National institutional response to climate change and stakeholder participation: a comparative study for Asia

Xin Zhou & Hideyuki Mori

International Environmental Agreements: Politics, Law and Economics

ISSN 1567-9764
Volume 11
Number 4

Int Environ Agreements (2011)
11:297-319
DOI 10.1007/s10784-010-9127-5

Springer

Int Environ Agreements (2011) 11:297–319
DOI 10.1007/s10784-010-9127-5

ORIGINAL PAPER

National institutional response to climate change and stakeholder participation: a comparative study for Asia

Xin Zhou · Hideyuki Mori

Accepted: 30 June 2010 / Published online: 20 July 2010

Abstract Asian countries are building domestic institutions in response to climate change at both the international and domestic levels. Many countries have adopted the inter-agency coordination mechanism (IACM) as a national institutional approach to adjust the functions of various governmental agencies to tackle climate change. This article compares and contrasts national IACMs in four countries: Japan, the Republic of Korea, China and India. It examines (1) the structure and function of an IACM; (2) agencies and their specific roles in IACMs; (3) measures to empower the participation of other stakeholders including local governments, private sector, civil society and academia; and (4) changes in IACMs and reasons for such changes. Four success factors drawn from our comparative study suggest that an effective IACM should feature (1) strong overall coordination by the President/Prime Minister; (2) empowerment of the industry and environment agencies as joint lead agencies coordinating mitigation and adaptation; (3) involvement of all major sectoral agencies related to mitigation and adaptation; and (4) maximisation of the use of the comparative advantages of other stakeholders. The article highlights successful practices in Asia that can be emulated by other governments considering reform of their own domestic institutions in response to climate change.

Keywords Asia · Climate change · Inter-agency coordination mechanism (IACM) · National institutional response

Abbreviations

CDM	Clean Development Mechanism under the Kyoto Protocol
CDM-EB	The Executive Board of the CDM
COP	Conference of the Parties to the UNFCCC
DNA	Designated National Authority to the UNFCCC
FYP	Five-Year Plan
G77	The Group of 77 at the United Nations

X. Zhou (✉) · H. Mori
Institute for Global Environmental Strategies, 2108-11 Kamiyamaguchi, Hayama, Kanagawa 240-0115, Japan
e-mail: zhou@iges.or.jp

GHG	Greenhouse gas
IACM	Inter-agency coordination mechanism
IPCC	Intergovernmental Panel on Climate Change
METI	Ministry of Economy, Trade and Industry, Japan
MOCIE	Ministry of Commerce, Industry and Energy, the ROK
MOE	Ministry of the Environment
MOEF	Ministry of Environment and Forests, India
MOFA	Ministry of Foreign Affairs
MOST	Ministry of Science and Technology
NAP	National action plan
NDRC	National Development and Reform Commission, China
NGO	Non-governmental organisation
OGPC	Office for Government Policy Coordination, the ROK
R&D	Research and development
ROK	Republic of Korea
SEPA	State Environmental Protection Administration, China
UNFCCC	United Nations Framework Convention on Climate Change

1 Introduction

Climate change is a cross-cutting issue pertaining not only to the environment and science but also to economics, politics and diplomacy. To address this global issue effectively requires international cooperation, domestic actions, integration across economic sectors, and the participation of multiple stakeholders. The current global climate regime includes two correlated processes: (1) creation of international treaties through negotiations and (2) domestic implementation of international commitments.

In response to both processes, many countries in Asia are currently building domestic institutions (Kameyama et al. 2008). By structuring the relationships among domestic actors and influencing their preferences in dealing with climate change, domestic institutions are important for the way in which countries implement international treaties. They also influence the effectiveness of international efforts that alter domestic policy priorities and regulations (Kanie 2004). Many countries have adopted the inter-agency coordination mechanism (IACM) to tackle climate change. Differences in IACMs across countries are attributable to social, economic, political and natural factors, such as: (1) different international commitments under the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol; (2) varying contributions to current global greenhouse gas (GHG) emissions and therefore different international pressures for mitigation; (3) domestic economic factors, inter alia, level of economic development, energy supply and mix, economy-wide impacts of mitigation and costs of adaptation; and (4) domestic political factors such as bureaucratic arrangements and power sharing among agencies. A mix of these factors influences institutional settings, which, in turn, influence the outcomes of domestic implementation efforts.

In addition, national governments alone cannot address climate change effectively. Participation of other stakeholders in domestic decision-making and implementation is important. Under each IACM, different countries use different measures to empower other stakeholders to play specific roles, which may also influence the outcomes of domestic actions.

Table 1 Country profiles

Item[a]	Japan	ROK	China	India
Population (million-2007)	127.8[1] (12)	48.5[2] (26)	1,321.5[2] (1)	1,119.5[3] (2)
GDP[4] (nominal in millions current US$-2006)	4,367.5 (2)	888.3 (12)	2,630.1 (4)	886.9 (13)
GDP[4] per capita (nominal in current US$-2006)	34,188 (19)	18,392 (34)	2,001 (107)	797 (133)
Total GHG emissions[5, b] (Mt CO_2 equivalent-2005)	1,356.2 (5)	568.7 (12)	7,234.3 (1)	1,866.1 (4)
GHG emissions per capita[5, b] (tonne CO_2 equivalent-2005)	10.6 (39)	11.8 (29)	5.5 (81)	1.7 (148)

Data sources: [1] Official statistics bureau; [2] Official population clock; [3] UN estimate; [4] International Monetary Fund; [5] World Resources Institute

[a] Number in bracket indicates world ranking; [b] GHG data includes six gases, i.e. CO_2, CH_4, N_2O, PFCs, HFCs and SF_6, and excludes emissions from land-use change and forestry and from international bunkers

The purpose of this article is to examine national IACMs in Asia in order to compare and contrast their functions and effectiveness. Policy recommendations are provided to improve the performance of IACMs in selected countries. The article also aims to identify successful practices in Asia that can be emulated by other governments considering reform of their domestic institutions in response to climate change.

We selected four Asian countries—Japan, the Republic of Korea (ROK), China and India—on the basis of, first, the different national circumstances in terms of factors influencing the establishment and evolution of an IACM and, second, their representativeness in terms of their status in the UNFCCC (Table 1). Specifically, Japan, characterised by a large and advanced economy and large emissions, is the only Annex I country having a binding mitigation target in Asia. China and India are both the largest developing nations and among the biggest emitters in the world. Differences in social, economic and political circumstances between those two countries make them a good pair to compare. Though a non-Annex I country, the ROK is different from other developing nations due to its advanced economy and membership in the Organisation for Economic Cooperation and Development (OECD). Without binding commitments under the Kyoto Protocol, the ROK is also in contrast with Japan.

The remainder of the article is organised as follows. Section 2 introduces the analytical framework. Section 3 discusses the four case studies, followed by a comparative analysis in Section 4. Section 5 provides conclusions, policy recommendations and sketches the contours of a future research agenda.

2 Structured framework for comparative study

In order to conduct a systematic comparative study, we constructed a structured framework (Fig. 1) to examine (1) the structure and function of an IACM; (2) agencies and their specific roles in IACMs; (3) measures to empower stakeholder participation; and (4) changes in IACMs and the reasons behind such changes.

