Verification and improvements to quantitative indicators for evaluation of urban environmental improvement

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Introduction

The Kitakyushu Initiative clearly states the importance of indicators in urban environment management. The purpose of the Kitakyushu Initiative is to improve the current environment of many cities in the Asia-Pacific region. As a means to achieve this end, quantitative targets in several areas must be set and policy decisions aimed at achieving the set targets must be made, starting and promoting activities that would solicit the participation of a wide spectrum of interested parties. In the various stages of policy decision and implementation of the improvement of the urban environment, the introduction of quantitative indicators is recommended because of two benefits they offer. One is that they make it easier to define aims, to measure the effectiveness and degree of success of policies, and to undertake regular surveys and adjustments. The other is that they promote the sharing of ideas and awareness and the participation of parties concerned with the various stages of decision-making and implementation. Furthermore, monitoring the implementation status of urban environmental improvement policies using quantitative indicators plays a significant role in the transfer of successful policy experiences as recommended by the Kitakyushu Initiative and in the assessment of the results.

Research in the use of quantitative indicators in the field of urban environment policy mostly involve the proposal of new "indicators," bearing in mind their universal utilization, or the introduction of a new "system of indicators." Numerous international organizations and research bodies are actively engaged in this research (Table 1).

Table 1 Examples of Past Indicator Research in Environmental Policy Field

- Urban Development Indicators by UN/HABITAT
- Sustainable Development Indicators by the UN Sustainable Development Commission
- Sustainable Environment Indicators by the International Economic Forum
- Policy Performance Indicators by the EU Commission
- EU Regional Sustainability Indicators
- Urban Environment Assessment System by the Chinese Government
- OECD's Indicator Core Set
- Ecological Footprint by Mathis Wackernangel and William Rees
- True development indices and indicators in sustainable economic development through redefinition of development
- World Wide Fund for Nature's Living Earth Index
- UNDP's Human Development Index
- IUCN's Well-being Assessment

What the Kitakyushu Initiative is supporting is the utilisation of quantitative indicators in policies. It does not necessarily encourage the creation of independent indicators or the application of specific existing indicators. However, in past research, views have been expressed on the general properties that quantitative indicators targeted at environmental policy should possess and on the advantages and disadvantages of indicators with various properties. The views of all such past research are useful in the deliberation of indicators to be used for the Kitakyushu Initiative. Therefore, as the starting point of this research, a comprehensive review was conducted in 2001 on existing indicator systems. Naturally, past indicator research has its own individual background and purpose; the Kitakyushu Initiative in its turn has its own individual purpose and included a proposal of additional facets not seen in past indicators. Bearing this in mind, what is needed is original research on the introduction or utilisation of policy indicators suited to the purpose of the Kitakyushu Initiative.

The basic idea is for indicators to initially be applied in specific local-level activities, progress to wider application to other cities, and ultimately move onto national or regional level policy assessment. Thus, what is desired are local indicators with global significance. In view of the fact that they will be used in comparative verification between cases and in assessment of successful practices, what is needed is something that would be accepted by a certain width of scope. In the application of these indicators to on-site activities in developing countries, it is necessary to continue to amass experiences with regard to details on data gathering and monitoring methods, as well as develop on-going discussions with the involvement of both working-level personnel and technical experts. As a base for this, the Kitakyushu Initiative is conducting pilot projects.

This research is follow-up from research conducted in 2001 and is also based on feedback received on activities carried out under the Kitakyushu Initiative to date. It sets out to make recommendations on ideal indicators and to summarise principal considerations of what future course should be pursued.

Evaluation of Existing Systems of Indicators

As part of commissioned work by the Ministry of the Environment of Japan in 2001, the Institute of Global Environmental Strategies conducted research on quantitative indicators for the assessment of urban environmental improvement in the promotion of the "Kitakyushu Initiative for a Clean Environment". In this research, investigation was made into (1) past research on indices and indicator systems and the potential for application to the Kitakyushu Initiative, (2) features that the indicator system of the Kitakyushu Initiative should possess, and (3) indicator design framework. The chief findings were as follows:

First, many of the indicators systems in which research is currently underway have been proposed with various purposes; however, when these are examined in the light of the fundamental properties desirable for policy indicators (measurable using accessible data, quick adaptability to policies, easily analysed, possible for comparison between countries for use in international contexts), they do not easily satisfy many of the criteria at the same time. Although there is a major issue in whether data for cities is obtainable, if one assumes the use of such indicators in developing countries in Asia, one can learn novel approaches from past indicator research, such as designating indicators as core set using minimal data in initial stages.

