that include important environmental provisions is that they are invariably concluded among wealthy countries with rigorous environmental standards (for example, the United States and Singapore). Environmental provisions similar to those contained in the USSFTA are not found in agreements involving groups of countries at varying levels of development, such as ASEAN, or in bilateral agreements among developing countries (for example, the Korea-Chile FTA, as compared with the US-Chile FTA). Modeling FTAs on the USSFTA may therefore not be a panacea.
- In East Asia, several FTAs are under consideration between ASEAN and Japan, the Republic of Korea, and China. These will account for a large share of trade within the Asia-Pacific region and are likely to have significant environmental implications. The extent to which these agreements harmonize the environmental effects of trade and investment liberalization will be even of more importance since the Fifth WTO Ministerial Conference in September 2003 failed to bring significant progress in this area.
- Finally, experience with FTAs to date provides a further indication that environmental protection requires a global approach with a strengthening of international institutions devoted to environmental protection, and greater linkages with the WTO and other relevant institutions such as the World Bank. The inclusion of environmental protection in FTAs could be regarded as complementary to these approaches, or even a driving force for pushing the environment further up the WTO agenda, but should not be considered as an alternative to a multilateral approach. FTAs can therefore be used especially for facilitating co-operation and capacity building, as bilateral and regional frameworks provide more flexibility for such purposes than global organizations do.

## Annex 1: Summary of environmental measures in selected free trade agreements in the Asia-Pacific region

	ASEAN FTA	SAPTA	ANZSCEP	JSEPA	USSEFTA	Republic of Korea-Chile
Does it have a formal mechanism for civil society participation?	No	No	No	No	Yes Citizens can lodge complaints about lack of enforcement of domestic environmental laws. A specific article (18.5) relates to public participation in discussions related to the implementation of the chapter on environment.	Yes Non-governmental organizations of both Parties are allowed to participate in, and express their opinions and comments on, the process of standards-related measures.
Are sanctions available as an enforcement mechanism?	No	No	No	No	Yes The chapter on environment provides for sanctions and remedies such as: compliance agreements, penalties, fines, imprisonment, injunctions, the closure of facilities, and the cost of containing or cleaning up pollution.	No
What institutional arrangements for environment are there in the FTA?	A ministerial-level council and the secretary-general of the ASEAN Secretariat.	No	No	The Joint Committee on Science and Technology to cover environment.	A joint committee will be created which, inter alia, is to consider the review performed by each Party of the environmental effects of this Agreement and provide the public with an opportunity to provide views on those effects.	A Fair Trade Commission, under which a Committee on Sanitary and Phytosanitary Measures and a Committee on Standards-Related Measures are established



	ASEAN FTA	SAPTA	ANZSCEP	JSEPA	USSFTA	Republic of Korea-Chile
Environmental co-operation				Targeted program for co-operation on environment under chapter 8 (Science and Technology) of the Implementation agreement.	Memorandum of Intent on Co-operation in Environmental Matters to be entered into between the Government of Singapore and the United States.	Committee on Sanitary and Phytosanitary Measures and Committee on Standards-Related Measures to promote technical co-operation in the respective areas
Are there environmental provisions <i>within</i> the FTA?	Yes	No	Yes	Yes	Yes	Yes
Are there environmental provisions in the preamble?	Yes	No	Yes	No	Yes	Yes
Does the FTA have a chapter on environment?	No	No	No	No	Yes Chapter 18.	No No environmental chapter per se, but two chapters deal respectively with sanitary and phytosanitary measures (chapter 8) and standards-related measures (chapter 9).

	ASEAN FTA	SAPTA	ANZSCEP	JSEPA	USSEFTA	Republic of Korea-Chile
Does the FTA have exceptions similar to GATT 1994 article XX?	Yes Article 9: General Exceptions in the CEPT Scheme of the ASEAN FTA, which is a key mechanism for AFTA.	No	Yes Article 71.	Yes In several chapters, including on trade in goods, trade in services, and investment.	Yes GATT 1994 article XX and its interpretive notes are incorporated into and made part of the Agreement. <i>mutatis mutandis</i> , for provisions on national treatment and market access, rules of origin, customs procedures, textiles, and technical barriers to trade.	Yes
Does the FTA have articles on MEAs?	No	No	No	No	Yes Preamble and article 18.8.	No

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*Current Development*

# Sustainable Livestock Development in Mongolia

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Dust (yellow) storms are becoming a serious environmental problem in the Asia-Pacific region.<sup>1</sup> Being part of this region, Mongolia is beginning to experience the consequences of global warming and climate change, as well as having its own impact on the natural environment. With the transition to a market economy, the number of livestock—the main source of food and income for herders—has been increasing and has reached its highest level to date. This has in turn pushed areas of pastureland to their limits, leading to overgrazing and increasing the area covered by desert. One example can be seen in the situation of cashmere, the valuable properties and limited supply of which give it a relatively high international price, encouraging an increase in cashmere goat herds in Mongolia, which in turn has a detrimental effect on pastureland. Policy decisions or countermeasures to protect pastureland should be taken in order to prevent this process before it has disastrous consequences for Mongolia and the whole of Asia.