First, to examine the structure and function of an IACM and division of responsibilities among relevant agencies, we divided an IACM into three hierarchical strata: executive leadership, leading agencies and other participating agencies. The executive leadership represents the President/Prime Minister (or representatives on his/her behalf) executing

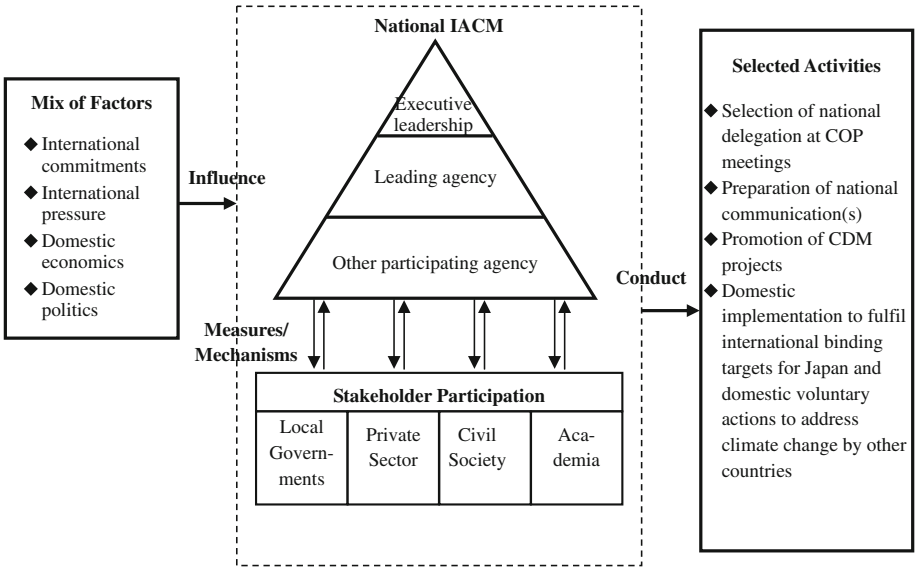

Fig. 1 Structured framework for comparative study. Note: *IACM* inter-agency coordination mechanism

overall coordination. Leading agencies include agencies playing principal roles in domestic decision-making and implementation related to climate change. Other participating agencies are responsible for sectoral actions within their normal functional domains.

Second, to examine agencies and their specific roles in IACMs, we studied four activities: selection of national delegations at the Conference of the Parties (COP) to the UNFCCC; preparation of national communications; promotion of Clean Development Mechanism (CDM) projects; and domestic implementation to fulfil international commitments and national action plans.

Third, we considered local governments, the private sector, civil society and academia to be stakeholders in our study. Participation of other stakeholders in an IACM and related activities is assumed to be beneficial to IACMs. We examined the measures and mechanisms to compare how countries empower the participation of other stakeholders.

Fourth, we considered a mix of influencing factors, inter alia, international commitments, international pressure, domestic economics and domestic politics, to explain changes in domestic institutions over time and differences among countries.

The data and secondary information used in this study have been obtained from the Internet, literature reviews and specific interviews conducted in Japan, the ROK and India. Data and information reflect the state of affairs by the end of March 2008.

3 Country case studies

3.1 Japan

Japan is the second largest economy in the world. Total GHG emissions in 2005 were 1.36 billion tonnes of CO_2 equivalent (fifth in the world) (World Resources Institute 2009). Having ratified the Kyoto Protocol as an Annex I party, Japan has committed itself to reduce emissions by 6% below 1990 level during the period 2008–2012.

3.1.1 National IACM

The Council of Ministers for Global Environmental Conservation was established in December 1989 (Prime Minister of Japan and His Cabinet 1989). As an ad hoc ministers' meeting, it coordinated policies on global environmental issues including climate change (Table 2). Its establishment marked the initiation of an IACM type of national institution to deal with climate change.

In 1997, the Global Warming Prevention Headquarters (Ministry of the Environment of Japan 1998), an inter-ministerial council, was established. The Headquarters is mandated to coordinate strategies relating to organisational setup, policy formulation, and guidelines and action plans on climate change. The Headquarters is chaired by the Prime Minister and vice-chaired by the Chief Cabinet Secretary, Minister of the Environment (MOE), and Minister of Economy, Trade and Industry (METI). All other ministers are also members, although the Minister of Justice and the Minister of Labour were not members at its initiation in 1997. Since the Japanese national policy formulation process is bottom-up from the ministries, there have been no top-down measures by the Headquarters, such as allocation of targets. In October 2007, the Government also set up a seven ministers' meeting (Minister of Foreign Affairs, Minister of Finance, Minister of Agriculture, Forestry and Fisheries, Minister of Economy, Trade and Industry, Minister of Land, Infrastructure and Transport, Minister of the Environment, and the Chief Cabinet Secretary) to discuss the revision of domestic measures to achieve the mitigation target (Prime Minister of Japan and His Cabinet 2007). Moreover, the Prime Minister's Office established an Advisory Panel on Climate Change in February 2008 to discuss various issues regarding the pathways to develop a low-carbon society and Japan's contribution to the global

Table 2 Evolution of IACM in Japan

	Council of Ministers for Global Environmental Conservation (1989)	Global Warming Prevention Headquarters (1997)
Driving forces	Rising concerns about global environmental issues among industrialised countries	Need to deliver a unified Japanese position to COP3 in Kyoto
Legal basis for creation	Decision by the Cabinet	Decision by the Cabinet Re-established in 2005 based on the Law of 1998
Executive leadership	Chaired by the Prime Minister with limited coordination role	Chaired by the Prime Minister with limited coordination role
Leading agencies	None	Vice-chaired by MOE and METI
Other participating agencies	All ministries	All ministries other than MOE and METI
Mandates/ functions	Coordination of policies regarding global environmental issues, including climate change	Overall coordination of promotion, planning and implementation of measures to tackle global warming
Frequency of meetings	Inter-ministerial level: 1-3 times per year; working level: more frequently	Inter-ministerial level: 1-3 times per year; working level: more frequently
Salient features	Bottom-up policy formulation process, starting from relevant ministries to the Council	Following deliberations with pertinent ministries, the Headquarters has the authority on the adoption of policies and measures

MOE Ministry of the Environment, *METI* Ministry of Economy, Trade and Industry

community. The Panel comprises 12 experts from the industrial sector, non-governmental organisations (NGOs), academia and local governments (Japan for Sustainability 2008).

In 1998, the Law on the Promotion of Measures to Cope with Global Warming (the Law) (Ministry of the Environment of Japan 1998) was promulgated to determine the national framework to tackle global warming. Subsequently, the Guidelines for Measures to Prevent Global Warming (the Guidelines) (the Prime Minster of Japan and His Cabinet 1998) were formulated to provide concrete policies and measures to achieve the Kyoto target. In 2005, the Kyoto Protocol Target Achievement Plan (the Plan) was formulated (Government of Japan 2005).

Formulation of the Guidelines and the Plan began with a draft prepared by relevant ministries. The draft was discussed in government councils, led by METI and MOE and open to the public. The Guidelines were agreed upon and published by the Headquarters' Steering Committee after public hearings. The Plan, however, was approved and published by the Cabinet alone.

3.1.2 Stakeholder participation

All 47 prefectures and 663 (out of 1,821) municipalities prepared local action plans to reduce GHG emissions from the daily operation and maintenance of government offices (Ministry of the Environment of Japan 2006, 2008a). As of March 2006, 47 prefectures and 60 municipalities have developed local action programmes to reduce emissions within their jurisdiction. However, local reduction targets are not explicitly linked with national targets. Eighteen prefectures set more ambitious reduction targets than the national target. Fourteen prefectures set local targets the same as the national target and another 14 prefectures set targets lower than the national one. One prefecture set its target based on per capita emission reductions rather than total emission reductions (see also Table 3).

