CAPACITY DEVELOPMENT FOR CITIES THROUGH THE ENVIRONMENTAL ASSET APPROACH: Examples of its application in Japanese cities

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In local environmental management, the importance of capacity development has often been discussed. The Urban Environmental Management Project of Institute of Global Environmental Strategies (IGES) has tried to establish appropriate methods to enhance urban environmental management capacity in cities, with the introduction of an "Environmental Asset Approach". This approach develops existing environmental accounting approaches such as SEEA, which is currently used for measuring the natural assets of a nation.

The framework defines non-physical environmental management assets in four categories: institutional assets; technological assets; social assets; and, environmental governance. The latter two were not highlighted in environmental management capacity development of the past, but recently they have been considered important elements. This paper proposes this method for capacity development for cities. Here it evaluates local capacity development in Japan with asset table and examples of indicators. It also explores the Environmental Asset Assproach's applicability in other Asia-Pacific countries.

Key Words: *Capacity Development, Environmental Asset, International Environmental Cooperation*

1. INTRODUCTION

Capacity Development in Environment (CDE) is defined by OECD as "the process by which capacity in environment and appropriate institutional structures is enhanced". By UNDP it is defined as "a concept that is broader than organizational development (the overall system, environment or context within which individuals, organizations and societies operate and interact)". In the 1990s CDE was introduced as a new prototype for international environmental cooperation, and has since been considered seriously by international organizations and development organizations in donor countries[1].

Recently, UNDP has emphasized homegrown policies instead of externally prescribed, countervailing measures[2]. UNDP has also focused on three layers of capacity (individual, institutional, and societal) and south-south collaborations as new paradigms for capacity development, and as new solutions to old problems. The Urban Environmental Management Project of IGES has also tried to establish new kinds of capacity development in cities, especially targeting the assessing capacity of Asian Pacific cities.

For this purpose, the project reviewed some policy-based indicators[3] and pursued case studies for analysis[4]. Moreover, by working closely with Hiroshima University's Graduate School for International Development and Cooperation (IDEC), which introduced Social Capacity Development for Environmental Management and International Cooperation, we kept abreast of trends in CDE[5].

After obtaining the results of these studies, the Urban Environmental Management Project examined environmental management capacities of cities and introduced an "environmental asset" approach. This approach is based on environmental accounting systems that are currently used by governments of the developed world. This approach attempts to measure environmental management capacity growth through the concept of environmental assets. It also documents gaps in the accumulation of environmental assets between developed and developing cities.

This methodology corresponds to the World Bank's emphasis on the maintenance of asset portfolios for sustainable development, as outlined in the World Development Report[6]. The report argues that poor institutional maintenance is likely to reduce assets. It also says that asset maintenance is important for the creation of sustainable societies. Similarly, European Union (EU) Environment and Climate RTD

programme deals with an environmental capital project called "CRITINC[7] (Critical Natural Capital and the Implication of a strong sustainability criterion)". The concept of Environmental Capital covers various aspects: natural capital; human-made capital; cultural capital; and, cultivated natural capital. The project examines natural capital conservation and cultivation with a number of case studies from European cities. Collecting information about working examples of environmental management is infinitely useful, and yet the main focus of these studies was on less built up areas like rivers, forests and fields, thus having little relevance for urban environment.

The next section will examine the environmental management capacity asset approach in detail.

2. ENVIRONMENTAL ASSET APPROACH

(1) Environmental Asset and its categories

Usually, the term "environmental assets", means the natural environmental assets (or natural capital). It is the source of the environmental services possessed by local residents. For example, clean air promotes good health of the local people, and provides fresh rivers, seas, mountain views and other services. Clean oceans contribute to the production of the fisheries, scenic views, and amenities. Efforts have been made to systematically create an inventory of these natural environmental assets and to conduct what is called "environmental resource accounting" as an attempt to evaluate the economic value of each asset[8].

These ideas of environmental assets can be related to cities and we expand mainly following two ideas for application to the urban areas. Firstly, we consider human-made assets, in addition to purely natural environmental assets because cities are spaces consisting of buildings and other artificial structures. Secondly, since the "artificial assets" that make up a city—housing, roads, ports, bridges, waterworks, etc—are enormous, here only the items that are important for environmental concerns are chosen and whose presence either donates to the protection of the natural environmental assets or provides environmental services to residents. These include parks, sewage systems, and waste treatment facilities, etc.