**Keywords:** Cashmere, desertification, traditional practice, advanced technology, Mongolia

## 1. Introduction

The Mongolian economy is dominated by agriculture, industrial output closely related to the agriculture sector, and mining and mineral activities.

*The mining sector:* Mongolia's large mineral potential makes it an attractive prospect for exploration, especially for gold and other metals traded on international commodity markets. Mining is a major sector of the economy that contributes 30 percent of total industrial output and around 60 percent of export revenues. Around 50 percent of total exports are accounted for by concentrated or enriched minerals (NSO 1997–2002). Mongolia is rich in minerals and metals such as coal, copper, gold, uranium, iron ore, wolfram, molybdenum, phosphate, and crude oil (IFC 2002, Petroleum Authority of Mongolia 2002).

*Agriculture:* Agriculture accounted for roughly one-third of Mongolia's GDP during 1990–2000 (IMF 2002). The main five livestock species—camels, horses, cattle, sheep, and goats—are bred and kept according to traditional pastoral practices. Some 76.5 percent of the land area is used for agriculture, of which approximately 0.8 percent is cultivated, 1.6 percent is used for hay making, and 97.6 percent is used for pasture (GOM 2001). Production of crops—wheat, potatoes, and vegetables for domestic

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1 The Ministry of Nature and the Environment of Mongolia has confirmed that, of the 32 yellow dust storms that have been recorded during the last two years (2001 and 2002) in Asia, 18 originated in Mongolia (Onoodor 2003b).

consumption and animal fodder—is difficult due to Mongolia's extreme temperatures, light rainfall or heavy rains and snow causing swollen mountain rivers to flood, and thin topsoil depleted by wind erosion.<sup>2</sup>

In a relatively good year for herd growth, the national herd (around 25–26 million) can increase by on average 10–40 percent in many areas. Mongolia's livestock increased by about one-third between 1990 and 1999 to reach nearly 33.6 million head. However, successive *dzud* (harsh winter) disasters in the subsequent two years resulted in a 10.4 percent drop in the number of livestock to 30.2 million at the end of 2000 and a further 15.7 percent drop to 26.1 million at the end of 2001 (NSO 2002a). Thousands of nomadic households lost their entire herds.

According to Ulambayar Barsbold, Mongolian minister for nature and the environment, climate change is occurring more rapidly in Mongolia than in the rest of the world; the yearly average number of days on which dust storms occur has increased fourfold during the last 40 years and the northern boundary of the Gobi Desert is gradually shifting northward due to desertification and sand movement (Onoodor 2003a). Climate change studies (for example, Dagvadorj et al. 1994, Dagvadorj and Batjargal 1999) in Mongolia suggest that over the last 60 years the average temperature in Mongolia has increased by about 1.56°C, which is much higher than the world average.<sup>3</sup>

The purpose of this paper is to analyze desertification from the viewpoint of the market that drives growth, as well as making policy proposals for decreasing the risks attached to this phenomenon and implementing sustainable livestock development, using Mongolia as a model case. In order to better understand this, we shall start with a brief consideration of Mongolia's transition to a market economy.

## 2. Transition to a market economy

For almost seven decades until its collapse in 1991, the Soviet Union offered economic and political aid to Mongolia. During the 1980s, all foreign aid to Mongolia was provided by the Soviet Union, accounting for 30 percent of Mongolia's GDP. The fall of the Soviet Union meant the end of Soviet financing in sectors such as education, medical services, and industry, as well as other kinds of subsidy, not to mention a severe decrease in trade and a shortage of spare parts and equipment for key Mongolian industries. This led to a significant drop in GDP (see table 1). Mongolia needed to find ways to stabilize its economy and eventually replace that missing 30 percent in order to ameliorate the extremely poor social conditions caused by the crisis.

During the first years of transition, the international donor community provided aid mainly in order to stop the decline in economic activity, to control increasing inflation, and to improve the balance of payments, particularly the purchase of critical imports such as petroleum products and spare parts needed for industrial production. Later, assistance in the form of loans and grants declined and was replaced by more medium- to long-term projects.

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2 The unusually hot summer of 2002 resulted in a decrease of the average cereal yield to 540 kg/ha., 30.8 percent lower than the 780 kg recorded in 2001 (NSO 2002b).

