

# OVERCOMING BARRIERS TO CLIMATE ADAPTATION: ROLE AND COMPARISON OF INTERNATIONAL NETWORKS

Kazuya YASUHARA<sup>1\*</sup>, Makoto TAMURA<sup>1</sup>, Frank H. LING<sup>1</sup>, Prabhakar S.V.R.K.<sup>2</sup> and Srikantha HERATH<sup>3</sup>

<sup>1</sup>Institute for Global Change Adaptation Science, Ibaraki University  
(2-1-1 Bunkyo, Mito, Ibaraki 310-8512, Japan)

<sup>2</sup>Institute for Global Environmental Strategies  
(2108-11 Kamiyamaguchi, Hayama, Kanagawa 240-0115, Japan)

<sup>3</sup>United Nations University  
(5-53-70 Jingumae, Shibuya-ku, Tokyo 150-8925, Japan)

\* E-mail: yasuhara@mx.ibaraki.ac.jp

Ongoing international climate negotiations are putting greater emphasis on the need for greater cooperation between developed and developing countries as well as among developing countries in order to promote climate change adaptation at all institutional levels. The pace at which adaptation is being implemented, however, does not meet the demands of climate sensitive communities due to various institutional barriers. While various adaptation networks, both globally and in the Asia-Pacific region, have recently formed to overcome these barriers, they have not met their full potential in enabling economies to become climate resilience. Among these is the lack of communication and collaboration among different domains of expertise. In this paper, we examine the role of existing networks, the stakeholders involved, operational modalities, and their expected outcomes and we identify recent activities that are helping to overcome these barriers and creating synergy by improving efficiency, strengthening coordination, and aiding in the convergence of multiple priorities.

**Key Words :** *Network, Adaptation, Climate change, Asia-Pacific region, Synergy*

## 1. INTRODUCTION

Many parts of the world are now experiencing adverse impacts of climate change such as intensified floods, droughts, heat waves, brush fires, and irreversible changes in natural ecosystems. The Asia-Pacific region is especially vulnerable to climate change impacts because of high poverty, high dependence on primary sectors such as agriculture, rapidly growing and unplanned urbanization, and poor developmental governance (IPCC, 2007)<sup>1)</sup>. In recognition of such climate change impacts and vulnerability, there is an urgent need for both developing and developed countries to implement adaptation (Tamura and Mimura, 2011)<sup>2)</sup>. Although numerous measures are already contribution to climate adaptation in the Asia-Pacific region, they are limited by the lack of a proper scientific basis for decision-making, the lack of coordination across numerous stakeholders, and limited resources to implement their strategies at scale. Recently, various climate networks for

researchers, policy makers, NGOs, practitioners have emerged to connect various resources and strengths available within and across regions. In spite of their potential, there are large inefficiencies due to the duplication of efforts and lack of coordination among both technical and policy-oriented communities.

In order to overcome these barriers, positive interactions are needed among different networks to coordinate adaptation goals across multiple priorities and overcome limited technical, financial, and institutional capacities. This paper examines the strengths of existing networks and how recent initiatives in Japan, supported by the Ministry of Environment and educational programs, are helping to create synergies among them to precipitate a unified but also active community for sharing knowledge, resources, and capacity for climate adaptation in the Asia-Pacific region.

## 2. ROLE OF INTERNATIONAL NETWORKS FOR PROMOTING ADAPTATION

The Conference of Parties to the United Nations Framework Convention on Climate Change (UNFCCC) has recognized the importance of networks in promoting climate change adaptation. Ongoing international negotiations have also underscored the need for greater cooperation for sharing resources among developed and developing countries and the need to learn from each other in promoting climate change adaptation at all levels of governance.

As a result, adaptation networks supported by multilateral organizations have formed rapidly in the Asia-Pacific region. These include ADB, APN, UNEP, UNU, etc. All networks whether at the international, regional or national levels should be able to play the following roles: (i) collecting information related to adaptation and vulnerability assessment through existing networks such as UNEP-APAN, APN, and UNEP; (ii) disseminating

new information through S-8 research activities; (iii) fostering human resources for support as experts and professionals through activities such as the UN-CECAR program; and contributing to policy-making for adaptation.

### *Comparison of Existing International Networks*

Several networks for climate change adaptation already exist at the international, regional and national levels (**Table 1** through **Table 3**). These tables are written by the contact persons in each network and adapted from their own website. Their activities are limited to the objectives of each network. However, at the moment, they have been classified into different purposes or have clarified the sharing of roles for activating society. In addition, since disaster risk management and climate change are closely related (Turner et al. 2003; Shipper, 2009)<sup>3), 4)</sup>, these tables include some networks which mainly focus on the disasters.

