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ESD/MG/KIN2/4
6 October 2003

ENGLISH ONLY

UNITED NATIONS
ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC
(in cooperation with the Institute for Global Environment Strategies, Japan)

Second Meeting of the Kitakyushu Initiative Network
15-17 October 2003
Weihai, China

APPLICATION OF QUANTITATIVE INDICATORS FOR URBAN ENVIRONMENTAL IMPROVEMENT IN THE IMPLEMENTATION OF THE KITAKYUSHU INITIATIVE FOR A CLEAN ENVIRONMENT

(Item 4(d) of the provisional agenda)

Note by the secretariat

CONTENTS

I. Introduction

1. The Kitakyushu Initiative is being implemented to improve the current environment of cities in the Asian and Pacific region. As a means to achieve this end, the Initiative recommends setting of quantitative targets in several areas along with policy decisions aimed at achieving the set targets. In the various stages of policy decision and implementation for the improvement of the urban environment, the introduction of quantitative indicators is recommended because of two major benefits they offer. Firstly, they make it easier to measure the effectiveness and degree of success of policies, and encourage undertaking regular surveys and adjustments. Secondly, they promote the sharing of ideas, create awareness and promote participation of stakeholders during the various stages of decision-making and implementation. Furthermore, monitoring the implementation status of urban environmental improvement policies using quantitative indicators play a significant role in the assessment of the results and transfer of successful practices as recommended by the Kitakyushu Initiative.

2. This paper reviews the major findings and feedback from the implementation of the Kitakyushu Initiative puts forward recommendations on future action for further promoting the application of quantitative indicators in urban environmental management.

II. Existing and Proposed Systems of Indicators

3. The Institute for Global Environmental Strategies in 2001 conducted research on quantitative indicators for assessing urban environmental improvement in promoting the "Kitakyushu Initiative for a Clean Environment"[1]. This research, included (1) review of past research on indices and indicator systems and their potential for application to the Kitakyushu Initiative, (2) enumerated features that the indicator system of the Kitakyushu Initiative should possess, and (3) suggested an indicator design framework. The major findings were as follows:

- Many existing indicators assess the environment and environmental policy performance of entire cities and countries. UN/HABITAT's Urban Development Indicators is the only system that addresses the effectiveness of policy packages, and is therefore the closest in purpose to the Kitakyushu Initiative. From this viewpoint, among existing indicators, the UN/HABITAT Urban Development Indicators are most useful as examples in creating indicators for the Kitakyushu Initiative.

- The key feature that Kitakyushu Initiative indicators should possess is the ability to support decision-making in choosing the best method for the design and implementation of policies in line with successful examples of policies in other regions. The indicators should also be useful in judging the applicability of successful practices in a specific region, in other sites and different situations. The Kitakyushu Initiative indicators would assess the status of the urban environment, the progress of urban environmental policy and the effect of that policy.

[1] "Kitakyushu Initiative for a Clean Environment - Business Report FY2001", Institute for Global Environmental Strategies, 2002

4. Existing indicators are not readily useable without adjustment and an indicator design is needed which matches the purpose of the Kitakyushu Initiative and suits the project or site properties where the indicators are to be applied. In choosing such indicators, while it is possible to design different scale assessment axes according to category or across categories depending on the situation, an "indicator design framework" can be proposed as a common basis, is to design (or select) realistic indicators in each individual category, and in future to conduct assessments of policy performance using these indicators.

III. Assessments and Feedback from Pilot Activities, Thematic Seminars and Other Research Activities

A. Indicators Development through Pilot Activities

5. At present, a number of pilot projects have been both completed and are underway in participating cities of the Kitakyushu Initiative Network; these are core activities of the Kitakyushu Initiative. These pilot projects include both project implementation and feasibility surveys (F/S). All pilot activities are implemented with the purpose of verifying achievement of various targets and results obtained in urban environmental management.

6. The pilot projects are defined in detail by the municipal environmental section or NGO, which are the implementation bodies, together with direction from UNESCAP, IGES or other supporting organizations. Monitoring of the progress of measures using quantitative indicators has become an essential element of this exercise. The indicators used in these individual pilot projects are essentially those chosen by the implementing bodies in accordance with the context of each project. The following table cites the main examples.