3 The overall warming amounts to about 0.6°C ( $\pm 0.2^\circ\text{C}$ ) over the twentieth century (UNEP 2002).

**Table 1.** Key indicators

Indicator	1985	1989	1990	1991	1992	1993	1994
GDP, billion togrog, at 1993 prices	172.7	214.0	208.6	189.3	171.4	166.2	170.0
GDP growth rate, percent	5.7	4.2	-2.5	-9.2	-9.5	-3.0	2.3
Average exchange rates	3.0	4.0	4.3	25.7	40.0	393.7	409.5
Per capita GDP, in US\$	1,714.0	1,328.7	1,172.6	345.6	543.1	190.1	306.2
Imports, in US\$ million	1,095.5	963.0	924.0	360.9	418.3	379.0	258.4
Exports, in US\$ million	689.1	721.5	660.7	348.0	388.4	382.6	356.1
Indicator	1995	1996	1997	1998	1999	2000	2001
GDP, (billion togrog), at 1995 prices	550.3	563.2	585.7	606.4	625.9	632.6	639.5
GDP growth rate, percent	6.3	2.4	4.0	3.5	3.2	1.1	1.1
Average exchange rates	447.0	547.2	791.0	837.4	1,072.7	1,097.0	1,102.0
Per capita GDP, in US\$	550.9	507.1	445.4	408.8	365.7	398.3	433.4
Imports, in US\$ million	415.3	450.9	468.3	503.3	512.8	614.5	554.8
Exports, in US\$ million	473.3	424.3	451.5	345.2	358.3	466.1	385.2

Sources: NSO 1997–2002.

Development assistance from the international community still plays an important role in solving difficulties as the country changes from a centrally planned to a market economy, as well as contributing to the conservation of the environment.<sup>4</sup> The environment is a major field of cooperation between Mongolia and Japan, the biggest bilateral donor to the country.<sup>5</sup>

Another force propelling Mongolian economic development is foreign direct investment (FDI), which is intended to be used to increase production and exports.<sup>6</sup>

Prior to 1990, Mongolian trade was characterized by state monopolies, a centrally planned pricing system, an artificially fixed exchange rate, and a limited market in the form of the USSR-dominated Council for Mutual Economic Assistance (CMEA) countries. Only a few state trade corporations had the right to handle foreign trade transactions, using the state order system. The first step away from this system was price liberalization, which commenced in January 1991, when many enterprises had to halt production due to such difficulties as power cuts and shortages of spare parts and fuel. Given these conditions it was necessary to reform trade, reducing imports drastically (see table 1). Along with the

4 Mongolian Action Program for the Twenty-first Century (MAP-21); Eastern Steppes Biodiversity Project; Preservation of the Altai Sayan Ecoregion; Conservation of the Great Gobi Ecosystem and its Endangered Species; Sustainable Management of Mongolian Grasslands; National Forest Code; National Forest Program; and other projects.

5 Added during Prime Minister Nambaryn Enkhbayar's visit to Japan, February 13–18, 2001 (MOFA 2001).

6 FDI in Mongolia is increasing. During 1990 and the first half of 2002, more than 2,300 businesses were established in Mongolia, with capital investment of over US\$740 million from 70 countries. Businesses in receipt of foreign investment produced nearly 70 percent of total exports (Enkhbayar 2002).



removal of the state monopoly, the export state order system and all quantity restrictions on exports and imports were abolished, thereby giving all entities, even individuals, the right to engage in foreign trade.

### 3. Cashmere

The agricultural sector has important implications for all of the nation's manufacturing sectors. Industrial-scale processing is mainly of wool, cashmere, leather, meat, and dairy products. Cashmere, hides, and meat products are the second-largest source of foreign currency revenue (18–27 percent of exports) after the export of copper concentrate (NSO 1997–2002).

The valuable properties and limited supply of cashmere give it a high international price, which has in turn encouraged increases in the number of goats and investment in cashmere production. Mongolia produces about 3,000 tons of cashmere annually, about 20 percent of the world market. In 2000, 1,500 tons of cashmere, valued at US\$77 million, was exported to Italy, the United Kingdom, China, and Japan. This accounted for 16.5 percent of the country's total exports. Cashmere exports to Japan were worth about US\$9 million in 2001, an increase of 2.3 times on the previous year (NSO 2002a). In 2001 there were five domestic and 77 joint-venture cashmere processing enterprises operating in Mongolia (Ministry of Industry and Trade 2002).

The number of goats more than doubled between 1989 and 1999, from 5 million, or 20 percent of the national herd, to 11 million, or 32.9 percent (NSO 1997–2002). The increased number of livestock, especially goats, led to pressure on pastureland.

As a whole, trade liberalization and livestock privatization have played significant roles in the socio-economic development of Mongolia and in providing an understanding of market mechanisms, but this has been achieved at the cost of environmental degradation.

### 4. Environment

The very dry climate, low soil fertility, and sparse vegetation cover of Mongolia, over 40 percent of the territory of which is in the Gobi Desert, make desertification a key issue of environmental concern. It has been estimated that over 78 percent of the total land area of Mongolia is at risk of desertification, with nearly 60 percent of this classified as highly vulnerable. Over the last four decades, the area of land covered by sand has increased 8.7 percent. Desertification has affected 30 percent of pastureland in Mongolia. Dr. Batjargal (1999) concludes that desertification is evident in Mongolia, with the most crucial factor being the vulnerability of the ecosystem to human activity, especially animal husbandry. About 13 percent of desertification in Mongolia is due to natural processes; the other 87 percent is caused by humans.