Many existing indicators are for the assessment of the environment and environmental policy performance of entire cities and countries. UN/HABITAT's Urban Development Indicators constitute 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 the most useful as reference and example and offer ideas in creating indicators for the Kitakyushu Initiative.

The feature that the Kitakyushu Initiative indicators should possess that existing ones do not is the ability to support decision-making when choosing the optimal method from many possible policies and ideas to determine the best method for the design and implementation of policies in line with successful examples of policies in other regions. In other words, in assessing the effectiveness of individual environmental policies in a specific region, the indicators should also be useful in judging the applicability of successful practices thus assessed in other sites and different situations. In terms of these criteria, it is essential for the Kitakyushu Initiative indicators to offer the three functions of assessing the status of the urban environment, assessing the progress of environmental policy and assessing the effect of the policy.

With the above points in mind, it is patently obvious that existing indicators cannot be used without adaptation and that we need an indicator design which matches the purpose of the Kitakyushu Initiative and which suits the project or site properties where the indicators are to be applied. In choosing such indicators, it is possible to design different scale assessment axes according to category or across categories depending on the situation, but an "indicator design framework" can be proposed as a common basis to some extent. The most immediate task is to design (or select) realistic indicators in each individual category, and the future task is to conduct assessments of policy performance using these indicators.

Feedback from Pilot Activity Projects

At present, a number of pilot projects are underway in participating cities of the Kitakyushu Initiative Network; these are core activities in the Kitakyushu Initiative. These pilot projects are assumed to take the form of project implementation, but in fact include an intermediate type that is akin to a feasibility survey (F/S). All pilot activities are being implemented with the purpose of verifying various targets, approaches and concrete measures in urban environmental management.

The pilot projects are defined in detail by the municipal environmental section or NGO, which will be the implementation body, and with advice from ESCAP, IGES or other Initiative supporting organizations. In doing so, "the monitoring of the progress of measures using quantitative indicators" has become an essential element. The indicators used in these individual pilot projects, though receiving information from ESCAP or IGES about the latest indicator use method, are essentially those chosen by the implementing body in accordance with the context of each project. The following table cites the chief examples.

Table 2 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)
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, O3, 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)

Below is a more detailed analysis of leading examples from the above.

[1] Ningbo

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 thoroughly implemented and maximum results were obtained. We can say that national policy had a fundamental impact on Ningbo's environmental policy, with the initiative of the local government also of major importance. Under the strong leadership of the Mayor and the municipal government, Ningbo introduced its own implementation system and legislative regulation to deliver a heavy and concentrated input of measures, input large-scale environmental investment and develop 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 testify to the success.[1]

Table 3 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)

Nonthaburi is located in the suburbs of Bangkok. It is a city with a high level of economic development, environmental awareness and local government effectiveness. However, with the rapid expansion in consumption came increases in waste generation which led to numerous problems, in other words, the shortage of final disposal sites, high cost of treatment and disposal, and deterioration in environmental hygiene due to imperfect collection and refuse scattering. The city is addressing these waste-related problems with a broad-based awareness of issues. As public cooperation is essential in raising recycling rates, the city has directed its efforts towards publicity and education, including the organisation of seminars for each area. What was proposed for the Kitakyushu Initiative was a project that set out to designate two communities as model areas (540 households and 120 households, respectively) and to promote public education and voluntary activities, as well as improvements in facilities and in profit-returning mechanisms, thereby aiming to increase recycling rates and reduce waste. Measures are proceeding 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 is doing its best to identify the quantity of waste collected and the recycling rate as indicators of the progress of their project. Targets for improvement are 30% reduction of waste and 20% improvement of recycling rates, respectively.

[3] Puerto Princesa (Philippines)

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. Many of the three-wheeled taxis run on two-stroke engines, which is a major source of air pollution. Often, combined with shoddy maintenance practices, these vehicles are major causes of urban air pollution and noise problems. Congestion and traffic accidents are also contributors to this problem. In terms of greenhouse gas emissions, the traffic sector contributes

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

the largest proportion (59%) on a sectoral basis. In order to deal with this compound 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 in research under the Kitakyushu Initiative 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 effects were achieved vis-à-vis restrictions. In this case, not only did the effect accrue benefits for residents, taxi operators, the local government and other local actors overall, it was also in line with global environmental protection efforts. In the wake of this success, a pilot project is now being proposed, based 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 2 Emission Reduction