Apart from these assets, there are the ones that do not have physical forms. They can be said "environmental management capacity assets". This represents the policies and measures, laws, governmental institutions, various partnerships, and other elements that can be used for urban environmental management.

To rephrase the above, "environmental assets" could be broadly classified as "physical assets" and "non-physical assets". The latter is also defined as "environmental management capacity assets". Thus, physical assets are the ones that have physical form and provide environmental services, and include natural environmental assets and artificial assets. In particular, for urban environmental management, the urban environmental infrastructure is needed, as it functions as an interface between the natural environment and the activities of society.

Through improvements in artificial assets, we can strengthen natural environmental assets, or to replace or compensate for those that have been degraded. For example, a city can replace some of the natural environment by improving urban parks that has been lost, and a high-quality sewerage system can bring back clean-flowing rivers.

(2) Components of Environmental Management Capacity Assets

A variety of ideas could be proposed for the content and types of environmental management capacity assets, but here we use a) institutional assets, b) technological assets, c) social assets, and d) environmental governance capacity[9,10].

a) Institutional Asset

Most environmental problems are the outcome of market failures and one of the roles of environmental management is to correct these market failures through government intervention. Therefore, the roles of government and municipal administration are essential. "Institutional assets," comprising plans, laws and regulations, governmental institutions, and financial mechanisms, display the role and capacity of the government. However, the environmental management is not sufficient only for these institutional assets.

b) Technological Asset

Pollution removal, monitoring, and other technologies that can be used to solve concrete problems are also crucial, and these we call "technological assets." The primary definition of technological assets is the technological know-how that has been accumulated within the city. They can also include the technologies acquired from outside the city but obtaining technology from outside generally costly. Local technology availability suggests the richness of environmental management capacity of the city.

c) Social Asset

The roles of various stakeholders that make up society, including the citizens, corporations, and non-governmental organizations are significant presently. This includes citizens with high environmental awareness, corporations having strong human resources, appropriate technologies and sufficient funds, NGOs working for environmental protection, and highly motivated researchers. The term "social capital" refers to this important factor, meaning mutual trust, norm, and network. This paper uses the term "social assets" to refer communally to the citizens, corporations and NGOs, etc., that have a role in

protecting the environment.

d) Environmental Governance

"Environmental governance" is one of the "environmental management capacity assets." It is the capacity to comprehensively oversee and control assets overall, including physical and non-physical assets. For example, this is evident when the mayor demonstrates excellent leadership to achieve environmental targets, and a government-citizen partnership arises in response.

Making an inventory of environmental management capacity assets, we could list up various policies and plans being implemented by a given city, as well as the various elements, such as institutions and organizations, laws and standards, funding, technology, and so on.

These individual elements will not function effectively if used independently of each other. Results are manifested only when various elements are working together effectively. Particularly, the social capital and environmental governance are important and the uniqueness of this framework lies in these categories.

The categories and details of each asset are shown in Table 1. Based on the above approach to consider environmental assets, it is necessary to see the mutual relationships between the assets that were mobilized for the various measures.

Table 1 Categories of environmental assets

Categories		Components	
Physical assets	Natural env'tal assets	Air, rivers, seas, water resources, flora and fauna	
	Artificial assets	Parks, sewer systems, waste treatment facilities, research facilities	
Non-physical assets	Env'tal management capacity assets	a) Institutional assets	Plans, laws and regulations, governmental institutions & organizations, funds, other
		b) Technological assets	Technological know-how such as pollution prevention, environmental monitoring, material cycles, etc.
		c) Social assets	c)-1 Residents (with high environmental awareness), NGOs, corporations (human resources, funds, technologies)
			c)-2 Social capital
		d)Environmental governance	Leadership Political will and commitment to enforce laws

3. RELATIONSHIP WITH CATEGORY OF SOCIAL CAPITAL

Social Capital plays an important role in the environmental management capacity framework. The idea of social capital dates back to the early 20th century, when it was first used by an educationalist in 1916. During the 1990s, Coleman and Patnam further developed the idea, making it both relevant for and widely used in the international development field. Also, the World Bank developed the Social Capital Initiative in 1996, which prompted the development of the SOCAT (Social Capital Assessment Tool). The Japan International Cooperation Agency, JICA, has begun to emphasize "bridging" social capital, which encourages public participation [11].