Over 70 percent of total pastureland has been degraded through overgrazing combined with drought. Other human factors contributing to the problem of desertification include poor pasture utilization, inadequate water supplies for livestock, deforestation in mountain and desert areas, and soil erosion due to poor agronomic practices (1.3 million ha. of arable land), and mining activities. In the last 20 years, about 10 percent of Mongolia's forest cover has been lost due to inappropriate logging and forest

management, unregulated cutting of wood for domestic fuel, forest fires, and insect damage.<sup>7</sup> Most forests are considered to be critical for watershed protection. The cutting of forests, combined with climatic factors and the increasing use of surface water for various economic activities, has caused significant reductions in the average flows of many rivers. An estimated 100,000 ha. of land has been degraded by coal and gold mining activities (Batjargal 1999).

According to the Government, the steppe and desert steppe—the main pasturelands—are more vulnerable to small changes in climate variables than are other regions (GOM 2001).

The increasing migration of herder families to regions closer to urban areas, where they continue to make a living from animal husbandry, has also accelerated the degradation of pastures, especially in the central regions. Grazing pressure is greatest near settlements and water sources, and leads to pastureland being pushed to its limits. Overgrazing can mean that pasture is destroyed for one to two years; or even longer, if an excessive amount of livestock is kept in one place. Overgrazing initially converts pastureland to land of lower productivity then, if the process continues, it destroys vegetation, leading to erosion of the soil and an increase in the area covered by desert (Brown et al. 2002).

Thus, even though some measures are planned in neighboring countries,<sup>8</sup> policy decisions or countermeasures relating to the protection of pastureland should be taken in Mongolia in order to halt desertification before it has disastrous consequences for Mongolia and the whole of Asia.

## 5. Sustainable livestock development

Nomadic pastoralism has been practiced for thousands of years, particularly in Mongolia, with different ecosystems being grazed in a sustainable manner thanks to traditional livestock herding practices and to the good habits of herders and their love of nature. For example, it is a rule that herders have to clean up the sites they have used for settlements before moving to other pastures, and even filling in every small hole they have made. In the past, Mongolians believed that Mother Nature was the perfect product of Eternal Heaven and worshipped her. They consumed little and lived simple and self-sufficient lives in their vast and scarcely populated land, in harmony with nature. According to the *Great Yasa* of Chingis Khan, people were not allowed to dig or till the earth, or cut trees at the headwaters of any river, for fear of erosion.<sup>9</sup> Violations were punished by heavy fines, with the pollution of a water

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7 Mongolia's total standing forest area in 1994 was estimated at 17.5 million ha., covering some 8.1 percent of the country. Around two-thirds of the total forest area can be found in north-central Mongolia. The Gobi region, covering southern and southwestern Mongolia, contains arid forest and shrubland, 90 percent of which is under the saxaul species (*Haloxylon ammodendron*). Mongolia's forest composition is as follows: 60.7 percent larch, 16 percent saxaul, 7.8 percent cedar, 4 percent scotch pine, 7.3 percent birch, and 4.2 percent other tree species (fir, aspen, and others) and shrubs (Ahlback 1999).

8 North China's Inner Mongolia Autonomous Region plans in the coming five years to build a 2,400 km forest belt, involving the protection of more than 600,000 ha. of natural forest and improving the ecological conditions in more than 2.5 million ha. of desert land by planting a forest to shelter Beijing. A project aimed at protecting existing forests and turning slopes and desert land into forest areas will be launched in the western part of Inner Mongolia, in order to harness the 1.6 million ha. of land suffering from soil erosion and salinization. Inner Mongolia will also improve 1.8 million ha. of pasture during the next five years (Xinhua News Agency, "Inner Mongolia to Build 2,400-kilometer Forest Belt," *People's Daily*, December 23, 2000).

9 Chingis Khan's collected laws, rules, and words of wisdom. The word *yasa* means order, decree.

source punishable even by death.<sup>10</sup> Chingis Khan's intention was always to combine the traditional lifestyle with civilization, as he recognized humanity's need for learning and science (Oestmoen 2003).<sup>11</sup>

The different species grazed in Mongolia are complementary in that each has a different food preference and style of eating, allowing a mixed herd to gain the maximum benefit from any area of pastureland. Horses eat the tops of grasses, cattle graze shorter, and sheep and goats the shortest. Camels are able to graze in the Gobi, on desert tussock, which other animals are unable to eat. The species also differ in terms of speed, endurance, and capacity to go without food or water (Adshead 1993).