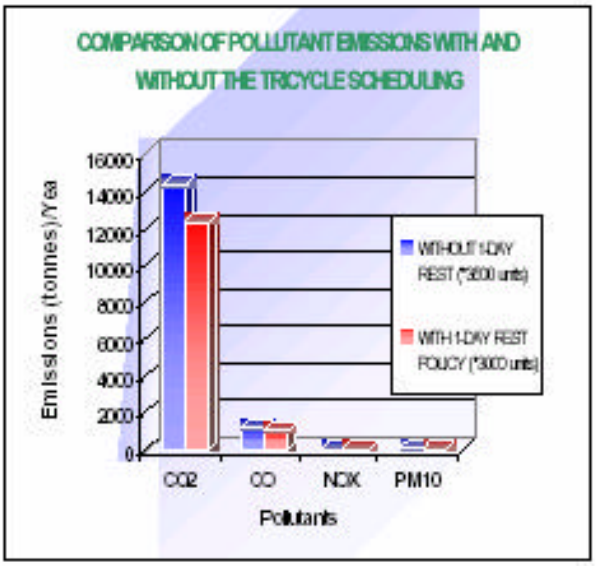


Table 4 Fuel consumption/Cost reduction (per vehicle)

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

In analysing the pilot activities and case studies listed in (1) - (4) above, we can make the following deductions about the use of quantitative indicators in the Kitakyushu Initiative.

(1) 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 under separate circumstances all fulfil the initial purposes of indicator use, such as 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.

(2) With respect to the indicator use purposes listed in (1) above, especially important as the basic properties of the selected indicators are the following: (i) indicators must be readily visible and easily understandable and (ii) indicators can be measured objectively.

(3) 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 achievement. From this viewpoint, even when a project of a fairly large scale (e.g. 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 vie against each other. In this way, there will be more contribution to the overall purpose of the Kitakyushu Initiative, those of “local initiative” and “promotion of participatory measures”.

(4) The indicators in pilot projects are selected by the project bodies 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 bodies. Meanwhile, where there is an assessment framework already set up on a national level (e.g. Ningbo), or where external donors such as ICLEI supplying funds for a specific purpose, we can see that the ground is prepared for external assessment indicators to be accepted. 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.

(5) 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, universal indicators in the form of carbon dioxide emission reduction is being applied. When the understanding of the project body 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 with different implementation bodies.

Under the Kitakyushu Initiative, a number of pilot projects are still underway and/or being planned. Under the support of ESCAP, 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 implementation of these pilot projects, we expect to see further practical experiences relating to the use of indicators in urban environmental policies. It is necessary to continue deliberations by incorporating knowledge thus gained.

Feedback from ESCAP Activities

The "4th Ministerial Conference on Environment and Development in Asia and the Pacific" was organised by UN/ESCAP in 2000, at which the Kitakyushu Initiative was adopted. A resolution was also passed at the UN/ESCAP Commission Session in 2001, which reiterates ownership of the implementation of the Kitakyushu Initiative by the 62 Asian-Pacific countries. UN/ESCAP has been active in the conduct of deliberations with regard to the application of an indicator system for the Kitakyushu Initiative, by undertaking various activities in the wake of the 2000 Ministerial Conference.

(1) Expert Group Meeting on Implementation of the Kitakyushu Initiative for a Clean Environment

The Expert Group Meeting on the Implementation of the Kitakyushu Initiative for a Clean Environment[2], held in Bangkok, Thailand, in August 2001, spearheaded activities. In this meeting discussions were held on urban environmental management issues with the participation of experts from 14 countries in the Asia-Pacific region. These experts gathered to consider various issues in the implementation of the Kitakyushu Initiative, including a research report commissioned to IGES, entitled "Preliminary Report on Quantitative Indicators to Assess Urban Environmental Improvement." The discussions led to the following recommendations.

> (Paragraph 2) The Meeting reaffirmed the usefulness of quantitative indicators and targets as urban environmental management tools. It was emphasized that the application of specific indicators should be considered depending on the specific situation as well as the specific concerns of different municipalities. The selection of such specific indicators and setting of targets might be performed through a participatory approach, in which the role of the media was significant, while the use of quantitative indicators would also facilitate participatory decision-making on environmental policies through information-sharing among stakeholders

This recommendation has come to form the basis of later deliberation on indicators of the Kitakyushu Initiative. Up until now, there was a strong tendency to prefer "universal indicators or set of indicators" from the perspective mainly of developers of quantitative indicators; however, we must note that

[2] Expert Group Meeting on Implementation of the Kitakyushu Initiative for a Clean Environment, Bangkok, 9-10 August 2001

"application of specific indicators" is being preferred from the perspective of users in the Asia and Pacific region.