Table 1 Application of Quantitative Indicators in Kitakyushu Initiative Projects

Implementing City	Project Summary	Indicators
Ningbo (China)	Overall urban environment Water quality (case study)	Urban Environment Quality Examination System, River water quality (COD)
Chongqing (China)	Air pollution improvement (case study)	Sulfur dioxide density
Weihai (China)	Treatment of industrial wastewater through public private partnership (introduction of PPP)	Emission load (BOD, COD)
Nonthaburi (Thailand)	Waste reduction	Waste generated, Recycling ratio
Korat (Thailand)	Urban river quality improvement	River quality (planned)
Cebu (Philippines)	Comprehensive urban environmental policies	River quality (planned), Waste generation (planned)

Table 1 Application of Quantitative Indicators in Kitakyushu Initiative Projects (cont'd)

Implementing City	Project Summary	Indicators
Puerto Princesa (Philippines)	Urban transportation improvement	Air pollution load, Greenhouse gas emissions, Health / economic impacts
Surabaya (Indonesia)	"Blue Sky" programme	Air pollution levels (PM10, SO_2, O_3, NO_2, CO), Air quality indicators (ISPU/PSI) (planned)
Dhaka (Bangladesh)	Waste management	Waste generation, public participation / awareness raising (planned)
Ho Chi Minh (Vietnam)	Industrial relocation	Environmental load (air, water, solid waste), land price
Ulaanbaatar (Mongolia)	Improvement to household fuel sources	Air pollution indicators (indoors/outdoors)

In this connection detailed description of some pilot activities are presented below:

1. Ningbo, China

7. In the city of Ningbo, the two national-level environmental policies devised for the improvement of urban environmental problems, namely, the Urban Environment Quality Examination System (UEQES) and the Creation of Environmental Model Cities (CEMC), were vigorously implemented and optimal results were obtained. In fact, the overall national policy had a fundamental impact on Ningbo's environmental policy, where the initiative of the local government was of vital importance. Under the strong leadership of the Mayor and the municipal government, Ningbo introduced its own implementation system and legislation/regulations to deliver a heavy and concentrated input of measures, which included large-scale environmental investment and the development of systematic indicators (UEQES & CEMC) into shared targets, thereby procuring an all-out effort by all stakeholders and producing an efficient functioning of inter-sector partnership and participation by businesses and residents. Ningbo climbed from 35th place in the Urban Environment Quality Examination System (1994) to 5th place (1998), and in 2001, became a government-designated Environmental Model City. In this process, simultaneous achievement of economic development and environmental protection was promoted and various indicators listed below testify to this success.[2]

[2] "Ningbo: A City That Achieved Rapid Total Improvement in Urban Environment," Miao Chang, IGES (2001)

Table 2 Changes in Economic and Environmental Indicators in the City of Ningbo (1998-2000)

Economic Indicators	▪ GDP growth rate: 13.5% annual average (1996-2000) ▪ GDP growth rate per capita: 10.8% annual average ▪ Industrial change: switch from textiles, food, machinery industries to petrochemical, electricity, and lumber industries; switch from primary to tertiary industry
Environmental Indicators	▪ Reduction in energy consumption per 10,000 yuan GDP: from 1.94 tons of coal/10,000 yuan to 1.7 tons of coal/10,000 yuan ▪ Reduction in water use per 10,000 yuan GDP: 66.8 tons/10,000 yuan ▪ Reduction in air pollution emission levels (1996-2000) ▪ TSP: From 0.214 to 0.154 (standard = 0.2mg/m^3) ▪ SO_2: From 0.02 to 0.015 (standard = 0.06mb/m^3) ▪ NOx: From 0.042 to 0.035 (standard = 0.08) ▪ Achievement rate for drinking water standards: From 94.4% to 100% ▪ Achievement rate for surface water quality standards: From 96.09% to 100% ▪ Average noise level in city: From 55.0dB to 53.4dB (standard = 60dB) ▪ Average noise level on arterial roads: From 68.5dB to 68.1dB (standard = 70dB) ▪ Percentage of natural protected areas: From 5.9% to 6.99% ▪ Greenery ratio in city: From 30.09% to 33.52% ▪ Green area per capita: From 4m^2 to 7m^2 ▪ Domestic wastewater treatment rate: From 1% (1996) to 53.56% (2001) ▪ Gasification rate: 100% ▪ Domestic waste treatment rate: From 0 (1994) to 100% (2001) ▪ Comprehensive use of industrial solid waste: From 67.23% to 72.86% (standard>70%) ▪ Rate of achievement for industrial wastewater: Of the 1556 polluting factories, 1355 sites achieved required standard. Plants at 201 sites either ceased operation or scrapped facilities, bringing the rate of achievement for industrial wastewater to 100%.