During the second half of the last century (before the 1990s), herds in Mongolia totaled roughly 25 million head in Mongolia, kept in a more or less sustainable manner. The approximate shares of all animals accounted for by each species were as follows: camels 2–3, percent; horses, 8–10 percent; cattle, 8–10 percent; sheep, 55–60 percent; and goats, 17–20 percent (NSO 1997–2002). With the transition to a market economy, livestock privatization, and a lack of alternative opportunities, many people turned to livestock production. The total number of herding households reached 191,500 in 2000 (35 percent of the total population), rising from 74,700 households in 1990 (17 percent of the total population) (NSO 2002a). The number of livestock—the main source of food and income for herders—increased and achieved its highest level in 1999. The composition of the national herd changed according to market demand, the price of raw materials of animal origin, and production costs (see table 2).

Mobility and knowledge are essential in pastoral livestock herding in order for it to be sustainable. However, there were differences between the new and existing herders in terms of their skill and experience in herding, levels of wealth, and orientation toward their livelihood, all of which influence herders' mobility and choice of where to graze their animals. In general, the newcomers were less skilled in livestock production, and tended to move less frequently, remaining closer to settlements, roads, and other points of market access, something that led to problems, both in the fragile ecosystems and in the animals themselves. Furthermore, wealthier herders also tended to move less frequently and began maintaining year-round bases at the best winter-spring campsites to guard the pastures they claimed from out-of-season "intruders."

With the changing of the socio-economic system, the country is losing its traditional pastoral livestock-herding customs. An increase in total livestock numbers is leading to the overgrazing of pastureland, especially by goats, which eat the shortest grass, destroying grassland and soil. Dr. Tumurjav (2003) notes that, "goats, because of their adaptability and dexterity, can cause disproportionate environmental damage. They can reach inaccessible areas and fragile plant communities on steep, rocky slopes. As population pressures increase, herders must learn how to limit the ecological degradation caused by their goat herds." On the basis of his long-term research, Dr. Tserendash (1996) has found that due to climate changes, the average volume of the annual pasture grass harvest fluctuates greatly—rising by as much as 195.4 percent in years with favorable climate

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10 "Whoever urinates into water or ashes is also to be put to death."—a fragment of the *Great Yasa* of Chingis Khan, conveyed through Makrizi. (Oestmoen 2003).

11 As a result of the Mongol campaigns and the unifying effects of the Empire, scientific discoveries and many forms of knowledge were made available to mankind as a whole. The well-known Mongolist Sir Henry Howorth once said, "I have no doubt myself, that the art of printing, the mariner's compass, firearms, and a great many details of social life, were not discovered in Europe, but imported by means of Mongol influence from the furthest East." (Oestmoen 2001).

**Table 2.** Herd composition by species

Year	Total (thousand head)	Herd composition by species, percent				
		Camels	Horses	Cattle	Sheep	Goats
1970	22,574.9	2.8	10.3	9.3	59.0	18.6
1980	23,771.4	2.5	8.4	10.1	59.9	19.2
1990	25,856.9	2.1	8.7	11.0	58.3	19.8
1999	33,568.9	1.1	9.4	11.4	45.2	32.9
2000	30,227.4	1.1	8.8	10.2	45.9	34.0
2001	26,075.2	1.1	8.4	7.9	45.8	36.8

Source: NSO 1997–2002.

conditions and dropping to as little as 51.6 percent in unfavorable years—and has elaborated a new method to determine pasture capacity based on grass harvesting in common, favorable, and drought years. He has also discovered that one of the core issues for multi-year preservation and exploitation of pasture is to leave no less than 50 percent of the biomass of the pasture and the majority pasture plants in the soil.

Dr. Tumurjav defines Mongolian nomadic livestock farming as a complex and closed system involving humans (herdsmen), nature (pasture and water supply), and livestock, and describes in detail the many skills and technologies developed by Mongolian nomadic herders to utilize fully their livestock for transport, work, food, and companionship (Tumarjav 2003). He also outlines methods of keeping and feeding the principal types of Mongolian livestock, as well as providing a description of ecology of pasture and their behavior, as a reference work instructing herders in sustainable livestock management.

A new embryo transplantation method for breeding Mongolian goats to produce the highest quality cashmere, developed by a group of Mongolian scientists, was nominated for the State Award of 2003. This work opens new possibilities for improving livestock productivity of pastures through introduction of advanced technologies.

As writes Dr. Adyasuren (2000), "The methodology of seasonal use and segmentation of pasture is the choice of the Mongols, arising from their traditions and experience shaped over centuries." Moreover, due to urbanization and changes in Mongolian lifestyles, the Government of Mongolia is searching for possible ways of shifting some pastoral livestock herders from a nomadic to a settled model of intensive farming for improved agricultural productivity, especially in dairy production for the urban population. The Action Program of the Government of Mongolia (GOM 2000) includes the objective of accelerating implementation of the national White Revolution program (GOM 1999a).