(2) First Meeting of the Kitakyushu Initiative Network

The next milestone was the First Meeting of the Kitakyushu Initiative Network[3] held in November 2001. In this meeting, concrete details with regard to indicators were not discussed. The Meeting commissioned the IGES Kitakyushu Office to serve as the Network Secretariat, one of whose functions was to provide Network members with "assistance in preparing and implementing integrated and sustainable urban development plans and strategies with quantitative indicators."[4]

Here again, quantitative indicators are referred to as "tools in preparing urban development plans and strategies of member cities" and in this respect, as with the Expert Group Meeting on Implementation of the Kitakyushu Initiative for a Cleaner Environment outlined above, it assumes the setting and use of specific indicators for each member city.

(3) Best Practice/Case Study Portfolio for Implementation of the Kitakyushu Initiative for a Clean Environment

About the same time as the First Meeting of the Kitakyushu Initiative Network, ESCAP conducted research on successful practices in urban environmental management, entitled "Best Practice/Case Study Portfolio for Implementation of the Kitakyushu Initiative for a Clean Environment".[5] This study gathered information on urban environmental improvement policies that have been published on the Internet or in publications as "best practices" and attempted to organise data in the light of how causal relationships between measures and results were analysed in these best practices, how quantitative indicators were used, and how they were used to assess the identification of these cases as best practices.

Table 5 Use of Quantitative Indicators in ESCAP Case Study

Case	Major Indicators	Purpose of Indicators
Air		
Air pollution control (Yokkaichi, Japan)	Number of emission violations; Emission volume and concentration level of sulfuric dioxide; Number of respiratory diseases	Case records; Assessment of success
Wastewater		
Minamata Disease and water pollution control (Minamata, Japan)	Incidence of Minamata Disease; Mercury pollution levels of marine products	Case records; Assessment of success
Ecological urban wastewater treatment (Calcutta, India)	BOD load; E-coli	Technological standard; Case records; Assessment of success
Cleaner Production		
Cleaner production for chemical plant (Fuyan, China)	Ammonia emissions; Cost reduction by CP introduction	Choice of technological options
Taiyuan chemical plant (Taiyuan, China)	Raw material reduction; Water consumption reduction; Cost recovery period	Choice of technological options

[3] First Meeting of the Kitakyushu Initiative Network, Kitakyushu, Japan, 20-21 November 2001

[4] Joint Announcement Paragraph (a) The Network is mandated to have eight measures in discharging its primary function as a permanent forum to strengthen intercity cooperation in implementing the Kitakyushu Initiative in Asia and the Pacific. The initial focus should, however, be placed in four areas, i.e. i) promotion of information exchange and sharing of experience among participating local governments; ii) provision of a platform for the transfer of technology and know-how packages, good practices and a successful municipal/regional model for sustainable development; iii) assistance in preparing and implementing integrated and sustainable urban development plans and strategies with quantitative indicators; and iv) linkages, catalysation and facilitation of international cooperation programmes to financially and/or technically support inter-city cooperation.

[5] Makoto Kato, Research Assistant, ESCAP "Best Practice/Case Study Portfolio for the Implementation of the Kitakyushu Initiative for a Clean Environment", December 2001