The role of the private sector in Japan is significant and rather unique in its reaction to climate change. In 1997, the Nippon Keidanren (Japan Federation of Economic Organisations) prepared a Voluntary Environment Action Programme to cope with climate

Table 3 Actors in selected activities related to climate change in Japan

Activities	Actors and their roles
National delegation to COPs	MOFA decides on the composition of official delegation; most participants from MOE, METI, MOFA, MOAFF and MOLIT; no representatives from local governments, private sector and civil society but some from academia
Preparation of national communications	MOE coordinated preparation; MOFA submitted four national communications; GHG inventory prepared under the supervision of MOE while METI, MOLIT, MOAFF, MOE, MOSWL, local governments and industrial associations provided data; Japanese individuals and organisations submitted public comments on drafts
Promotion of CDM projects	The Liaison Committee for the Utilisation of the Kyoto Mechanism is the DNA. Project documents submitted to the DNA are appraised by several ministries such as METI (energy projects) and MOAFF ("sink" projects)

MOFA Ministry of Foreign Affairs, *MOE* Ministry of the Environment, *METI* Ministry of Economy, Trade and Industry, *MOAFF* Ministry of Agriculture, Forestry and Fisheries, *MOLIT* Ministry of Land, Infrastructure and Transport, *MOSWL* Ministry of Social Welfare and Labour, *DNA* Designated National Authority

change and improve waste management (Keidanren 1997). As of February 2008, 101 business organisations participate in the programme and each has set targets on energy intensity improvement or annual reduction of emissions (Keidanren 2008). Progress in most business organisations is self-reviewed annually and reported to the government councils, pursuant to the Guidelines. In 2007, 34 participating industrial sectors and energy transformation sectors emitted 521.9 Mt CO_2 equivalent, 1.3% more than that of the 1990 level and 3.1% more than that of the 2006 level, mainly due to the economic recovery in 2007. In addition to the actions under the voluntary programme, companies also try to address climate change through corporate social responsibility activities, e.g. the Toyota Motor Company's support of forest plantations. There is also significant industry representation in the government councils established by various ministries, especially METI.

Researchers have been significantly involved in policy formulation through participation in government councils and, in particular, in the council under MOE. A few environmental NGOs participate in the 40-member council under MOE, and there is one NGO member out of the 29 seats in the council under METI (Ministry of the Environment of Japan 2008b; Ministry of Economy, Trade and Industry 2008). Civil society has contributed to local planning and implementation through the activities of the Japan Centre for Climate Change Action and its prefectural centres.

3.2 The Republic of Korea (ROK)[1]

The ROK ranks 12th (2006), 12th (2005) and 29th (2005) in terms of GDP, total GHG emissions and GHG emissions per capita, respectively, in the world (Table 1). Energy and manufacturing account for 94.3% of its total emissions. As one of world's top emitters but still being a non-Annex I party, the ROK has been under growing international pressure to make a binding reduction commitment.

3.2.1 The Republic of Korea (ROK)

After the adoption of the Kyoto Protocol, the ROK recognised the economic implications of the Protocol and saw an urgent need to set up a separate national institution to deal with climate change. In April 1998, the Inter-Ministerial Committee on UNFCCC (Table 4) was established as a national IACM and chaired by the Prime Minister. It has four levels: ministers, vice-ministers, directors-general, and five task forces on negotiation, energy/industry, environment, agriculture and forestry, and research and development (R&D). The Inter-Ministerial Committee is supported by an expert pool including nine government-affiliated institutes. A new Task Force on General Coordination led by the Office for Government Policy Coordination (OGPC) was established in September 2001. The OGPC is a ministerial-level body assisting the Prime Minister in policy coordination, evaluation and regulatory reform.

Three national action plans (NAPs) (1999–2007) were prepared and implemented. During the preparation process, different agencies initiate project proposals, which are

[1] Most information was based on the report of secondary information provided by the Climate Change Research Division of the Korea Environment Institute (Climate Change Research Division, Korea Environment Institute 2008). Report on Institutional Response to Climate Change in the Republic of Korea. Korea Environment Institute (not published).

Table 4 Evolution of IACM in the ROK

	Inter-Ministerial Committee on UNFCCC (1998)	Restructured Inter-Ministerial Committee on UNFCCC (2008)
Driving forces	The Kyoto Protocol; implementation of first NAP	Implementation of fourth NAP
Legal basis for creation	Prime Minister's Order	Prime Minister's Order
Executive leadership	Prime Minister as chair and OGPC providing overall coordination	Prime Minister and OGPC providing overall coordination
Leading agencies	MOCIE, MOE and MOFAT are lead agencies and MOCIE plays key role	MOCIE, MOE, MOFAT and Korea Meteorological Administration are lead agencies in four priority areas: mitigation, adaptation, negotiation, and R&D
Other participating agencies	Includes finance, public affairs, science & technology, agriculture & forestry, construction, maritime affairs, planning & budget, and information agencies	N/A
Mandates/functions	To (1) make consistent climate policies (2) develop diverse negotiation strategies (3) promote mitigation measures and (4) implement NAPs	In addition to existing mandates, to establish an integrative responsive mechanism of mitigation and adaptation
Frequency of meetings	Ministerial level and vice-ministerial level: once every three years; director-general level: once a month	N/A
Salient features	Complicated hierarchical structure with a supportive expert pool	Involvement of local governments and strengthened overall coordination

NAP national action plan, *OGPC* Office for Government Policy Coordination, *MOCIE* Ministry of Commerce, Industry and Energy, *MOE* Ministry of the Environment, *MOFAT* Ministry of Foreign Affairs and Trade, *N/A* not available

screened and coordinated by OGPC. The ministerial committee gave the final approval. Priorities of the first two NAPs were (1) system construction in response to the UNFCCC and (2) development of mitigation technologies and measures. The third NAP prioritised impact assessment and adaptation, while priorities of the fourth NAP (2008–2012) are shifting back again to mitigation and technology development.

The IACM was restructured in 2008 to remove the duplication of the vice-ministers' working council and to further strengthen the role of OGPC in overall coordination. In addition, President Myung-bak Lee took office in December 2007 and established the Presidential Committee on Green Growth to implement the national project of "Low-carbon, Green-growth" (Presidential Committee on Green Growth 2008).

3.2.2 Stakeholder participation

Local governments in the ROK have been actively involved in the promotion of local sustainable development. In 2003, all 16 regional governments and 164 (out of 232) local governments developed a Local Agenda 21 (Korean Council for Local Agenda 21 2008). In domestic activities related to climate change, the national government has taken the

Table 5 Actors in selected activities related to climate change in the ROK

Activities	Actors and their roles
National delegation at COPs	Key ministries: MOFAT, MOCIE and MOE; MOE's head of national delegations; MOCIE's head of national delegations at the SBST and SBI; MOFAT coordinating and synthesising national positions; no representation from local governments, private sector or civil society; participation of academia has increased dramatically since COP4
Preparation of national communications	OPGC is in charge of preparation but delegated action to the Korea Economy and Energy Institute, MOCIE; a research team was organised comprising seven ministries, four government-affiliated institutes and one state-owned enterprise; private sector established a GHG database; two national communications (1998 and 2003) submitted
Promotion of CDM projects	DNA is the CDM Review Committee under the IACM, chaired by OGPC with members from foreign affairs, science and technology, agriculture and forestry, environment, public affairs and others. Korea Energy Management Corporation, MOCIE, provides technical support to local governments and the private sector

MOFAT Ministry of Foreign Affairs and Trade, *MOCIE* Ministry of Commerce, Industry and Energy, *MOE* Ministry of the Environment, *SBST/UNFCCC* Subsidiary Body for Science and Technology/UNFCCC, *SBI/UNFCCC* Subsidiary Body for Implementation/UNFCCC, *OGPC* Office for Government Policy Coordination, *DNA* Designated National Authority, *CDM-EB* Executive Board of the Clean Development Mechanism

lead, while the role of local governments is limited to delivering national policies into their localities. Recently, local governments have recognised the importance of climate policies and are trying to develop concrete action plans. During the restructuring of the IACM in 2008, a Conference of Local Governments has been established to provide a channel for local government participation in decision-making and in implementation of NAPs (see also Table 5).