**Table 1** Policy-oriented adaptation networks

Name	Aims	Outline of network	Promotion for adaptation
Asia Pacific Network (APN) for Global Change Research <a href="http://www.apn-gcr.org">http://www.apn-gcr.org</a>	The network aims to help Asia-Pacific countries adapt to global-change-related challenges through promotion of science-based adaptation, policies, and capacity building by promoting collaborative efforts among and between developed and developing countries in the region and through funding of related activities.	APN is a network of 22 national governments in the Asia-Pacific region promoting global-change-related research and capacity development. Member countries appoint a national focal point and global change research expert through which national governments are represented in various meetings and decisions made by the network.	The network promotes collaborative research in global change science, funds capacity-building proposals and supports a sound scientific basis for policy formulation. It also endeavors to identify and address various global change issues through consultation with policy-makers, the scientific community, and practitioners.
UNEP Asia-Pacific Adaptation Network (APAN) <a href="http://www.apan-gan.net">http://www.apan-gan.net</a>	The network aims to develop adaptive capacity of human, ecosystem, and economic systems through capacity building and sharing of technologies and knowledge.	The Asia-Pacific Adaptation Network is the regional part of the Global Adaptation Network (GAN). The network operates through a regional hub in Bangkok, five sub-regional nodes for various parts of the Asia-Pacific region, and several national partners.	The network promotes linkages among various research and development organizations, governmental agencies, links various regional, national, and international organizations, promotes collaborative research on vulnerability and risk assessment.



Name	Aims	Outline of network	Promotion for adaptation
Regional Climate Change Adaptation Knowledge Platform for Asia  <a href="http://www.climateadapt.asia">http://www.climateadapt.asia</a>	Aims to develop adaptive capacity of developing countries through knowledge sharing among members.	The network includes more than 13 countries in the Asia-Pacific region represented by national and regional partners. The network was established by SEL, SENSE, UNEP, and RRC.AP as implementing partners. Partners represent various sectoral focus areas including disaster risk reduction, academia, private sector, and policy-makers.	The network promotes regional and national multi-stakeholder forums, helps generate new knowledge by providing guidance to national and regional partners, promotes pilot studies, and establishes knowledge-sharing mechanisms through documentation and various other media.
Adaptation Research and Policy Network for Asia and the Pacific	To promote effective networks with other adaptation and sustainable development networks in Asia and beyond, to collaboration with other like-minded networks, to encourage promising students, to make linkages between researchers and policymakers, and to proactively assist the governments to access newly available adaptation funds.	Formed by a group of policy research institutions and universities in the APN funded project countries with an aim to expand the network beyond the project countries including Philippines, Cambodia, Laos, Thailand etc.	1. Conduct regular meetings and workshops among the project partners involving researchers and policy makers to exchange solutions for adaptation decision making. 2. The publication of the network is shared among the stakeholders by hosting them on the website.

**Table 2** Education-oriented Networks

Name	Aims of organization	Outline of network	Promotion for adaptation
The University Network for Climate and Ecosystems Change Adaptation Research (UN-CECAR)  <a href="http://cecar.unu.edu">http://cecar.unu.edu</a>	1. Strengthen a diverse community of connected researchers, students, and teachers to offer expert advice to practitioners, policymakers, business people, civil society, and local groups 2. Create a platform through which participating universities will collaborate and develop multidisciplinary internationally accredited education and research programs on adaptation 3. Improve communication across academic disciplines in the region and globally 4. Produce quality education opportunities to meet the urgent need for adaptation specialists and trainers	UN-CECAR is hosted and coordinated by Institute for Sustainability and Peace (ISP) at United Nations University (UNU). Universities with higher education programs related to climate and ecosystem change-adaptation research can become members of the organization. In addition the organization is supported by advisors and resource centers which can either be individuals or research centers. A core group of leading universities, the International Coordinating Committee (ICC) is responsible for management decision making of the network.	1. Accumulating and assessing information 2. Developing education programs for adaptation 3. Advancing collaborative research for adaptation 4. Policy support and outreach 5. Developing an interface for UN-CECAR with global research and policy frameworks such as IPCC, ISDR, etc., as well as local communities for developing and implementing community-based adaptation strategies.
Asian University Network of Environment and Disaster Management (AUEDM)  <a href="http://www.auedm.net">http://www.auedm.net</a>	1. Promote environment and disaster management in higher education 2. Collaborate on field-based and policy-oriented research 3. Broaden the scope of education and learning with other stakeholders 4. Document, develop, and disseminate knowledge products 5. Provide a forum for	AUEDM is a network of universities undertaking education and research in the field of environment and disaster management. The network is hosted by the Kyoto University Graduate School of Global Environmental Studies. The network currently includes 22 members from 17 countries and regions.	1. Ensure that CCA becomes part of the formal curriculum on a multi-disciplinary level 2. Undertake field-based bilateral / trilateral projects 3. Internships with local and international NGOs 4. Publish a journal for field-based research 5. Organize workshops and meetings