Electricity supply to herders is a key issue in policies seeking to modernize herders' lifestyles. In this regard, the role of small-scale energy systems based on renewable energy sources has been considered (Nachin 2002, 2003), especially the role of solar photovoltaic power in sustainable livestock development and the socio-economic benefits it could bring—including eradication of disparities in standards of living; access to water, information, and modern communications technologies; and medical and educational services—not only for herders, but also for the entire country. This may gain public approval and be accepted by policy-makers as well. At present, 40 percent or so of the Mongolian population has no access to electricity.

The Government's resolution on energy supply to rural residents from renewable energy sources, the One Hundred Thousand Solar *Ger* national program (GOM 1999b),<sup>12</sup> aims to promote the development of decentralized energy systems, as well as encouraging sustainable water resource management and the application of information technology to various aspects of society, including health, education, and governance. This measure should be a very positive one for herders, particularly wealthier ones and those who live in relatively accessible areas. Herders without much money or who live in mountainous areas that are hard to reach will be able to benefit from these technological advances as easily.

Access to electricity is a precondition for the application of modern information and communications technology, as well as use of the internet. Once it is achieved, Mongolian herders will be able to engage in small-scale processing at their own sites, making direct contact with customers and organizations via satellite communication systems. For better pasture management and the prevention of livestock losses arising from extreme climatic phenomena, it is necessary to develop satellite imaging database systems for pasture and water resources and expand the information network in isolated areas. In this regard, the study of the environment and natural resources in northeast Asia using advanced technologies, which is being carried out by the Center for Northeast Asian Studies at Japan's Tohoku University, is very important. This survey focuses on several areas, including water resources, permafrost, oil and energy resources, mineral resources, and biology. Remote sensing, ground-penetrating radar, electromagnetic survey techniques, and polarimetric borehole radar will be used for these measurements, with field tests planned in Russia, China, Mongolia, and Korea (Tohoku University 2002). It is anticipated that the results of this research will help in conservation and restoration of natural resources, and ensure the balanced management of various human activities in the light of future climate change.

The combination of the best traditional livestock herding practices with advanced technology should not adversely affect economic development nor the current lifestyles of herders, allowing them to maintain their indigenous culture, stay happy, and be self-sufficient.

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<sup>12</sup> A 200 kW solar photovoltaic station was installed in a province in the Gobi Desert with the cooperation of Japan's New Energy and Industrial Technology Development Organization (NEDO) and the opening ceremony held in September 2003. (Montsame (Mongolian state news agency), "Solar Power Station Will Be Established in Gobi Desert," July 22, 2002).

## 6. Conclusions and recommendations

Pastureland in Mongolia is not very productive and is highly vulnerable to minor weather changes as well as human activities, particularly animal husbandry. Its inappropriate management can increase the risk of desertification, which is already being seen.

In order to decrease the risk of desertification, it is necessary to:

- develop and improve animal husbandry management strategies, based on the best traditional livestock herding practices, including maintaining appropriate herd compositions;
- improve water supply in pastureland;
- restore saxaul and other types of forest;
- plant woody vegetation in degraded areas and areas sensitive to soil moisture, and
- use modern scientific methods.

A mechanism should be established for promoting a close relationship between members of parliament and their constituents in order to educate people about the environmental situation and eco-economy, as well as improving legislative mechanisms for pasture use, health care systems for both people and animals, the livestock insurance system, and protection of the environment.

In order to maintain herders' income levels, the Government of Mongolia must take such measures as establishing a marketing system for eco-products of livestock origin, eco-labeling, and eco-taxation, with the support of Organization for Economic Cooperation and Development member countries, in order to reinforce environmental protection and social development (Waller-Hunter and Jones 2002).

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**Book Review**

# **Making Microchips**

Author: Jan Mazurek

Publisher Information: Cambridge: MIT Press. 2003 245 pp. Paperback.

ISBN: 1-84376-419-9

Reviewer: John Lane<sup>a</sup>

In *Making Microchips* Jan Mazurek provides not only a broad overview of the environmental challenges facing the semiconductor industry and its regulators, but also gives insights on new-style regulatory initiatives. Mazurek's goal is not to propose a grand solution to the difficult problems the chip industry faces, but to provide the background information, the historical context and the perspective necessary for the construction of any future framework.

The book is set against the backdrop of two recent US government programs (the so-called Common Sense Initiative (CSI) and Project XL) aimed at moving beyond adversarial enforcement of environmental regulations to a more co-operative framework in which firms are trusted to search for innovative manufacturing methods, which should meet regulations, but which could also better them. This is in exchange for greater leeway and increased bureaucratic flexibility from government regulators.

In the introduction, Mazurek provides a roadmap to the book's main points and discusses the importance—both ecological and economic—of solutions to the problems being presented.

Chapter One provides background information on the history of the semiconductor industry and describes how economic models used extensively and successfully in more traditional industries have been less than successful in the high-tech industry—strongly suggesting a need for newer models and further research on them.

Chapter Two provides a great deal of technical information on the computer chip fabrication process, sheds light on the industry's many environmental failings, discusses the difficulties associated with tracking industry emissions and points out the pace of technological development in the methods used in chip production. One important result is that, because of the constant change in industry chemical use, interested parties lack sufficient information to properly assess the long-term effects of current practices.