Social capital incorporates various different, and sometimes ambiguous, ideas. Recently researchers have attempted to refine its elements. Grootaert and Bastelaer [12] see social capital as consisting of 4 categories, as the figure below illustrates. In the environmental management capacity asset approach, we contend that national and municipal institutions, regulations, and governance should be differentiated from social capital. The institutions of the state and rule of the law correlate to institutional assets, and governance to environmental governance.

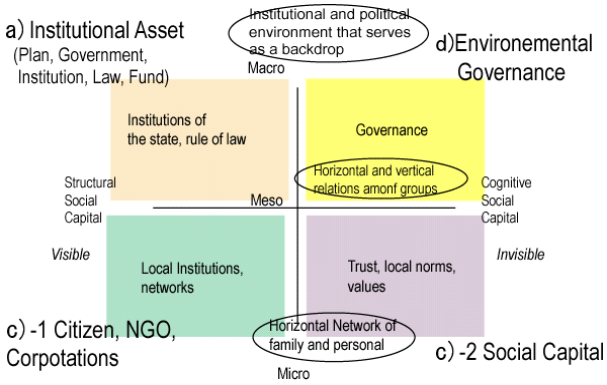


Fig. 1 Forms and scope of social capital and environmental management capacity asset [12]

4. ANALYSIS BY THE FRAMEWORK: KITAKYUSHU CITY AIR QUALITY

Kitakyushu City suffered from environmental pollution problems in the latter half of the 20th century, with its air pollution problems in particular becoming one of the most serious examples of pollution in Japan. However, the city recently has successfully tackled its pollution through their environmental management capacity. Using the Environmental Asset Approach, the section analyzes the city's accumulation of assets, as well as its relations with natural assets [13].

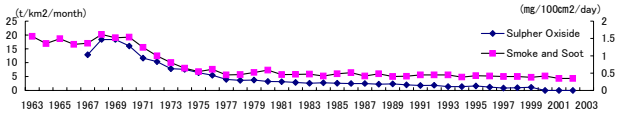
In Kitakyushu, various assets have interacted in complex ways to create success. Nonetheless it is a useful example to clearly illustrate how air pollution control was achieved by the city. In 1901, the publicly run Yahata Steel Works was established, which, along with a focus on steelmaking, led to the creation of heavy and chemical industries complex in Kitakyushu. In 1945, after the WWII, the factories were running at full speed, along with Japan's growing economy, but the impacts on human health were severe.

By the 1950s, the smoke and dust emissions from the factories were causing problems for local residents. At that time, the residents and companies, as well as the government, lacked adequate information on the pollution sources and emission levels. During the 1960s, pollution from factories in the City of Kitakyushu was so serious that the sky in Kitakyushu was said to have all seven colors of the rainbow.

In Kitakyushu, social assets, such as Pollution

Control Agreements between the city government and private sector played a key role in the fight against air pollution. The introduction of cleaner production by companies illustrates a technological asset. The know-how acquired during the process of overcoming pollution problems became the foundation of the city's present-day international environmental cooperation. The financial resources available to the large steel-making company were also a key factor in the successful eradication of pollution. The company also possessed strong leadership and became a role model in dealing with pollution.

Below is a table of asset accumulation and city's environmental indicators (sulfer oxides and smoke and soot). The amount of smoke, soot and sulfur oxides decreased in 1965－70, while the environmental assets were being established.