Solid waste		
Public housing waste purchase/recycling program (Chicago, U.S.)	Recycling volume; Sale of recovered resources	Case records; Assessment of success
Semi-aerobic landfill/Fukuoka Method (Japan)	Leachate BOD; Generation of methane gas; Project cost	Case records; Assessment of success; Technology transfer
Volume-based collection fee system (Incheon, South Korea)	Solid waste generated; Tax revenue	Case records; Assessment of success
Transportation		
JBIC assistance project for Metro Manila traffic improvement (Philippines)	Internal economic profit ratio; Road congestion (average congestion rate, average driving speed); Air pollution emission (SOx, CO2, NOx, SPM)	Case records; Assessment of success; Third-party assessment
Singapore transportation policies	Number of vehicles; Bus, subway supply volume; Driving speed	Case records; Assessment of success
Human Settlements		
Kampung Improvement Programme (Jakarta, Indonesia)	Incidents of outflow of polluted water into drains; Frequency and severity of flooding; Type of waste accumulation points; Waste collection frequency; Incidents of waste disposal/incineration; Rate of waste separation; Separated waste disposal methods; Collection rate of unwanted goods; Fuel consumption by type; Indoor air pollution countermeasures; Percentage of infant health abnormalities	Policy targets; Case records; Assessment of success
Pilot project (Orangi, Pakistan)	Drainage gutter installation rate, installation extension; Number of sanitary toilets installed; Wastewater drainage investment; Investment for drainage gutters; Investment in sanitary toilets	Policy targets; Case record; Success assessment
Urban slum improvement (Visakhaptatnam, India)	Occupation percentage; Ratio of occupation to land possession; Size of owned dwelling; Percentage of services (electricity, water, other)	Policy targets; Case record; Success assessment
Comprehensive programmes		
Sustainable development demonstration zone (Benxi, China)	Smoke and dust emission; Smoke and dust precipitation; Floating particulates; Number of days of good visibility	Policy targets; Case record; Success assessment
Industrial zone environmental renewal project (Mizushima, Japan)	Sulfur dioxide; Nitrogen dioxide; Nitrogen monoxide; Floating particulate level; Oxidants; River environment standard attainment ratio	Case record; Success assessment
Air and water pollution control (Seoul, South Korea)	Sulfur dioxide; Nitrogen dioxide; PM10; Ozone; River environment standard attainment ratio	Policy target; Case record; Success assessment
Other		
Environmental-friendly hotels and replication practices (Bali, Indonesia to Hua Hin, Thailand)	Waste recycling rate	Policy target; Case record; Success assessment; Transfer of experience
Energy policy/carbon dioxide reduction strategy (Portland, U.S.)	Energy consumption; Carbon dioxide emission	Policy target; Case record; Success assessment

Based on the above analysis, the following additional deductions concerning the use of quantitative

indicators in the Kitakyushu Initiative can be made.

1) 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 published. 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".

2) In many of the cases, assessment is based on the viewpoint of the implementation body of the project. External assessment can only be seen in the case of the Japan Bank for International Cooperation, which conducted post-project assessment from a donor's perspective. This case used a third-party assessment method, thereby demonstrating the objectivity in assessment.

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

4) We can see an example of the use of even highly simplified indicators in technology or experience transfers.

Following the conclusion of this research, independent research has not been conducted by ESCAP with relation to the Kitakyushu Initiative or indicator development and its use within the Kitakyushu Initiative. The summary of studies and activities made after this date has been documented in Chapters 2 and 3.

Feedback from Thematic Seminars

Since September 2002, seminars on specific issues have been held as a new 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).

The following is a summary of the points raised in these seminars relating to the use of environmental policy indicators.

(1) Seminar on Solid Waste Management[6]

1) Twelve participating local governments delivered presentations on the following: (a) status of household waste being generated, (b) management practices, and (c) measures directed towards improving the status quo. Table 6 provides an excerpt of the major quantitative and qualitative indicators from these presentations.

[6] "General Overview – Kitakyushu Initiative Seminar on Solid Waste Management", Institute for Global Environmental Strategies, 2002

Table 6 Summary of Waste Disposal in Seminar 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

2) In the table above, GDP is used to divide the cities into groups. This kind of general indicator can be used in selecting cities at a similar developmental phase among a large number of cities. The amount of waste generated evidently increases in line 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 looks to be useful in identifying counterparts or matchmaking when carrying out information exchange for the purpose of sharing experiences in inter-city cooperation.

3) As for fundamental indicators on waste management policy, all cities are trying to identify such indicators 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. 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 and the like. When setting numerical targets for policies, it is possible to set target values using comparisons to other cities in similar developmental stages and can be used as stimulus for the promotion of measures involving public participation.

4) With regard to the use of quantitative indicators in waste management policies, the very first step is to obtain basic data. Often, it is difficult to accurately identify data regarding waste materials, and there is dissatisfaction about the accuracy of such data within cities as well. However, the use of indicators is ultimately as policy targets, and unless it is a situation where they are linked to a levy on individual parties responsible for discharge, the degree of accuracy currently available poses no problem on a practical level.

(2) Public-Private Partnerships for Urban Water Supply and Wastewater Treatment (PPP)[7]

1) In this seminar, information was exchanged between cities that have leading experiences in PPP (Beijing, Bangkok, Macao, Kathmandu) and cities that are considering full-scale introduction of PPP in the future (Yangon, Ho Chi Minh, Colombo, Weihai). A consensus was reached that PPP is a promising funding option in future for improvement of water supply and wastewater treatment in cities in developing countries in Asia.