Chapters Three and Four discuss some difficulties unique to the semiconductor industry that prevent application of standard economic models, hinder effective recording and tracking of emissions and even further frustrate assessment of the threat potential of given practices. For example, the extremely high cost of building chip fabrication plants and their quick obsolescence has forced some chip manufacturers into design-only (non-manufacturing) roles and others into co-operative ventures with erstwhile

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overseas competitors—an unusual trend in more traditional business models. Furthermore, chip fabrication facilities can, and routinely are, placed all over the world—greatly frustrating enforcement of environmental reporting.

Chapters Five and Six bring the discussion back full circle to the aforementioned US government initiatives and attempt to put the successes and failings of the initiatives into their proper historical and contextual perspective—given the facts and concepts introduced in the earlier chapters. Chapter Six includes a lengthy discourse on Project XL—its shortcomings, successes and possibilities for future improvement.

The final chapter concludes with a summary and further suggestions for improvements on the current generation of regulatory frameworks.

Mazurek's book is of relevance not only for those interested in environmental regulation of the semiconductor industry, but also for those interested in the future of environmental regulation in general. While initiatives such as Project XL and CSI have problems, they also hold great promise for cooperative efforts aimed at not simply managing harmful emissions but eliminating them before manufacturing even begins. This book provides solid insights into the challenges and issues faced in their implementation.

**Book Review**

# **Global Warming and the Asian Pacific**

Editors: Ching-Cheng Chang, Robert Mendelsohn, and Daigee Shaw

Publisher Information: Edward Elgar, Cheltenham. 2003. 305 pp. Hardcover.

ISBN: 1-84376-419-9

Reviewer: Axel Michaelowa<sup>a</sup>

Up to now, analyses of climate policy have mainly focused on Europe and the United States. So in principle it is welcome that Chang et al. address a region that will be increasingly important for climate change issues—East Asia. Unfortunately, the book has several shortcomings that limit its usefulness. It is a collection of papers from a conference that took place in December 2000. Anyone active in climate policy knows that this three-year lag severely reduces the relevance of any policy suggestions made. The editors' claim that the information is the "most up to date" is thus rather dubious, especially as some papers date back to 1999.

The modeling background of the editors leads to an overemphasis on modeling studies, while policy issues are neglected. The entire first part of the book tries to make emission forecasts for several countries in the region: Vietnam, Taiwan, and Japan, using Computable General Equilibrium (CGE) and input-output models. This would have benefited from an introductory chapter comparing the different methods. In chapter 2, "Forecasting carbon dioxide emissions in Vietnam" (pp. 13–34), Vu Xuan Quang's model is essentially an extrapolation of past trends and unsurprisingly forecasts a quadrupling of CO<sub>2</sub> emissions between 1990 and 2010. It would have been interesting to compare this forecast to the actual development between 1990 and 2000. In chapter 3, "Baseline forecasting for greenhouse gas reductions in Taiwan: a dynamic CGE analysis" (pp. 35–59), Ping-Cheng Li, Shih-Hsun Hsu, Chung-Huang Huang, and Hsing-Hua Li use an elaborate CGE model to forecast Taiwan's emissions based on the high assumption of a 2 percent annual productivity growth rate. On the other hand, the rate of autonomous energy efficiency improvement is set very low at 0.5 percent per annum. Thus it is no wonder that they forecast that emissions will double between 2000 and 2020. Comparison with the bottom-up Market Allocation (MARKAL) model for Taiwan gives a 5 percent difference, but the emission share of industry is estimated 50 percent lower in the MARKAL case. In chapter 4, "Forecasting baseline CO<sub>2</sub> emissions in Japan" (pp. 60–74), Masahiro Kuroda and Kojida Nomura present a CGE model for Japan. This model suffers from specification of parameters from the growth period 1962–1992, which makes it less relevant for stagnation periods like the 1990s. Assumptions are clearly stated but unrealistic, such as expansion of nuclear power by 50 percent between 2000 and 2010 as well as a 25 percent increase in hydropower. Economic growth is estimated optimistically at more

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than 2.5 percent between 2000 and 2010, while emissions increase by 15 percent. The modeling section is concluded by an analysis of the emissions impacts of trade based on an input-output model. The data used are from 1990 and thus not up to date. Emissions attributed to exports are minuscule, less than 0.5 million t CO<sub>2</sub> for Japan.