			1965－1975	1975－1985	1985－1995	1995－2005
Environmental Management Capacity Asset	Institutional Asset	Plan	1965 "We Want our Blue Skies Back" by Women's society		1989 JICA Kyushu International Center 1990 The City of Kitakyushu Fundamental Plan for the Anti-	1996 Agenda 21 the City of Kitakyushu 2001 Outline of Kitakyushu's Promotion of Internationalization
		Institution	1963 Plant pollution inspections 1965 Kitakyushu Health Research Institute 1971 Advisory Body of	1970 Pollution Monitoring Center 1980 Establishment of Kitakyushu International Techno-Cooperative Association (KITA)	1990 Establishment of Kitakyushu Forum on Asian Women (KFAW)	
		Regulation	1970 Measure Implementation Guideline 1970 Kitakyushu Pollution Control Ordinance 1971 Information System for Special	1984 The City of Kitakyushu Photochemical Smog Emergency 1985 Kitakyushu City Guidance Outline on Nitrogen Oxide Measures		
		Finance	1968 Pollution Prevention Funding System 1973 Pollution-related Health Damage Compensation System			2002 Funding from JICA/JBIC Proposal Based Planning Research (International Environmental Cooperation in China/Indonesia)
	Social Asset		1951 Women's Association 1967 Pollution Control Agreement		1997 Environmental Cooperation Network of Asian Cities	1997 Environment Account Book Campaign 2000 Kitakyushu Initiative Network 2000 Women's Conference on Environment in Asia and the Pacific 2002 North East Asian Women's conference on Environment
	Technological Asset		1967 Measurement of Deposited Dust 1970 Mt. Sarakura Meteorological Observation Station 1970 Smog Alert			
	Environmental Governance		1967 Mayor Tani elected.	1983 Mayor Tani, announced the cleaning of Murasaki River and strengthened the environmental consciousness.	1987 Mayor Sueyoshi elected.	2003 Mayor Sueyoshi announcement of "Environmental Capital." 2000 Establishment of International Environmental Cooperation Office

Fig. 2 Environmental indicators (concentration of SOx, smoke and soot) and environmental management capacity asset table[13]

The collection of successful case studies and good practice in environmental management in cities is pursued by various international organizations and is a highly utilized tool for international environmental cooperation. However, this collection of good practice stories is often delivered in descriptive form only and therefore lacks comparability among cases. In this regard, the asset table is useful for analyzing successful cases of environmental management capacity since it provides concrete examples of the successful elements of each success story. Moreover, it is practical for grasping the present policies and conditions in developing countries.

5. INDICATOR FOR THREE CITIES

In the previous section of this paper, concrete examples of assets are listed in the "asset table" with their characteristic components. However, more concrete methods of international environmental cooperation and capacity building are necessary and sometimes should be pursued with indicators of environmental management capacity assets. Indicators need to be chosen with precise compatibility in terms of space and time. Also, indicators should be practical and concise enough to be used by city officials themselves.

The Japanese system of monitoring and execution for environmental pollution control is highly known throughout the world[14]. On the other hand, developing countries, efforts to reduce environmental pollutants are poor, due to the insufficient arrangement of monitoring and execution. Also, Memon and Imura[15] assert that the increase in staff members and researchers working in environmental sections is a sign of institutional capacity building. Considering these, we take the number of government officials working in the areas of the environment as a possible indicator of environmental management capacity.

In Japan, the Ministry of Internal Affairs and Communications conducts annual surveys on the number of city officials in each municipality, classified according to the job description[16]. Therefore, this data is comparable among cities. Table 2 shows the 3 industrial cities staff members' shifts.

After the "Environmental Pollution Session of the Diet (Kogai-Kokkai)" in 1970, the Environmental Law was enacted and local autonomy for the pollution controls began. Osaka established the Environmental Welfare Bureau in 1971 through the amalgamation of few existing bureaus. Kitakyushu and Nagoya also created Environmental Measure Bureaus in the same year. The number of staff members working on environmental policy increased as the environmental jurisdiction was moved to the municipal level.

Table 2 Environmental section staff members 1965-2003[16]

Environmental Section Staff Members (Unit: person)

	1965	1970	1975	1980	1985	1990	1995	2000	2001	2002	2003
Nagoya	15	38	215	251	255	251	229	207	207	207	207
Osaka	38	88	192	179	178	162	173	176	176	180	179
Kitakyushu	8	23	74	69	60	54	51	55	52	56	52

Staff per 1 million people (Unit: person)

	1965	1970	1975	1980	1985	1990	1995	2000	2001	2002	2003
Nagoya	7.8	19	103	120	121	117	106	95	95	95	94
Osaka	12	30	69	68	68	62	67	68	68	69	68
Kitakyushu	7.7	22	70	65	57	53	50	54	52	56	53

Using these numbers, we calculated the strength of the institutional capacity in monitoring and execution in air quality management in point source and mobile source. The index "the manufacturing industry offices per one environmental section officer" at Fig. 3 shows the rapid growth of the capacity in 1970-1975, which corresponds to the time when the emission of smoke and soot and SO_3 go down in all three cities.