The private sector established the Industrial Committee on Measures for the UNFCCC in 2001. Industry has also contributed to the completion of Korean national communications by establishing a GHG database and providing research funding and technical assistance. The private sector has developed voluntary agreements in the implementation of NAPs.

NGOs have played a limited role in climate change responses in the ROK, although they are represented in many environment-related committees. A Policy Conference for Environmental NGOs consisting of more than 20 NGOs has been established and meets three to four times a year to discuss current environmental issues and policies. The Government also provides financial support for environmental NGOs.

Academia plays a very active role in climate-related activities. Government-affiliated institutes together with other private institutes form an expert pool to the Inter-Ministerial Committee providing technical support to the Government in the decision-making process. Academia also plays an active role in international negotiations and in the preparation of national communications.

3.3 China

Attributable to its rapid economic growth since the early 1980s and with the largest population in the world, China has been the world's largest GHG emitter since 2005 (World Resources Institute 2009). However, 47% of its population still lives in poverty

(World Bank 2007) and GHG emissions per capita ranked 81st in the world (World Resources Institute (WRI) 2009). Playing an important role in the 'G77 plus China' and being the top emitting country, China has been under great international pressure to undertake stronger mitigation commitments.

3.3.1 *Evolution of national IACM*

In 1990, China established its first IACM to coordinate participation in the Intergovernmental Panel on Climate Change (IPCC) and international negotiations (National

Table 6 Evolution of IACM in China

	National Coordination Committee on Climate Change (1998)	National Climate Change Leading Group/National Energy Conservation and Emission Reduction Leading Group (2007)
Driving forces	Government restructuring in 1998; need to strengthen cross-agency coordination	Increasing international pressure; change in development strategy and implementation of domestic mandatory targets
Legal basis for creation	State Council Notification	State Council Notification (State Council 2007)
Executive leadership	No representation from the State Council	Premier as chair, Vice Premier and State Councillor as vice-chairs
Leading agencies	Executive Office at SDPC with SDPC as Chair; MOFA, CMA, MOST, SEPA and MOF coordinating five areas: COP delegation; IPCC participation; implementation of CDM; EIA and GEF-related work	Executive Office at NDRC; external function related to the UNFCCC led by the NDRC with MOFA, MOST, SEPA[a] and CMA; internal function on energy conservation and emissions reduction led by the NDRC and SEPA
Other participating agencies	Another seven agencies	Another 22 agencies
Mandates/functions	To (1) improve capacity to implement the UNFCCC; (2) contribute to sustainable development; (3) frame national interests in negotiations; and (4) build consensus in climate policy making among agencies	To (1) draft significant national climate strategies; (2) review China's negotiation strategy; and (3) implement two mandatory targets
Frequency of meetings	Twice a year before and after each COP (Bjørkum 2005)	N/A. One meeting chaired by the Premier in July 2007 (National Development and Reform Commission (NDRC) 2007)
Salient features	Stronger mechanism led by SDPC with distinct division of responsibilities among agencies; role of SEPA is insignificant	Stronger overall coordination led by the Premier emphasising the enforcement of domestic mandatory targets

SMA State Meteorological Administration, *SDPC* State Development and Planning Commission, *MOFA* Ministry of Foreign Affairs, *CMA* China Meteorological Administration, *MOST* Ministry of Science and Technology, *SEPA* State Environmental Protection Administration, *MOF* Ministry of Finance, *NDRC* National Development and Reform Commission, *N/A* not available

[a] In March 2008 SEPA was upgraded to the Ministry of Environmental Protection. Remarkable changes in its responsibilities in the IACM have not been observed. Its representatives in the Chinese delegation to the COPs have also not changed

Coordination Committee on Climate Change 2007a). The State Meteorological Administration, a weak agency in China's bureaucratic system, played the leading role together with the Ministry of Foreign Affairs (MOFA). Climate change was perceived primarily as a scientific issue and an issue of international relations.

In 1998, the National Coordination Committee on Climate Change was established (Table 6), chaired by the State Development and Planning Commission, a macroeconomic management agency above the ministry level. This IACM coordinated policies and activities while significant decisions were made by the State Council. Other lead agencies included foreign affairs, meteorology, science and technology, and the environment. The IACM was expanded in 2003, increasing its members from 7 to 12 ministries.

In 2007, Jintao Hu, Chairman of the Chinese Communist Party, advocated the so-called Scientific Approach of Development and Sustainable Development as a new national development strategy (Xinhua Net 2007). To address the changes in the development approach, domestic environmental issues and climate change, China set mandatory targets on energy intensity (20% reduction) and emission reductions of major pollutants (10%) for the period 2006–2010 (State Council 2006). In June 2007, to strengthen implementation, the State Council established an inter-ministerial leading group, chaired by the Premier (State Council 2007). About the same time, the Chinese government published the National Climate Change Programme to provide guidance and set targets for priority areas. The new IACM has external functions related to the UNFCCC and internal functions related to the domestic implementation. Externally, the National Development and Reform Commission (NDRC) is the lead agency, together with foreign affairs, science and technology, environment and meteorology agencies. For internal functions, NDRC and the State Environmental Protection Administration (SEPA) take the lead.

3.3.2 Stakeholder participation

In accordance with the State Council Decision on Strengthening Energy Conservation (State Council 2006), provincial governments have issued local regulations and a few of them set up provincial inter-agency coordination mechanisms, with similar composition to the national IACM (National Coordination Committee on Climate Change 2007b). To enforce implementation of domestic mandatory targets, the Government established a target-responsibility system and performance assessment system for local governments. The assessment results have been used to evaluate the political performance of local governors. Clean Development Mechanism (CDM) promotion centres have been established in 22 provinces to support the preparation of project documents and provide relevant training (Kyoto Mechanisms Information Platform 2007). See also Table 7.

The private sector accounts for 70% of national energy consumption (National Development and Reform Commission, National Bureau of Statistics of China 2007). The mandatory targets are disaggregated into sectoral and local targets and further into the targets of major energy-intensive enterprises and large emitters. The NDRC selected 1,000 enterprises, mostly state-owned enterprises, and signed energy-reduction agreements with them in 2006. To find policy instruments to improve energy and resource efficiency in small and medium-sized enterprises still remains a challenge.

In general, independent civil society in China is weaker compared with the other three countries. However, environmental NGOs are generally more active than those working in other areas. A few domestic NGOs and local offices of international NGOs have carried out various projects to address climate change and participated in UNFCCC meetings (National Coordination Committee on Climate Change 2007c). The China Civil Climate

Table 7 Actors in selected activities related to climate change in China

Activities	Actors and their roles
National delegation at COPs	NDRC, MOFA and MOST are playing lead roles in cooperation with CMA, SEPA, MOA and SFA. Majority from NDRC but MOFA leads and coordinates negotiations; MOST with increasing role related to CDM; no representatives from local government, private sector, or civil society, but academia increased sharply since COP6 (more than 35%)
Preparation of national communications	Project Steering Committee including NDRC, MOFA, MOST, MOF, SEPA and CMA; Executive Office at NDRC; limited participation from local governments and private; no participation from civil society; six government-affiliated research institutes joined national inventory project; initial national communication submitted in 2004
Promotion of CDM projects	IACM coordinates CDM policies. NDRC as DNA gives final approval of projects. CDM Board under IACM includes NDRC and MOST as co-chairs, MOFA as vice-chair and SEPA, CMA, MOF and MOA as members. A levy system on CERs was established. China CDM Fund was set up under the supervision of MOF. CDM promotion centres in 22 provinces established

NDRC National Development and Reform Commission, *MOFA* Ministry of Foreign Affairs, *CMA* China Meteorological Administration, *MOST* Ministry of Science and Technology, *SEPA* State Environmental Protection Administration, *MOF* Ministry of Finance, *SFA* State Forestry Administration, *MOA* Ministry of Agriculture, *DNA* Designated National Authority, *CER* Certified Emission Reduction, *CDM-EB* Executive Board of the Clean Development Mechanism

Action Network, financially supported by the Heinrich Boell Foundation, works actively to strengthen knowledge and capacity building on climate change, policy and public involvement and participated in COP meetings (China Civil Climate Action Network 2007).