2) The major objective of introducing PPP is the provision of cost-effective basic urban services. Naturally, the public (local government) sector is chiefly concerned with the balance between the service provided (quality and quantity) and cost, while the private sector's main interest is in the

[7] Mushtaq Ahmed Memon, "Overview & Analysis – Kitakyushu Initiative Seminar on Public-Private Partnerships for Urban Water Supply and Wastewater Treatment", Institute for Global Environmental Strategies, 2002

profitability of the project. We can say that these are relatively easy assessment criteria to turn into numerical values. However, when actually conducting a public project using PPP, there are numerous other issues that can be regarded as problems (See Table 7): for example, when accepting private capital, the maturity of the public sector has a large impact on the decision of the private investor in close relation to procedural cost, profit guarantee and incentive packages, regulatory frameworks, and sustainability, among others; nonetheless, quantitative assessment of these items are not simple.

Table 7 Major Issues in PPP

● Relationship with project body (outreach) and flexibility in asset
● Operational efficiency
● Setting and collection of charge
● Procedural cost
● Profit guarantee and incentive package
● Regulatory framework
● Sustainability
● Private operation know-how

3) Generally speaking, measuring policy attainment in PPP using indicators or quantitative means is not yet mature. In particular, there seems to be a long way to go before analyses can proceed beyond individual assessments of specific projects and develop comparisons between projects or cities. In the light of the purpose of the Kitakyushu Initiative, what is needed is a set of indicators that can contribute to the monitoring of the maturity of the partnership-forming environment for both the public and the private sector with regard to PPP, in addition to the identification of problem areas and necessary remedial measures. It is hoped that such indicators would support the forging of further public and private partnerships.

(3) Urban Air Quality Management[8]

1) At this seminar, presentations were made on the status of air pollution in participating cities in the Kitakyushu Initiative Network and their capacity to address air pollution; issues such as public participation and political will, which may pose problems in policy execution on the municipal level; and exchange of information on success stories and experiences in these areas.

2) Policy targets in air pollution management at the municipal/local authority level widely take the form of 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 do not exist, 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.

3) The fact that the use of qualitative and quantitative indicators is effective 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.

Input from New Research and Surveys

(1) Indicators for Urban Environmental Management Capacity: Urban Air Quality Management in Bangkok – Transport Sector[9]

This brief paper is based on hearings and interviews conducted with the Bangkok Metropolitan Administration and other bodies. This research went one step beyond the framework of past indicator

[8] Mushtaq Ahmed Memon, "Capacity Building for Urban Air Quality Management", Institute for Global Environmental Strategies, 2003

[9] Mushtaq Ahmed Memon, "Indicators for Urban Environmental Management Capacity: Urban Air Quality Management in Bangkok (Thailand) – Transport Sector", Institute for Global Environmental Strategies, 2003

research, in the sense that it addressed not only SOx, NOx, and other such indicators relating to the status of the environment but also attempted to create indicators on the progress of administrative capacity formation and system for environmental improvement.

The research analysed environmental management capacity as two separate capacities, that of assessment and of response. The following tables list the evaluation criteria thought to be effective in assessing these two capacities.

Table 8 Evaluation of Assessment Capacity

Major Constituent Factors	**Evaluation Criteria**
Environmental monitoring	Status of implementation
Identification of emission source	
Examination of health impact	Establishment of appropriate technology and equipment/human resources
Analysis of economic impact	

Table 9 Evaluation of Response Capacity

Major Constituent Factors	**Evaluation Criteria (quantitative indicators)**	
Urban planning	Introduction of public transport mechanism	(extension of coverage)
	Traffic control/special lanes	(average driving speed)
	Creation of green space	(coverage)
Regulations	Setting of emission standards	
	Setting of environmental standards	
System / Organisation	Coordination with related organisations	
Finance	Public financial resources	(budget for measures)
	Promotion of private sector investment	
Technology	Reduction of vehicle emissions	
	Encouraging use of cleaner fuel	
	Improvement of repair/maintenance and management	
	Introduction of new transit systems	
Social capacity and participation	Support of local government through public participation in field surveys (NGOs, academic experts)	
	Conduct of campaigns	
	Publicity ads/ creation of education materials	
	Use of mass media	
	Publication of Environmental White Paper	

In this research, quantitative indicators to measure possible evaluation criteria are not necessarily proposed. The evaluation is through qualitative means, using the grading system of low, moderate, or high in comparison with general conditions in other cities in developing countries or comparison with general conditions in cities of developed countries. The future task is to consider quantification methods for these evaluation criteria.