The second part of the book consists of—equally stylized—analyses of the effects of energy/carbon taxes in China, Taiwan, and Japan, with an outlier on abatement costs of energy crops in the United States. In chapter 6, “Effect of energy tax on CO<sub>2</sub> emissions and economic development in Taiwan 1999–2020” (pp. 105–130), Chi-Yuan Liang and Dale Jorgensen use a dynamic Taiwanese CGE model to apply a carbon tax of US\$ 22/t CO<sub>2</sub>. They calculate a GDP loss of 1 percent for immediate introduction of the tax and 0.8 percent if the tax is introduced gradually until 2020. In chapter 7, “Impact of carbon tax and reduced CO<sub>2</sub> emissions on the Chinese economy” (pp. 131–152), Yuxin Zheng and Gang Ma perform a static CGE analysis for China, but their base data are for 1992 only. The GDP loss for a non-revenue-recycling case and a tax level of US\$8/t CO<sub>2</sub> is 1 percent; for full recycling, 0.3 percent. The analysis includes sectoral and regional differentiation. In chapter 8, “Cost of reducing CO<sub>2</sub> emissions in Japan” (pp. 153–168), Kuroda and Nomura use the same model as in Part One. They now suddenly use a more realistic scenario concerning nuclear power but limit the effects of the tax to two years only, making the whole exercise extremely unrealistic.

In chapter 9, “Greenhouse gas mitigation through energy crops in the US with implications for Asian Pacific countries” (pp. 168–186), Uwe Schneider and Bruce McCarl model abatement and sinks options in the US agricultural sector depending on greenhouse gas prices. While the relevance for East Asia is unclear, apart from some sensitivity analysis of energy crop yields, the results are interesting; due to its low costs sequestration in soils is one of the most attractive options for low prices, but is superseded by biofuels if prices increase above US\$20/t CO<sub>2</sub>. Afforestation also becomes relatively attractive at this price level. While also quite interesting, the argument on impacts of climate change merely scratches the surface. In chapter 10, “Climate change and crop yield distribution in Taiwan” (pp. 187–204), Ching-Cheng Chang and Chi-Chung Chen try to analyze impacts of expected warming on crop yields in Taiwan on the basis of yield variations in the past two decades. The only robust result is that increasing variability in temperature and rainfall will lead to increased variability in yields. In a digression in chapter 11, “Will global warming cause heat stress?” (pp. 205–216), Mendelsohn and Shaw analyze the effect of increasing temperatures on mortality. Using US data, they argue that people adapt to higher temperatures and that only unpredicted extreme deviations from the normal temperature lead to mortality increases. Given conditions in the United States, adaptation is fairly easily done by installing air conditioning. However, this is not possible for low-income people in developing countries. Moreover, the emissions impact of increased use of air conditioning should not be underestimated, as is currently illustrated by developments in China. In chapter 12 “The impact of climate change on Asian Pacific countries” (pp. 217–230), Mendelsohn uses an outdated climate model with a coarse resolution to calculate impacts of climate change on East Asia. His response functions have been calibrated for the United States and are extrapolated by using very simple transfer functions. In particular, the assumption that level of development does not influence vulnerability to climate change is unrealistic, as most studies on adaptation show that low development increases vulnerability. There is a very large

difference between the results of cross-sectional and experimental models, sometimes changing the sign of impacts from minus to plus. In addition, the effect of water stress seems to be underestimated.

The policy part of the book, looking at the countries in the region, could really have broken new ground but instead is a collection of very general ideas about alternatives to the Kyoto Protocol, the Kyoto mechanisms, and domestic emissions trading, with a strong US bias. In chapter 13, “Reducing cost uncertainty and encouraging ratification of the Kyoto Protocol” (pp. 231–246), Raymond Kopp, Richard Morgenstern, William Pizer, and Frédéric Ghersi present their well-known idea of a price cap (for a criticism, see Müller et al. 2001) and have clearly not taken the Marrakech Accords into account in their paper. Their simulation of a price cap of US\$7 to US\$28/t CO<sub>2</sub> shows that the low cap leads to a substantial emissions increase of 1 billion t CO<sub>2</sub>. In chapter 14, “A better alternative to the Kyoto Protocol” (pp. 247–257), Warwick McKibbin sets out his equally well-known Kyoto alternative, which is definitely the most inefficient suggestion currently in the debate, given that it is as rigid as an autarkic carbon tax in the short term and makes governments pay to emitters for any future strengthening of emissions targets (Michaelowa 2003). In chapter 15, “Joint Implementation, the Clean Development Mechanism and the baseline: an economic analysis” (pp. 258–277), Ekko Van Ierland, Rianne de Leeuw, and Joram Krozer discuss baseline issues of the Clean Development Mechanism (CDM) that have become obsolete since the policy decisions taken by the CDM Executive Board during 2003. Nevertheless, this chapter is instructive in showing the differences between baseline approaches. In chapter 16, “Economic issues related to design of a domestic permit trading system” (pp. 278–294), Carolyn Fischer concludes the book with a superficial description of a domestic emissions trading system; this paper would have benefited immensely from looking at the European Union’s experiences in actually introducing such a system.

Overall, this book is interesting for those who enjoy looking at the details of modeling approaches. For those interested in a contribution to the policy debate concerning climate mitigation and adaptation in East Asia, it is a disappointment.

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