Government-affiliated institutes and national universities play active roles in most climate-related activities (Ministry of Science and Technology 2007) including (1) one-third of the national delegation at COPs and preparation of negotiation positions; (2) climate change R&D; (3) IPCC-related work; (4) review of CDM projects for domestic approval; and (5) preparation of national communications.

3.4 India

At 1.1 billion, India ranks second in world population (World Bank 2007). In 2006, GDP was $886.9 billion (International Monetary Fund 2007). With emissions per capita ranked 148th in the world, however, India was the sixth largest global emitter in 2005 (World Resources Institute 2009). In spite of being one of the ten fastest-growing economies in the world, per capita GDP remains one of the lowest in the world (World Bank 2007).

3.4.1 Evolution of national IACM

The Ministry of Environment and Forests (MOEF) is responsible for planning, promotion, coordination, and overseeing implementation of environment and forestry policies and programmes. The National Environment Council, chaired by the Prime Minister with members from central ministries, chief ministers of states, representatives of NGO groups, and scientists and academics, is the highest policy-making body on environmental issues

Table 8 Creation of IACM in India

	Prime Minister's Council on Climate Change (2007)
Driving Forces	The need to review, consolidate and articulate mitigation and adaptation strategies; release of the fourth IPCC Assessment Report
Legal basis for creation	Prime Minister's Directive
Executive leadership	Prime Minister's Office
Leading agencies	MOEF, MOP, and Principal Scientific Advisors to the Prime Minister
Other participating agencies	MOEA, MOST, MOA, MOWR, MOF, Planning Commission, and the private sector through economic councils
Mandates/functions	To provide strategic guidance on mainstreaming climate change in development, identify key intervention priorities, and formulate a NAP on climate change
Frequency of meetings	At least four times before the COP13 meeting
Salient features	Multi-stakeholder representation; non-official members include credible personalities from civil society and the mass media

MOEF Ministry of Environment and Forests, *MOP* Ministry of Power, *MOEA* Ministry of External Affairs, *MOST* Ministry of Science and Technology, *MOA* Ministry of Agriculture, *MOWR* Ministry of Water Resources, *MOF* Ministry of Finance

(United Nations Department of Economic and Social Affairs 2007). Prior to 2007, India had not set up an IACM. A Climate Change Division within MOEF carried out the function of Designated National Authority (DNA) for the CDM, and various sectoral plans and programs on both adaptation and mitigation initiatives were also implemented. However, before the G-8 Summit and on June 5, 2007, the Government announced the establishment of a Prime Minister's Council on Climate Change (Ministry of Environment and Forests, Ministry of Power 2007) (Table 8). The Council is comprised of official and non-official members. Additionally, in March 2008 the Prime Minister announced that a permanent negotiating team is to be created within the Council (The Indian Express 2008, March 19).

Poverty reduction and economic growth are the prime objectives of India's national development strategy. To support economic growth under the tenth five-year plans (FYP) (2002–2007), India has focused on energy supply and improving access to clean and modern fuels. India's economy has been growing at a rate of over 9% per year but energy intensity has been reduced since 2004. The Government intends to further improve these areas by promoting sustainable patterns of consumption, promoting energy efficiency, and using CDM to promote clean energy technologies (Ministry of Environment and Forests, Ministry of Power 2007).

During the Delhi Sustainable Development Summit in 2008, the Prime Minister of India listed various adaptation measures among the priority areas of the country which include large-scale afforestation, drought-proofing, protection of the glacial systems and coastal areas as safeguards against the hazards of climate change (Merinews 2008, February 7).

3.4.2 Stakeholder participation

India is the largest democracy in the world. With a strong judiciary and Supreme Court, environmental issues in India are of high importance, and are taken up aggressively by the powerful media and an active NGO community (see also Table 9).

Table 9 Actors in selected activities related to climate change in India

Activities	Actors and their roles
National delegation at COPs	COP8 in New Delhi ushered in more NGO participation. Research institutions under MOEF are usually represented, with other government representatives from foreign affairs and from industry agencies
Preparation of national communications	The environment agency takes the lead but local governments contribute to data collection. Civil society has mostly contributed to capacity building initiatives
Promotion of CDM projects	MOEF is the DNA in charge of all matters pertaining to CDM projects, but state governments have established CDM promotional cells to encourage submission of CDM project proposals; the private sector assists in information dissemination on CDM rules; NGOs conduct capacity building, and academia participates in technical evaluation of project concept notes and proposals

The Constitution Amendment Act (1992) ushered a decentralised approach to development planning. Consequently, under India's eighth and ninth FYP, social mobilisation and participation of people at all levels were recognised as a means to ensure environmental sustainability of the development process (United Nations Department of Economic and Social Affairs 2007). The tenth FYP, on the other hand, paved the way for the formation of what is now popularly known in India as self-help groups. Three states have established CDM promotional cells to facilitate submission of CDM project proposals.

The private sector has assisted in increasing the capacity of Indian industry on issues such as cleaner production options, environmental management standards, green ratings, environmental legislation and energy auditing. The Federation of Indian Chambers of Commerce and Industry has established an Environmental Information Centre to enable industry to become more environmentally responsible and competitive. At the state level, power sector reform began by transferring tariff fixing powers to independent regulators to encourage private sector participation. Energy agencies mobilise participation of local institutions, NGOs and village-level organisations to implement non-conventional energy programmes.

NGOs have also played an important role in awareness-raising and in empowering communities and women by facilitating self-help groups at the grassroots level. Research institutions have been active in the outreach component of climate change initiatives in India. Indian scientists have contributed to national and international climate research efforts. In preparing the first national communication, a broad participatory approach was adopted with 131 research teams drawn from research and technical institutions, government departments and NGOs (Ministry of Environment and Forests 2004).

4 Comparative analysis

4.1 National delegations at COPs

Japan has the largest number of delegates at COPs, followed by the ROK, China and India (Table 10). Direct representation from the executive leadership has been observed in a number of COPs for the ROK and China.

The environment agency plays the major role for all selected countries except for China, where the NDRC has the most important role. Industry/energy agencies share roles with

Table 10 National delegations at COPs

Actors	Japan	ROK	China	India
Executive leadership	×	4%	0.4%	×
Leading agencies				
Environment agency	26%	16%	–	47%
Business-related agency	14%	8%	22%	–
Foreign affairs agency	14%	8%	20%	3%
Other participating agencies	17%	7%	27%	11%
Local government	×	×	×	3%
Private sector	×	×	×	×
Civil society	×	×	×	5%
Academia	4%	18%	22%	3%
Diplomatic missions	21%	13%	9%	34%
Average number of delegates	73	32	27	17

Percentage represents the average participation for each actor from COP1 to COP12

(–) = not defined as a lead agency, (×) = no participation

the environment agency for Japan and the ROK but only a limited role for India. This indicates that Japan, the ROK and China have emphasised the economic aspects of climate change. The Ministry of Foreign Affairs plays a significant role in coordinating strategies and negotiating positions in all four countries. Significant participation of other government agencies related to mitigation, adaptation, science and finance can be observed for Japan and China.

Generally, there is no representation from local governments in national delegations, except for India, especially at COP8, held in Delhi. No country has sent representatives from the private sector. Academia, however, has played an important role for China, the ROK and India, especially in government-affiliated institutes. In contrast, academia played a relatively minor role in direct representation at COPs in the case of Japan.