(Unit: Number of Offices)

	1965	1970	1975	1980	1985	1990	1995	2000	2001	2002
Kitakyushu	259	105	38	38	45	51	49	40	28	24
Osaka	720	348	185	194	201	203	164	131	62	54
Nagoya	1,156	464	86	75	72	70	71	67	35	32

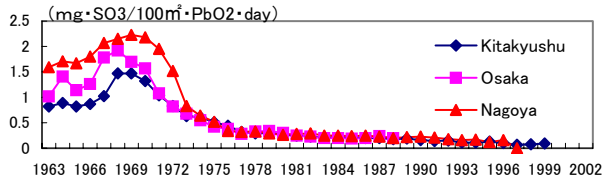


Fig. 3 Number of the manufacturing industry per one city official in environmental section and SO_3 concentration in ambient air[16, 17, 18]

The index "number of the cars per one environmental section officer," at Fig. 4 shows a significant decrease until 1975, when it increases in all three cities until 1990. Recently, it this trend has tapered to either a slight decrease or remaining at the same level. Considering this result, strengthening the capacity for monitoring and execution for mobile source emissions might be needed. However, the reason for this may need further research on other elements such as accumulation of technological assets.

(Unit: Number of Cars)

	1965	1970	1975	1980	1985	1990	1995	2000	2001	2002
Kitakyushu	8,521	7,001	3,207	4,462	6,119	8,282	10,365	10,089	10,655	9,945
Osaka	9,538	6,551	3,520	4,013	4,520	5,801	5,371	5,165	5,142	4,987
Nagoya	12,386	9,105	3,002	3,112	3,675	4,521	5,355	6,132	6,145	6,097

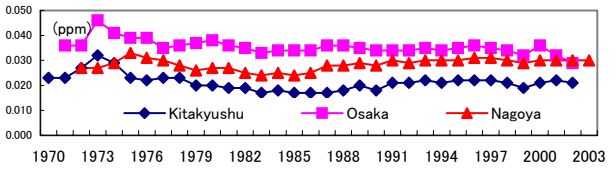


Fig. 4 Number of cars per one city official in environmental section and NO_2 concentration in ambient air[16, 18]

These data show one element of the enhancement of environmental management capacity through the number of members. However, to grasp the environmental management capacity condition, more detailed analysis is needed to establish the quality of these human resources, including level of education, professional ability, and contents of task and so on. This kind of information is not easy to obtain even in the most developed cities like in Japan, and it is all the more difficult in cities of development countries.

Recently in Japan, the central government enforced a system of self-evaluation to review its policies. This kind of system should be introduced in local municipalities as well. The self-check questionnaires are also practical for environmental capacity evaluation.

6. APPLICATION TO CITIES IN DEVELOPING COUNTRIES

This section tries to apply environmental asset idea to one city in developing countries, Surabaya, the second largest city in Indonesia. The city made some unique contributions to air quality management

(1) Overview of the City

Surabaya has a population of 2.60 million (2000), in an area of about 326 square kilometers in the coastal and lowland area. Surabaya has a tropical climate with a constant temperature throughout the year.

Surabaya has been suffering from heavy air pollution in recent years, in particular from mobile sources. Table 3 shows that air pollution from mobile sources is more serious than non-mobile sources. The health problems of residents are severe; the number of asthma patients is increasing and COHb and Pb rates in the blood of people near the sources are high[19].

Table 3 Annual accumulations of the 5 pollutants in Surabaya (2000) [19]

(Ton/year)

	Dust	SO_2	NO_x	HC	CO
Non-mobile	0	0.37	4.9	0.17	0.79
Mobile	3.35	0.26	46.2	28.5	9.5

The city has tried to solve these problems through various methods, including Blue Sky programs, Inspection & Maintenance, Car Free Day campaigns, CNG cars, and transportation management. The city has recognized its active performance on air quality management by many organizations and has received funding from GTZ (German Technical Cooperation), Umweltbundesamt (German Environmental Agency), ICLEI, Asia-Urbs, Swisscontact (Swiss NGO), IEA, World Business Council for Sustainable Development and UNESCAP. This section analyzes the city's air quality management capacity, in particular the effects of mobile sources, through the environmental asset idea.

(2) Surabaya Asset Table

Table 4 is Surabaya's environmental management capacity assets in air quality control. The assets in Surabaya have several unique traits, and some attempts are suggestive for mobile source management in other countries.