2. Nonthaburi, Thailand

8. Nonthaburi addressed waste-related problems with a broad-based awareness of issues. As public cooperation was essential in raising recycling rates, the city directed its efforts towards publicity and education, including the organisation of seminars for each area within Nonthaburi. Measures proceeded smoothly with the introduction of experiences from other cities, including the designated use of transparent plastic refuse bags widely used in Japan for recycling purposes. Nonthaburi did its best to identify the quantity of waste collected and the recycling rate as indicators of the progress of their project. Targets for improvement were 30% reduction of waste and 20% improvement of recycling rates, respectively, which were achieved.

3. Puerto Princesa, Philippines

9. Puerto Princesa is the capital city of the state of Palawan in the Philippines. It is a small city with a population of 160,000 but is a typical example of a regional city in Southeast Asia. The three-wheeled taxi is the main vehicle of urban transport. The traffic sector contributes the largest proportion of greenhouse gas emissions (59%) on a sectoral basis. In order to deal with this situation, municipal authorities began to restrict the number of three-wheeled taxis in the city centre from 1998 (1 day a week per vehicle). The impact of this was surveyed by IGES in a study jointly conducted with the ICLEI Cities for Climate Protection (CCP) Programme. Quantitative measurements were taken in (1) fuel consumption and cost reduction, (2) pollution emissions, and (3) government cost. In all these areas, it was assessed that positive effects were achieved. In this case, not only did the effects accrued benefits for residents, taxi operators, the local government and other local actors overall but it was also in line with global environmental protection efforts. Following up on this success, a pilot project is now being proposed on the assumption that there will be much more significant results if additional measures were introduced such as the restriction to inner-city taxi operation, reduction in the number of three-wheeled taxis, restriction in the area of operation, ban on two-stroke vehicles and vehicle use restriction based on emission tests. In view of the potential reduction in greenhouse gas emission, it has been suggested that this is a promising area as a future CDM project.

Figure 1 Emission Reduction

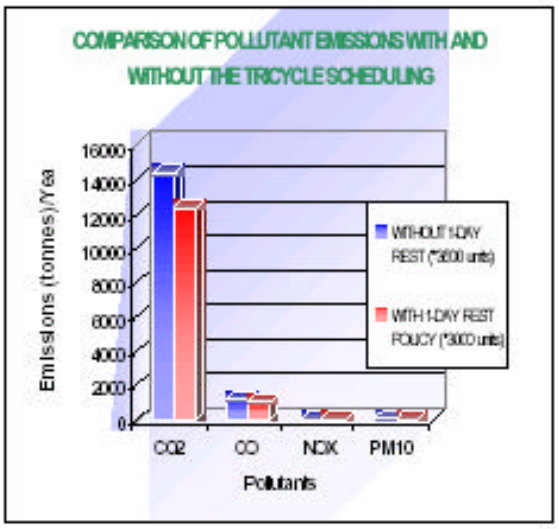


Table 3 Fuel consumption/Cost reduction (per vehicle)

Direct Cause	Effect
Restrictions on vehicle use	Fuel cost: USD2.5/week
Increase in speed limits	Fuel cost: USD12.6 reduction
Reduction of idling	Cost: 20% reduction
Maintenance improvement	Fuel consumption: 10-15% improvement

4. Achievements from Pilot Activities

10. In analysing the pilot activities and case studies listed above, the following conclusions could be deduced about the application of quantitative indicators in Kitakyushu Initiative projects.

i) In the pilot projects currently being conducted, the choice of indicators is made according to the background and purpose of each project. The indicators thus selected fulfil the initial purposes of indicator use, namely the clarification of the direction and targets of policies, the promotion of participation of various actors in order to achieve the shared targets, and the formation of a common conceptual basis among participants concerning the assessment of target achievement status.