The conference agenda often influences the size of national delegations. The size of the Japanese delegation showed an increasing trend until COP7, and decreased thereafter. This may indicate that international negotiations have become less important to Japan after the binding targets and flexible mechanisms were clearly defined. The ROK and China show a continuing upward trend, indicating the importance of the ongoing negotiations regarding the post-2012 climate regime. India, on the other hand, has maintained a consistent number of delegates in COPs held so far.

4.2 Mandates of IACMs

The mandates of each IACM vary in three broad functions related to (1) negotiations (e.g. preparation of national positions and strategy); (2) climate policy making (e.g. development of national action plans); and (3) domestic implementation (e.g. fulfilment of international commitments and implementation of NAPs on climate change) (Table 11).

For negotiations-related functions, although Japan has emphasised domestic implementation of the Kyoto Protocol, Prime Minister Fukuda was engaged with the strategy regarding the post-2012 climate regime. For the ROK, negotiations have been the major function of its IACM, as indicated by its task force on negotiations. Under international

Table 11 Stated mandates of current IACMs

Mandates	Japan	ROK	China	India
Negotiations	–	√	√	–
Policy-making	√	√	√	√
Implementation	√ (mitigation)	√ (mitigation and adaptation)	√ (mitigation and adaptation)	√
Others	–	–	To integrate climate change into national sustainable development	To mainstream climate change in national development

(√) = with stated mandate, (–) = without stated mandate

pressure, the Government of China has also taken the role of negotiations seriously. The IACM in China usually meets twice a year, just before and after each COP. The negotiations are clearly becoming more important to India, with the recent creation of a permanent negotiating team in 2008.

For policy-making functions, IACMs in all countries are mandated to ensure that climate concerns are integrated into various sectoral activities. To fulfil these mandates, the development of a national climate strategy and action plan is typical. Japan promulgated a law to cope with global warming (1998) and developed a NAP to achieve the Kyoto target (2005). The ROK developed four comprehensive NAPs. China published its National Climate Change Programme in 2007. At the time of writing this article, India still lacked a comprehensive NAP.[2] For national strategies on mitigation and adaptation, Japan has put greater emphasis on mitigation. The ROK has two task forces on mitigation and adaptation under its current IACM. China maintains a strong position on balancing mitigation and adaptation in the climate negotiations.

For implementation-related functions, Japan, the ROK and China developed NAPs guiding economy-wide implementation. India has not developed comprehensive NAP yet but project-based or sectoral approaches have been adopted.

A promising aspect of IACMs' mandates is to integrate climate change into the national sustainable development agenda, in particular for China and India. However, an enigma is why IACMs have developed along separate lines from the apex national sustainable development councils. Different triggers for their creation may lead to their parallel development. Most IACMs in our case studies were established in response to the UNFCCC and its Kyoto Protocol, while national sustainable development councils were established in response to the implementation of Agenda 21. How to remove this institutional barrier to re-integrate climate change into national sustainable development needs further investigation.

4.3 Evolution of national IACMs

Comparative analysis of IACM evolution was conducted by examining (1) the frequency of structural change; (2) overall coordination by the executive leadership; (3) leading agencies; and (4) number of agencies.

[2] Indian Prime Minister released first National Action Plan on Climate Change on June 30, 2008.

Table 12 Changes in structure and function of IACMs

Country	Frequency of change	Overall coordination		Number of agencies
		Initial stage	Latest stage	
Japan	1	Reactive coordination	More proactive coordination	All agencies
ROK	3	Weak coordination	Strengthened through OGPC	12
China	3	Performed by NDRC	Performed by the Premier	4–27
India	1	Performed by MOEF without an IACM	Prime Minister's office	Now 19

OGPC Office for Government Policy Coordination, *NDRC* National Development and Reform Commission, *MOEF* Ministry of Environment and Forests

National IACMs have changed more frequently in China and the ROK than in Japan and India, possibly due to three major factors (Table 12). First, some countries are more responsive to the development of the climate regime than others in developing their domestic institutions. For example, the initial IACMs were established in Japan (1989), the ROK (1992) and China (1990) in response to the emergence of the climate issue in the international political agenda during the late 1980s. In addition, Japan (1997), the ROK (1998) and China (1998) made substantial structural changes in IACMs in response to new commitments and opportunities arising out of the Kyoto Protocol. More recently, the ROK and China are all considering strengthening their IACMs, partly in response to mounting international pressure on both countries to take more substantial action. In June 2007, India created an IACM in response to the IPCC's Fourth Assessment Report and has since then listed various priority areas, largely on adaptation. Second, institutional changes reflect different needs and approaches of domestic implementation. For example, the ROK strengthened the overall coordination by the OGPC and has recognised the role of local governments by including them in the IACM. To achieve mandatory targets, China strengthened overall coordination by the Premier and included more agencies to enforce sectoral implementation. India established an IACM to develop a NAP. The third factor may be attributed to changes in government. In the ROK, President Kim Dae Jung strengthened institutions to deal with climate change during his presidency while President Myung-bak Lee set 'Low-carbon, Green-growth' as a national vision. Premier Wen Jiabao took office in 2003 and put more emphasis on environmental issues, which resulted in further strengthening climate change–related institutions in China.

In all countries, overall coordination by the executive leadership has been strengthened over time, due mainly to a need to deal with climate change across sectors. Japan strengthened coordination substantially when the Kyoto Protocol was adopted. However, political leadership provided by the Prime Minister has been usually constrained because major coordination on climate change positions is controlled by MOE and METI. During the administration of Prime Minister Fukuda, the political leadership was strengthened to guide strategy decisions regarding the post-2012 regime. Since the third NAP (2005–2007), the ROK has strengthened the executive leadership in its IACM through the OGPC. China has a substantial executive leadership headed by the Premier in its latest IACM (2007). India, until recently, had climate change matters largely administered by the environment agency. Climate change was treated as one of several global environmental issues handled by the environment agency.

Table 13 Leading agencies in national IACMs

Country	Initial stage				Latest stage			
	EA	BRA	FA	SA	EA	BRA	FA	SA
Japan	√				√	√		
ROK		√			√	√	√	
China				√	√	√	√	√
India	√				N/A			

(√) = lead agency, *EA* environment agency, *BRA* business-related agency including energy and/or industry sector, etc., *SA* science agency, *FA* foreign affairs agency, *N/A* not available

Regarding the leading agencies, the environment agency, business-related agency, foreign affairs agency and science agency are key actors in national climate policy making (Table 13). At the initial stage of an IACM, environment and science agencies played leading roles in addressing scientific aspects of climate change. At a later stage, both business-related agencies and environment agencies became leading agencies coordinating mitigation and adaptation, respectively. This change is attributable to a changing perception from a scientific to an economic concern, as well as the resulting opportunities for both developed and developing countries with the three flexible mechanisms defined by the Kyoto Protocol.

Japan has been represented at COPs mostly by MOE and METI, together with MOFA (Table 10). In the ROK, the Ministry of Commerce, Industry and Energy (MOCIE) played the dominant role when the Kyoto Protocol was adopted because the country already perceived climate change as an economic issue. MOE then started to play a more important role and now both MOE and MOCIE together with foreign affairs agency are key agencies of the IACM. Compared with other countries, the environment agency in China is underrepresented while NDRC has played the substantial role together with MOFA and MOST. Another reason is that SEPA was weak in China's bureaucracy and lacked the capacity for coordinating across-agency activities. However, the recent elevation of SEPA to the ministerial level and the re-arrangement of the National Energy Administration (supervised by NDRC) in the government restructure in March 2008 may imply a strengthened role for the environment agency and stronger energy policies. In India, the environment agency has played a major role in climate change–related activities.