(3) Indicators for Urban Environmental Management Capacity: Essay on Quantification

The quantification of urban environmental management capacity as proposed above may be achieved through the following methods. Briefly, there is a method of parallel addition evaluation of indicators belonging to the same evaluation factor, or the method whereby these indicators are arranged in stages according to the capacity building sequence to create a scale and evaluate the degree of capacity formation (progress) of individual cities on this scale.

Taking "social capacity and participation" listed in Table 9 above as an example, it can be seen that if City X implements only the items: "Publicity ads/creation of education material" and "Publication of Environmental White Paper" among all the listed measures, the "social capacity and participation" of City X is evaluated as C + D (Table 10). City X can compare this score with the perfect score of A + B + C + D + E and evaluate the level of its own capacity building.

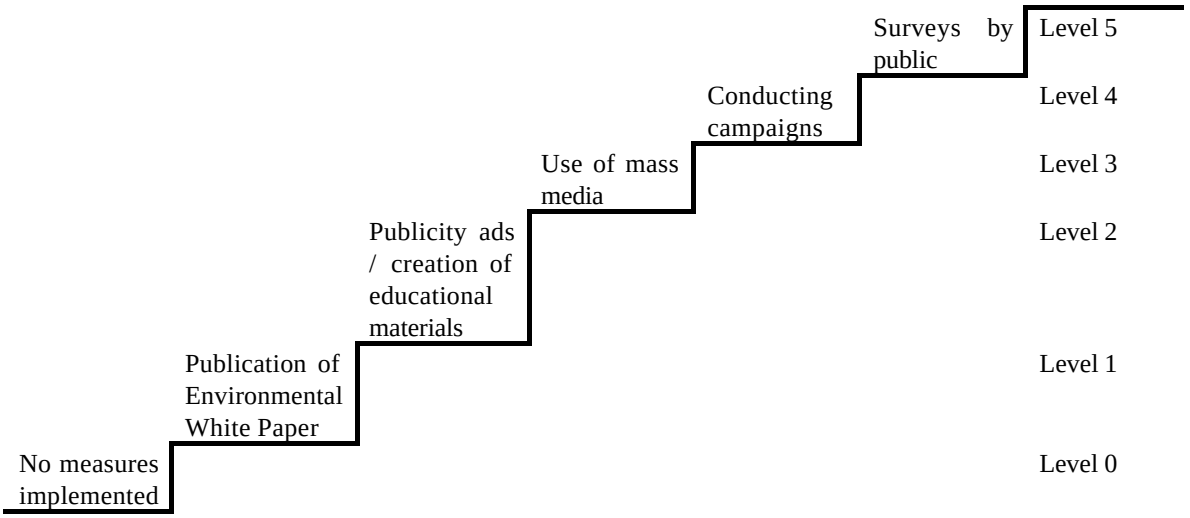
Table 10 Example of Indicator Evaluation of "Social Capacity and Participation" Capacity Building Using the Parallel Addition Method

Indicators on Social Capacity and Participation	**Score***	**(Example) Implementation in City X**
Support of local government through public participation in field surveys (NGOs, academic experts)	A	X
Conduct of campaigns	B	X
Publicity ads/ creation of education materials	C	○
Use of mass media	D	X
Publication of Environmental White Paper	E	○
Total evaluation of social capacity and participation		C + D

* In an actual case, weighting values will be incorporated here.

Meanwhile, Figure 3 provides an example of an evaluation using a staging method that employs a sequence. Here, the measures used as evaluation material for "social capacity and participation" are arranged in a standard sequence. In this way, it is possible to identify the progress of the city to be evaluated. Using the example of City X used in Table 10 above, this city has attained Level 2 in this assessment (full marks are given to Level 5).

Figure 3 Example of Indicator Evaluation of "Social Capacity and Participation" Capacity Building Using the Staging Method



Of course, it is not easy to arrange measures undertaken in an area in a standardised sequence, and above all, the order of implementing these measures will greatly differ with individual cases. Having said that, evaluation using the staging method enables cities using this method to identify the next step, offering them the benefit of pursuing efficient capacity building. This is a method widely used in the "Hazardous Waste Policies and Strategies – Training Manual" implemented by the United Nations Environmental Programme.[10]