ii) With respect to the indicator use purposes listed in (i) above, especially important as basic properties of the selected indicators are: (a) indicators must be readily visible and easily understandable and (b) indicators should be objectively measurable.

iii) In pilot projects implemented by the designation of a small community as model zone, it was found that the most effective were those projects where the cause and effect of input and output were obvious to the residents of the model zone, or in other words, where it was clear to see how the actions of residents directly contributed to target achievements. From this viewpoint, even when a project of a fairly large scale (e.g. an entire city) is conducted, it is beneficial to set progress indicators for small group units (such as communities) rather than designating indicators for the entire project zone, and allowing groups to compete against each other. In this way, there will be more contribution to the overall purpose of the Kitakyushu Initiative, namely those of "local initiative" and "promotion of participatory measures".

iv) The indicators in pilot projects are selected by the project proponents and are fundamentally viewed as indicators for self-assessment. Therefore, in many cases, almost no attention is paid to the convenience of external assessment, that is, the comparative assessment from a unified perspective of projects belonging to different project proponents. Meanwhile, where there is an assessment framework already set up on a national level (e.g. Ningbo), or where external donors such as ICLEI supply funds for a specific purpose, the ground is already prepared for the acceptance of external assessment indicators. The Kitakyushu Initiative by nature is based on a loose union that links local voluntary efforts and does not have legally binding powers and has but a small fund-providing capacity. This means that it would be difficult to make mandatory the use of its own indicators for external assessment purposes.

v) Many of the pilot projects are geared towards addressing local environmental issues, and the indicators used are those relating to the local environment. However, in the project to improve urban traffic in Puerto Princesa (Philippines), which professed to alleviate global environmental problems through greenhouse gas emission reduction, a universal indicator in the form of carbon dioxide emission reduction is being applied. When the understanding of the project proponent or participants can be obtained on the correlation between local measures and global problems, the use of universally applicable indicators can be made, paving the way for measurement of standardised results in projects involving different implementation entities.

11. Under the framework of the Kitakyushu Initiative, many pilot projects are currently underway or being planned. Under the support of UNESCAP, the Ministry of the Environment of Japan and IGES, efforts are continuing towards initiating and organising new pilot projects in

participating cities. In the future, through the conduct of these pilot projects, further practical experiences relating to the use of indicators in urban environmental policies is expected.

B. Indicators Identified through Thematic Seminars

12. Since September 2002, seminars on specific themes have been held as a supplementary vehicle for implementation activities of the Kitakyushu Initiative. Three seminars have taken place thus far under the themes of: (1) Solid Waste Management (Kitakyushu, 19-20 September 2002); (2) Public-Private Partnerships in Urban Water Supply and Wastewater Treatment (Beijing, 4 November 2002); and (3) Urban Air Quality Management (Bangkok, 20-21 February 2003).

13. The following points were raised in these seminars relating to the application of quantitative indicators in urban environmental management.

1. Solid Waste Management

14. Twelve participating local governments in this thematic seminar delivered presentations on: (a) the status of household waste being generated, (b) management practices, and (c) measures directed towards improving the status quo, Table 4 provides an overview of the major quantitative and qualitative indicators from these presentations.

Table 4 Summary of Waste Disposal in Participating Cities

	Group A	Group B	Group C
City	Dhaka, Kathmandu, Ulaanbaatar, Bhopal, Yangon	Cebu, Nonthaburi, Chongqing, Surabaya	Fukuoka, Kitakyushu, Macao
GDP (USD)	1000 to 3000	3000 to 10000	Over 10000
Waste generation (kg/person·day)	0.3 to 0.6	0.7 to 1.1	1.4 to 1.5
Collection rate (%)	Less than 70	80-90	Approximately 100
Treatment fees (USD/person·year)	Less than 1	1-3	38 to 220
Rate of expenditure in total budget (%)	15.4 to 38	6 to 23.2	1.6 to 5
Recycling	Informal (metal, glass, plastic, composting)	Formal + Informal (metal, glass, plastic, composting)	Formal (metal, glass, plastic, furniture, clothing)
Incineration treatment rate (city / total cities)	No cities	1 out of 4 cities	3 out of 3 cities

15. As an economic indicator, GDP was used to divide the cities into groups. This kind of general indicator can be used in selecting cities at a similar developmental level among a large number of cities. The amount of waste generated increases with economic development, and therefore, there are many cases of similar problems both quantitatively and qualitatively occurring in cities at similar stages of economic development. Dividing cities into groups using general indicators appears to be useful in identifying counterparts or matching when carrying out information exchange for the purpose of sharing experiences in inter-city cooperation.