Increased involvement of other agencies is a common feature of the latest national IACM in all four countries (Table 10). Major agencies include (1) mitigation-related sectors, e.g. construction, transportation, electricity supply and forestry; (2) adaptation-related sectors, e.g. agriculture, water resources and maritime affairs; and (3) others such as finance and public affairs. Japan included all agencies and the ROK and China involved most relevant agencies, indicating their more comprehensive approaches for implementation and perception on climate change as a cross-cutting issue requiring cooperative action by all sectors. Involvement of other agencies was not apparent in India, mainly due to the absence of an IACM before 2007.

4.4 Stakeholder participation

Local governments and the private sector tend to begin to play more active roles after the country shifts its emphasis from international negotiations to domestic actions (Table 14). In Japan, all prefectures developed a climate change action programme as required by

Table 14 Comparison of stakeholder participation in Japan, the ROK, China and India

Activities	Local governments				Private sector				Civil society				Academia			
	J	K	C	I	J	K	C	I	J	K	C	I	J	K	C	I
IACM	−	√	−	−	−	−	−	√	−	−	−	√	−	√	−	√
National delegation	−	−	−	√	−	−	−	−	−	−	−	√	√	√	√	√
National communication	√	−	√	√	√	√	√	-	−	−	−	√	√	√	√	√
Promotion of CDM	−	−	√	√	√	√	√	√	−	−	−	√	−	√	√	−
Other domestic activities[a]	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

J Japan, *K* the ROK, *C* China, *I* India, (√) = involved, (−) = not involved

[a] Other domestic activities include the implementation of internationally binding reduction targets by Japan and voluntary actions addressing climate change by other countries

national law. The ROK included the Conference of Local Governments in its latest IACM (2008) to allow local governments to participate in the decision-making process. In China, provincial governments developed action plans and a few of them established institutions similar in structure to the national IACM to help achieve national mandatory targets. In India, several pioneer states have established CDM promotion cells.

In Japan, a voluntary action programme has been adopted by the Keidanren to help achieve the country's reduction targets. In the ROK, voluntary agreements have been concluded between individual plants and the Government to implement NAPs. In China, national targets are disaggregated into sectoral targets and have been enforced by signing target responsibility agreements between the NDRC and major enterprises. India has representatives from the private sector in its newly established IACM. In developing countries, particularly in India and China, the private sector is very active in developing CDM projects supported by their governments. In all countries, with a mix of policy measures in place, such as laws and regulations, economic incentives, financial mechanisms and information disclosure instrument, the private sector is gradually changing production behaviour towards energy decoupling.

Based on the country's representation at COPs and its involvement in national IACMs, civil society seems to have played a more active role in India than in other countries. Reflecting differences in how governments view civil society, Japan seems to be concerned about the legitimacy of civil society as formal representatives at COPs and in the national IACM, while India has domestic legislation to empower the participation of civil society. In general, independent civil society plays a limited role in China compared with the other countries. However, environmental civil society groups are more active than others (e.g. those focusing on societal issues). The ROK is located in between by including representatives from the Presidential Commission on Sustainable Development in its national delegations. When a country moves to the grassroots implementation stage addressing mitigation and adaptation, civil society can be expected to participate more actively in raising public awareness, educating people, supporting research and surveys, disseminating information and monitoring the progress towards achieving national targets on climate change.

Academia has played an active role in most domestic activities related to climate change. Government-affiliated or independent institutes have supported R&D, international negotiations, national GHG inventories, scientific information and data and climate policy making. In the ROK, the inclusion of academics as an expert pool in the IACM from

the outset is a distinctive characteristic. In China, government-affiliated research institutes and national universities are included in domestic CDM approval processes. Academics in the ROK (18%) and China (22%) (see Table 10) have a high proportion of national representation at COPs. In India, scientists and experts participate in the IACM in their personal capacity and Indian research institutes have been very active members in the conduct of significant region-wide and international climate research activities. In all countries, research institutes provided technical support to develop a GHG inventory for their national communication.

5 Conclusions and recommendations

Based on the comparative study across four countries, several tentative conclusions and policy recommendations regarding national institutional development response to climate change in Asia emerge.

First, there is no 'ideal' institutional arrangement that can work well for all countries. Nevertheless, IACMs as a national institutional response to address climate change are clearly more appropriate than fragmented approaches to combat climate change, a complex issue that cuts across almost all sectors. In response to climate change–related matters at both international and domestic levels, IACMs may prove to be effective institutional arrangements to deliver, among others, (1) a consistent national strategy and position for international negotiations; (2) a coherent and coordinated domestic action plan guiding the fulfilment of international commitments and respective national goals related to climate change; and (3) effective nation-wide implementation. IACMs may also act as a mechanism to further promote and ensure wider participation of other stakeholders in policy-making processes and in implementation stage.

Second, countries considering an IACM as a national institutional arrangement to address climate change can adopt the hierarchical model, tiered into executive leadership, leading agencies and other participating agencies as a practical option. To ensure efficient and effective overall coordination, the Prime Minister/President (or representatives on their behalf) should provide strong leadership to coordinate competing or conflicting interests among ministries related to climate change and coordinate local governments and other stakeholders. To integrate mitigation and adaptation in the NAP and to ensure its implementation, the industry/energy agency (for mitigation) and the environment agency (for adaptation) should be empowered as leading agencies among other ministries. Other sectors contributing substantially to national GHG emissions (e.g. agriculture, transportation and construction, etc.) or related to adaptation (e.g. meteorology, agriculture, forestry, water resources, maritime affairs, public health and public affairs, etc.) should be included as additional participating agencies. Furthermore, an effective IACM should also empower other stakeholders to play active roles, in particular at the implementation stage.

Third, although most IACMs were established as an institutional mechanism in response to climate change at both the international and domestic levels, it is timely for all countries to shift their national emphasis from international negotiations to domestic actions addressing mitigation and adaptation. It is also important for all countries to move forward from climate change as a standalone national agenda to being part of the ongoing national sustainable development effort. Experiences from current international and national political processes for sustainable consumption and production under the Marrakech Process could provide valuable lessons.

Among the selected countries, due to different domestic circumstances and international commitments, Japan, the ROK and China possibly have more advanced institutional capacity than India. If each country needs to make more substantial efforts to address climate change in the future, there seems to be room for improvement in domestic institutional arrangements. In Japan, the overall coordination of the executive leadership could be strengthened to ensure effective implementation. In China, empowerment of the environment agency in the national IACM and strengthening the implementation of national action plans could be considered. More effective mechanisms to mobilise participation of civil society could be established in Japan, the ROK and China. NAPs could be considered in India to provide overall guidance to domestic implementation. Integration of climate change into national sustainable development planning and implementation could be promoted in all countries.

The final goal of effective institutions is to achieve grassroots behavioural change. Unless the relations between specific institutional arrangements and associated behavioural changes are understood, the effectiveness of institutions cannot be assessed. Although some success factors for establishing an ideal institutional arrangement were identified, this does not help to assess the effectiveness of real-world institutional arrangements in achieving tangible climate change outcomes. This remains a challenge for future research.

Acknowledgments The authors would like to thank the many useful comments received from Norichika Kanie, Yukari Takamura, Yasuko Kameyama, Peter King, Akio Morishima, Mark Elder and Eric Zusman during the research, and to Hisakazu Kato, Yong Ren, Shinichi Okuda for invaluable comments during the write-up. Thanks would be given to Hidenori Nakamura and Mario De Leoz Muzones for their contributions to case studies on Japan and India. We are also grateful to all interviewees in Japan, the ROK and India for their helpful information. We would like to give our sincere thanks to two anonymous reviewers and to Harro van Asselt and Agni Kalfagianni for their valuable comments. Thanks also to Peter King for English editing.