The Blue Sky Program plays a central role for comprehensive air quality management in Surabaya, creating regulations, institutional stability, partnerships and public awareness. This program began even before the environmental department was established and contains "Car Free Day" campaign, I&M, researches at the universities, and so on. However, I&M is not very comprehensive compared to other developing countries like Thailand, since Surabaya's I&M does not include

gaseous emissions and road tests[20].

The Environment Department of Surabaya, DLHKS, was established in 2001 with the start of decentralization. There were approximately 70 people working in the DLHKS in 2003; this is an increase of more than double the size of 30 people in 2001.

Social assets are characterized by their conduct of a Public Awareness Campaign. On Car Free Day and at nights in several areas of the city, a total pedestrian paradise is realized, full of local people and venders. The campaign was suggested by the local government and involved all stakeholders: communities, the private sector, and policy makers in planning.

Mayor Hartono (2000-) emphasizes environmental improvement and he is an important figure in environmental governance. Moreover, DLHKS's political will and commitment to enforcement has gained visibility by international organizations and agencies such as UNESCAP, ICLEI, and ADB, in successfully obtaining funds to solve issues.

Surabaya's assets are still under development in terms of regulations and institutions, but their social assets are unique and take a long-term vision of urban planning, such as pedestrian friendliness and urban amenity[21].

Table 4 Surabaya air quality management capacity assets
(legend：○＝favorable asset, x＝unfavorable asset)

Physical Assets			○ 2001: 5 monitoring stations and 5 public displays networked together
Non- Physical Assets	a. Institutional Asset	Planning	○ 1996－ : Blue Sky Program (PLB)
		Governmental Institution	○ 2001: Environment Department (DLHKS) started, as the local autonomy starts in Indonesia.○Local government has jurisdiction to reduce emissions through land use, infrastructure, and TDM.○City Planning Department is concerned with reducing mobile source emissions
		Regulation	○ Stricter Emissions regulation than the national standards. ○Local Act to support the inspection and maintenance of the vehicles in city. X I & M only for particulate matters, no roadside random testing.
		Finance	○ Surcharge on gasoline funds are used to fund CNG investments, and retrofits of government vehicles. ○Transport and environment trust fund to work as sources of funds from fees & surcharges, licensing. ○Reform of annual vehicle taxation: High taxation on old vehicles which are heavily polluting vehiclesCongestion pricing mechanism is being under consideration. X Limited funding from the central government.
	b. Technological Assets		○ New driver's licensing system (Quality License). ○Introducing CNG (Compound Natural Gas) cars. ○Introducing clean technologies to public transportations. ○Transport Demand Management. ○Area licensing scheme.
	c. Social Assets		○ Public Awareness Campaign involves all sectors of community, companies, working group. ○City promotes cooperation with international organizations○Working Groups in each key subject area (Public transport, non-motorized transport, inspection and maintenance, CNG, Economic instrument, and public awareness campaign). ○NGO, Tunas Hijau, consisted of young students and workers. ○Local universities' researches (Surabaya Institute of Technology, University of Airlangga, State University of Surabaya). X Less communication with the central government due to the distance disadvantage.
	d.Environmental Governance		○ 2000- Mayor Hartono / DLHKS's members have reasonably strong leadership.

Source: Surabaya Environmental Department (DLHKS), personal communication, 2003

7. CONCLUSION

Capacity development is an indispensable tool in the recent trend towards international environmental cooperation. The IGES Urban Environmental Management Project has also tried to develop a system for capacity development. In this paper a framework of capacity development is explored and we argue that this approach could be introduced as one of the most functional models for capacity development in environment.

The environmental management capacity asset approach enables us to understand how a city conquers environmental pollution and how success in urban environmental management is made, by showing its four concrete elements (Institutional Asset, Social Asset, Technological Asset and Environmental Governance) and their chronological relations. This asset table analysis can be used for solving a variety of problems that developing countries currently face.

The utilization of indicators made the approach more feasible. The indicators that represent each asset element (such as the quality and quantity of human resources, activity of networking and measures of monitoring) should be chosen. These data, however, are enormously hard to reach in a developed country like Japan, and of course even more so in developing countries. Therefore, self-evaluation is appropriate, and simple questionnaires or checking sheets for asset analysis should be considered as an easy way of obtaining data. The creation of such a self-evaluation system might be expected through the extension of the Environmental Management Capacity Asset Approach and this, in turn, will assist future capacity development for the cities in developing countries.

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