Improving Quantitative Indicators – Investigation and Recommendation

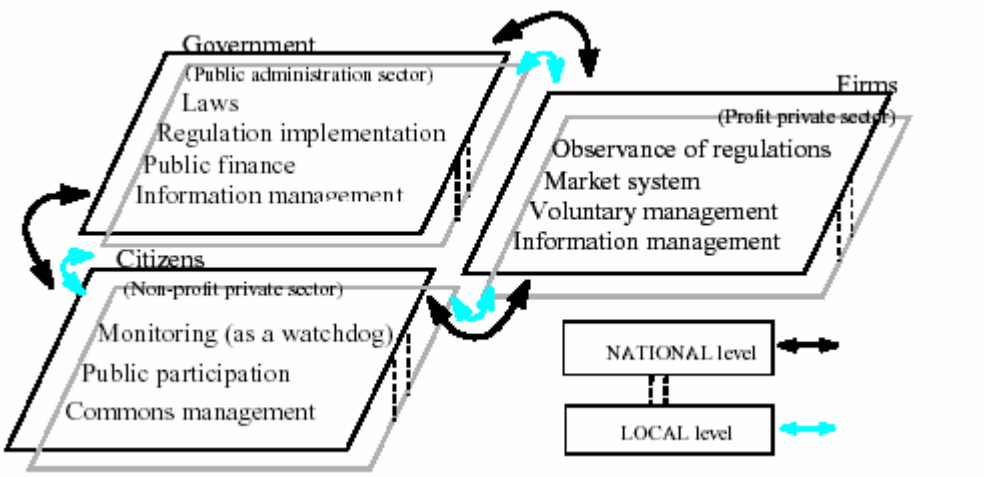
In the consideration thus far of numerical indicators for the Kitakyushu Initiative, verification has been conducted on the status of the use of quantitative indicators as policy tools for the clear identification of policy direction and targets, the promotion of participation by various actors towards the achievement of shared targets, and the formation of a common awareness among participants concerning target attainment level evaluation; also considered were the features these quantitative indicators should have.

[10] United Nations Environment Programme, "Hazardous Waste Policies and Strategies – Training Manual", UNEP Industry and Environment Programme Activity Centre, 1992, Other

Furthermore, methods for the application of quantitative indicators were proposed to measure the status of capacity building in the implementation of policies.

The Kitakyushu Initiative, in addition to the factors mentioned above, includes the encouragement of public participation and partnership as an important element. Therefore, a set of indicators is required that enables self-assessment of the progress and weaknesses in participation and partnership formation and provides the project body with encouragement for the implementation of policies.

Figure 4 Social Environmental Management System (SEMS)



Source: Imura and Matsuoka (2002)

A response to such a requirement is the Social Environmental Management System (SEMS) model advocated by Professor Shunji Matsuoka *et al.*[11] 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. For example, with respect to mutual interaction between the government and the public, a multi-faceted set of benchmarks are envisaged, including information disclosure, a system open to residents, environmental education, prioritisation of policies, access to information, number of pollution complaints filed, media, demonstrations, lawsuits, negotiations with the government, lobbying, and policy recommendations. Together with this, by making evaluations also through mutual interaction between the public and private enterprise and between the government and private enterprise, it would become possible to make quantitative evaluations of the partnership building in society as a whole from a multi-layered viewpoint.

However, it was stated at the Ministerial Conference on Environment and Development in 2000, at which the Kitakyushu Initiative was adopted, that while there has been some progress in the past five years in the Asia-Pacific region, the overall quality of the environmental is worsening. The Initiative purports to not only improve systems, organisation, and capacity building, but to also have a direct and real impact of improvement of the environment itself through the establishment of a priority programme with focused target areas. This was the starting point of the Kitakyushu Initiative. Therefore, we need to be aware that the SEMS model, which considers structural and organisational improvement as the mainspring of environmental management capacity and employs the analysis of outward system improvement based on capacity evaluation for each actor, would not necessarily be in full accord with the indicator system of the Kitakyushu Initiative. In particular, by setting up indicators that overemphasise system and organisation building, it would be counterproductive if the effort of governments and cities of developing nations end up concentrating in this area alone.

The following conclusions can be drawn from the above viewpoints, as follows:

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[11] 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

(1) Social system indicators including system improvements and partnership building are useful in measuring the progress of urban environmental policies and their implementation system formation and in identifying problems.

(2) However, when using these social system indicators such as system improvement and partnership building, they should not be used alone; rather, it is essential for them to be used in combination with practical environmental indicators such as air or water quality and waste generation/disposal volume.

(3) In the implementation activities of the Kitakyushu Initiative, the development and study of these indicators should continue, and practical experience in the application of these indicators should be gathered through the implementation of pilot projects.