References

Bjørkum, I. (2005). China in the International Politics of Climate Change: A Foreign Policy Analysis. The Fridtjof Nansen Institute (FNI) Report 12/2005. Retrieved from http://www.fni.no/doc&pdf/FNI-R1205.pdf.

China Civil Climate Action Network. (2007). Retrieved December 16, 2009 from http://www.c-can.cn/about.

Government of Japan. (2005). The Kyoto Protocol Target Achievement Plan. Retrieved November 15, 2007 from http://www.kantei.go.jp/jp/singi/ondanka/kakugi/050428keikaku.pdf.

International Monetary Fund. (2007). World Economic Outlook Database: Spillovers and Cycles in the Global Economy. Retrieved September 25, 2007 from http://www.imf.org/external/pubs/ft/weo/2007/01/index.htm.

Japan for Sustainability. (2008). Japan Establishes Cabinet Advisory Panel on Climate Change. Retrieved April 23, 2008 from http://www.japanfs.org/db/2057-e.

Kameyama, Y., Sari, A. P., Soejachmoen, M. H., & Kanie, N. (Eds.). (2008). *Climate change in Asia: Perspectives on the future climate regime*. Tokyo: United Nations University Press.

Kanie, N. (2004). Global environmental governance in terms of vertical linkages. In N. Kanie & P. M. Haas (Eds.), *Emerging forces in environmental governance* (pp. 86–87). Hong Kong: United Nations University Press.

Keidanren, N. (1997). Voluntary Environment Action Programme. Retrieved December 18, 2007 from http://www.keidanren.or.jp/japanese/policy/pol133/index.html.

Keidanren, N. (2008). Voluntary Environment Action Programme (on Parts Related to Climate Change): Fellow-up Report 2008. Retrieved 18 December 2007, from http://www.keidanren.or.jp/japanese/policy/2008/085/honbun.pdf; http://www.keidanren.or.jp/japanese/policy/2008/085/besshi1.pdf.

Korean Council for Local Agenda 21. (2008). Local Agenda 21. Retrieved April 16, 2008 from http://www.la21.or.kr/eng/part2/p2_1.htm.

Kyoto Mechanisms Information Platform. (2007). Local CDM Centres. Retrieved December 27, 2007, from http://www.kyomecha.org/pf/china.html.
Merinews. (2008, February 7). Prime Minister Lists Priorities for Sustainable Development. Retrieved April 8, 2008 from http://www.merinews.com/shareArticle.do?detail=Print&articleID=130028.
Ministry of Economy, Trade and Industry. (2008). The Central Government Council on the Environment: Committee on Global Environment. Retrieved March, 25, 2008 from http://www.env.go.jp/council/06earth/gaiyo06.html.
Ministry of Environment and Forests. (2004). India's Initial National Communication to the UNFCCC. Retrieved September 10, 2007 from http://unfccc.int/resource/docs/natc/indncl.pdf.
Ministry of Environment and Forests, Ministry of Power. (2007). India: Addressing Energy Security and Climate Change. Retrieved October 25, 2007 from http://envfor.nic.in.
Ministry of Science and Technology. (2007). China's Science and Technology Action Program Addressing Climate Change. Retrieved November 16, 2007 from http://www.ccchina.gov.cn/website/ccchina/upfile/file198.pdf.
Ministry of the Environment of Japan. (1998). The Law Concerning the Promotion of Measures to Cope with Global Warming. Retrieved October 30, 2007 from http://law.e-gov.go.jp/htmldata/h10/h10ho117.html.
Ministry of the Environment of Japan. (2006). Survey Report on the Implementation of Related Laws to Promote Measures to Cope with Global Warming by Local Governments. Retrieved November 22, 2007 from http://www.env.go.jp/earth/dantai/rep-a_h180401.pdf.
Ministry of the Environment of Japan. (2008a). The Survey Report on the Implementation of the Law Concerning the Promotion of Measures to Cope with Global Warming by Local Governments. Retrieved March 13, 2008 from http://www.env.go.jp/earth/dantai/rep-a_h180401.pdf.
Ministry of the Environment of Japan. (2008b). Members of the Central Government Council on the Environment: Committee on Global Environment. Retrieved March 25, 2008, from http://www.env.go.jp/council/06earth/meibo06.html.
National Coordination Committee on Climate Change. (2007a). State Council Notification No. 18. (2007). Retrieved July 5, 2007 from http://www.ccchina.gov.cn/cn/Column.asp?NewsId=5474.
National Coordination Committee on Climate Change. (2007b). Domestic Activities. Retrieved December 21, 2007 from http://www.ccchina.gov.cn/cn/Column.asp?NewsId=8919; http://www.ccchina.gov.cn/cn/Column.asp?NewsId=8903.
National Coordination Committee on Climate Change. (2007c). Domestic Activities. Retrieved January 4, 2008 from http://www.ccchina.gov.cn/cn/NewsInfo.asp?NewsId=10296.
National Development and Reform Commission. (2007). News on the First Meeting of National Climate Change Leading Group & National Energy Conservation and Emission Reduction Leading Group. Retrieved October 17, 2007 from http://hzs.ndrc.gov.cn/qhbh/qjfzjz/t20070712_147778.htm.
National Development and Reform Commission, National Bureau of Statistics of China. (2007). Status Report of Energy Utilization of 1,000 Target Enterprises. Retrieved January 4, 2008 from http://www.ccchina.gov.cn/cn/NewsInfo.asp?NewsId=9460.
Presidential Committee on Green Growth. (2008). Introduction. Retrieved October 29, 2009 from http://www.greengrowth.go.kr/english/en_about/en_introduction/introduction.cms.
Prime Minister of Japan and His Cabinet. (1989). On the Council of Ministers for Global Environmental Conservation. Retrieved October 10, 2007 from http://www.kantei.go.jp/jp/singi/ondanka/index.html.
Prime Minister of Japan and His Cabinet. (1998). On the Guidelines for Measures to Prevent Global Warming. Retrieved October 10, 2007 from http://www.kantei.go.jp/jp/singi/ondanka/9806/taikou.html.
Prime Minister of Japan and His Cabinet. (2007). On the Seven Ministers' Meeting in Response to Global Warming. Retrieved October 10, 2007 from http://www.kantei.go.jp/jp/hukudaphoto/2007/10/18ondanka.html.
State Council. (2006). China's State Council Document (2006) No.28: Decision on Strengthening Energy Conservation Work. Retrieved October 17, 2007 from http://www.gov.cn/zwgk/2006-08/23/content_368136.htm.
State Council. (2007). China's State Council Document (2007) No.18: Circular on the Establishment of National Climate Change Leading Group & National Energy Conservation and Emission Reduction Leading Group of the State Council. Retrieved July 5, 2007 from http://www.ccchina.gov.cn/cn/Column.asp?NewsId=5474.
The Indian Express. (2008, March 19). Permanent Group on Climate Change. Retrieved March 25, 2008 from http://www.indianexpress.com/printerFriendly/286186.html.

United Nations Department of Economic and Social Affairs. (2007). Institutional Aspects of Sustainable Development in India. Retrieved January 4, 2008 from http://www.un.org/esa/agenda21/natlinfo/countr/india/inst.htm.

World Bank. (2007). The Little Green Data Book 2007. Retrieved October 25, 2007 from http://www.sitesources.worldbank.org/inteei/936214-1146251511007 7/21329572/LGDB2007.pdf.

World Resources Institute. (2009). Climate Analysis Indicators Tool (CAIT) Version 7.0. Retrieved December 16, 2009 from http://cait.wri.org/.

Xinhua Net. (2007). Scientific Approach of Development. Retrieved November 19, 2007 from http://news.xinhuanet.com/ziliao/2005-03/16/content_2704537.htm.