16. All cities are trying to identify fundamental indicators on waste management policy, such as the amount of waste generated per capita, waste disposal/treatment cost per capita, amount of waste collected and collection charges, recycling rates and cost recovery rates among others. These basic indicators are not only indispensable in ascertaining the status of waste management but are also widely used in policy targets as measures are introduced for controlling waste generation, recycling promotion, cost reduction among others. When setting numerical targets for policies, it is possible to set target values using comparisons to other cities at a similar developmental stage and can be used as a stimulus for the promotion of measures involving public participation.

17. For using quantitative indicators in waste management policies, the first step is to obtain basic data. Often, it is difficult to obtain accurate data regarding waste materials, and in addition there is dissatisfaction about the accuracy of such data within cities. However, the use of indicators is ultimately to frame policy, and unless it is a situation where indicators are linked to a fiscal levy on individual parties responsible for discharge, the degree of accuracy currently available poses no problem on a practical level.

2. Urban Air Quality Management

18. Air pollution management policy at the municipal/local authority level often target pollutant levels, for instance, SO_2 and PM10. However, monitoring systems that operate at certain stable levels and usability of data are prerequisites in the application of these indicators. If these preconditions are not met then, it is possible to use alternative criteria such as the proportion of automobiles that emit black smoke and fuel conversion ratios. These alternative indicators are also sufficiently useful as policy targets. They are especially effective in generating ordinary public interest, encouraging participation in activities to combat problems and ensuring the transparency of policy decisions.

19. The use of qualitative and quantitative indicators as an effective tool in urban air pollution management has been strongly backed by international experts. The Seminar participants adopted a recommendation that studies should be continued in the development of a common framework for air pollution management based on the use of major indicators as an activity of the Kitakyushu Initiative Network.

20. The seminar enabled compilation of 18 cases of successful practices of urban environmental management and analysed them in the light of the quantitative indicators applied

in assessing the policy effectiveness and identifying the instances of best practices. The major findings were as follows:

i) Even with cases that had been identified as successful, many have not necessarily been assessed quantitatively and/or have not had their quantitative data widely publicized. There are many that claim to be "best practices" based on qualitative self-assessment, and a number of cases based on such primary judgment are repeatedly quoted. With regard to these cases, the potential to transfer experiences and analysis relating to factors are not easy to identify for even those cases that have come to be known widely as "best practices".

ii) In many of the cases, assessment is based on the viewpoint of the implementing entity of the project. External assessment, can be seen only in one case, were post-project assessment was conducted from a donor's perspective. This case used a third-party assessment method, thereby demonstrating objectivity in assessment.

iii) In projects carried out in the same category, common indicators are present to a certain degree. Even in instances where the cases used similar environmental indicators (e.g. monitoring data), the instrumentation or conditions were not the same, making it difficult to make comparisons between projects undertaken in different countries.

iv) Application of highly simplified indicators was observed in assessing the possibilities of replication of policy and technology measures. Despite the simplicity of the indicators used, their application was regarded as useful and thus need to be further encouraged.

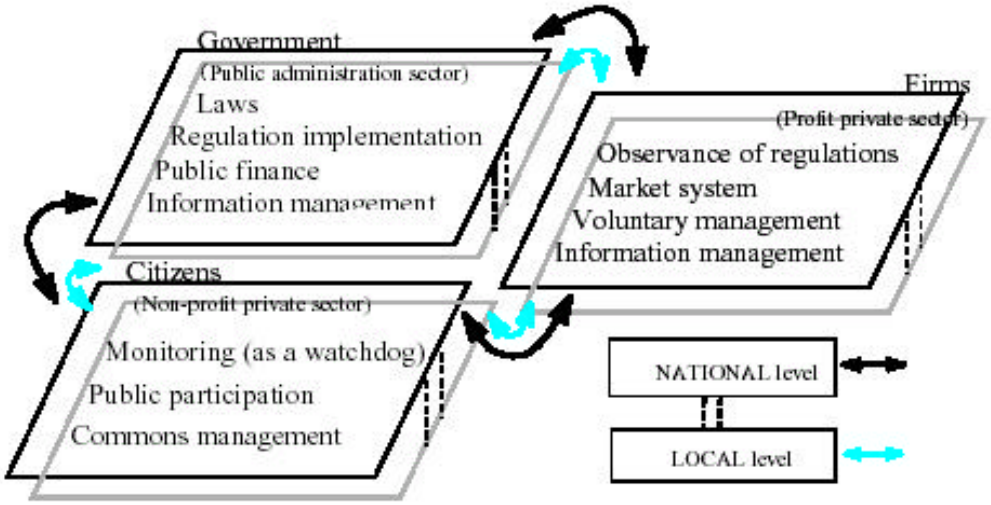
IV. Indicators for Social Environmental Management Capacity

21. A recent research by the Institute for Global Environmental Strategies[3] pointed out that while the past application of quantitative indicators focused mainly on the environmental quality performance, such as air and water quality, and management and treatment of wastes, there was a need for indicators to assess progress of institutional capacity building in municipal administrations as well as interaction and development of collaborative partnership among stakeholders. It should be reminded that the encouragement of public participation and partnership as an indispensable element of the Kitakyushu Initiative for a Clean Environment.
One response to such a requirement is the Social Environmental Management System (SEMS) model advocated by Professor Shunji Matsuoka *et al*[4] of Hiroshima University. SEMS takes the three parties of government, private enterprise, and the public as chief social actors in environmental management and sets a benchmark for each actor's system improvement and on the mutual interaction among the actors in relation to environmental management, thereby attempting to analyse the developmental stage of social environmental management capacity.

[3] Mushtaq Ahmed Memon, "Indicators for Urban Environmental Management Capacity: Urban Air Quality Management in Bangkok (Thailand) – Transport Sector", Institute for Global Environmental Strategies, 2003
[4] Matsuoka Shunji and Honda Naoko, "Social Capacity Development for Environmental Management in Asian Countries", Graduate School for International Development and Cooperation, Hiroshima University, Kitakyushu Initiative Seminar on Urban Air Quality Management, 20-21 February 2003

22. The system, once practically developed, would provide a useful tool, not only to evaluate the levels of environmental management capacity of the urban community as a whole, but also enables self-assessment by city managers of the progress, weaknesses and remaining tasks in promoting participation and partnership among the stakeholders in managing the urban environment, and thus encourage and facilitate the implementation of the pertinent projects addressing critical threats.

Figure 2 Conceptual Diagram for the Social Environmental Management System (SEMS)



V. Issues for Consideration

23. Kitakyushu Initiative has encouraged the application of quantitative indicators to measure the effectiveness or success of the policies and enable periodic review and adjustment. Assessments and feedback from the broad range of activities that had been thus far conducted for the implementation of the Kitakyushu Initiative for a Clean Environment indicate that quantitative indicators are more and more often used in urban environmental management by a number of cities in Asia and the Pacific, primarily to help city administrators to monitor the progress of their policy intervention, assess the effectiveness or success of policy measures and to enable periodic review and adjustment in interaction with stakeholders. For such purposes, site-specific and sectoral indicators are widely applied responding to site-specific needs and background conditions, rather than comprehensive indicators (or sets of indicators) which have been proposed for universal use by such organization as UNCHS.

24. Based on the above review, the following conclusions and recommendations may be considered for possible adoption by the meeting:

(a) The application of quantitative indicators should be further promoted through compilation, analysis and dissemination of successful practices, organization of thematic seminars and conduct of pilot activities/demonstration projects.

(b) Technical and human resource capacities of the local governments for environmental quality monitoring should be further enhanced. Meanwhile, further study and promotion of simplified practical indicators and monitoring through participatory approaches should be encouraged.

(c) There is a need to develop practical indicators to assess *inter alia* development of urban planning strategies, progress of institutional capacity building in municipal administrations as well as interaction and development of collaborative partnership among stakeholders, including the private sector, NGOs, CBOs and other civil society groups and individual citizens. A new framework such as SEMS is proposed as a response to these needs. Municipalities are encouraged to volunteer to provide pilot sites for testing of the new framework.