Name	Aims of organization	Outline of network	Promotion for adaptation
Ibaraki University Network (IUN) <a href="http://www.icas.ibaraki.ac.jp">http://www.icas.ibaraki.ac.jp</a>	consultation, information sharing, and cooperation among universities  Ibaraki University/Institute for Global Change Adaptation Science (ICAS) has organized four research groups to promote research of "Adaptation to Climate Change Suitable for the Characteristics of the Asia-Pacific Region." 1. Development of engineering methodologies for adaptation 2. Agricultural development adapted to climate change 3. Living-sphere planning and policies for adaptation 4. Plans for safe and secure societies in the future	Observers and advisors also include those of civil society (NGOs).  1. ICAS is a trans-faculty research project through all-campus cooperation in Ibaraki University, involving members from all five colleges. 2. It attaches special importance to the fostering of human resources that can apply the achievements of adaptation science and sustainability science to solve practical problems in the Asia-Pacific region. 3. ICAS emphasizes case studies with regional themes such as desertification in China, restoration from the tsunami in Thailand, disaster control in Vietnam, agricultural technology in Indonesia, and countermeasures in the South Pacific region.	1. Impact assessment and vulnerability assessment in Japan 2. Impact assessment and vulnerability assessment in the Asia-Pacific region 3. Development of engineering and agricultural technology and policy for adaptation 4. Adaptation database in the Asia-Pacific region

**Table 3** Community-based Adaptation Network

Name	Aims	Outline of network	Promotion for adaptation
Asian Disaster Reduction and Response Network (ADRRN; Secretariat based in Kuala Lumpur, Malaysia.) <a href="http://www.adrrn.net">http://www.adrrn.net</a>	Promote coordination, information sharing, and collaboration among NGOs and other stakeholders for effective and efficient disaster reduction and response in the Asia-Pacific region.	ADRRN is a network consisting of 34 national NGOs from 16 countries across the Asia-Pacific region. With a strong footprint in the region, the network members are constantly engaged with local communities, strengthening their ability to combat disasters. ADRRN has developed and promoted partnerships among its members to implement a wide range of projects for strengthening and enhancing disaster management capacities of NGOs and local communities in Asia.	1. Training programs for members on CCA-DRR 2. Collaboration with the AUEDM on the contents related to CCA-DRR 3. Undertaking community-based projects

The following observations are made from the analysis of current adaptation networks:

- There are some redundancies. For example, there are four networks covering the subject of adaptation policy making.
- Not all types of networks are equally proliferated. For example, there are very few numbers of networks concentrating on education and curriculum development as compared to

policy related and broad-based networks.

- In some important areas such as community based adaptation (CBA), which deserves attention in most of the developing countries, there is a dearth of networks (Shaw et al., 2010; Flint, 2011)<sup>5), 6)</sup>.

Because of the mutual goals shared among the networks listed in **Tables 1** through **3**, there is a critical opportunity to amplify their impacts by



taking their respective strengths and enabling greater interactions to create a broad community of practitioner.

### 3. BARRIERS TO PROMOTING ADAPTATION

Climate change adaptation is indeed a complex topic that requires inter-disciplinary and inter-institutional processes, which are not yet fully realized. We have identified three categories of barriers that hinder adaptation (Table 4).

Among them, the most significant barriers are the lack of recognition for climate change adaptation among policy makers in both developing and developed countries, insufficient data and scientific basis for taking adaptation decisions, and the lack of sufficient financial and human resources. Moreover, there is a lack of valid methodologies to assess the vulnerability and adaptability (effectiveness of adaptation). For more information on the vulnerability assessment, see, e.g., Yohe and Tol (2002)<sup>7)</sup>, Eriksen and Kelly (2007)<sup>8)</sup>, and Swanson et al. (2007)<sup>9)</sup>.

Table 4 Barriers to promotion of climate change adaptation (Fujimori, 2009; Yasuhara et al., 2010)<sup>10), 11)</sup>

Issue as barrier	Category
-Insufficient recognition for adaptation	Leadership / Domestic Politics
-Shortage of data (Weather, Information., Vulnerability assessment)	Science and Technology
-Few reliable methodologies	
-Development policy / Priority	International negotiations
-Adaptation fund	

In addition to the barriers summarized in Table 4, other issues must also be addressed, namely, the localization of adaptation measures, integration of traditional practices with scientific advancements, harmonizing between sustainable development and climate change adaptation, avoiding mal-adaptation, downscaling climate change projections to local conditions, improving the capacity to measure and monitor adaptive capacity, mainstreaming adaptation strategies, and scaling up of community based adaptation measures (Prabhakar and Matsumoto, 2010; Nambi and Prabhakar, 2010; and Prabhakar et al., 2010)<sup>12), 13), 14)</sup>.

It should be noted that these barriers are contextual and vary across locations and countries. For example, while there are some research and project implementation tools available in certain developed countries, they are not widely available in developing countries. There is also a wide gap even among developing countries in terms of their ability to use the available information and making adaptation decisions. As for financing related issues, negotiations under the United Nations Framework Convention on Climate Change (UNFCCC) are continuing in order to enhance financial support for adaptation in the most vulnerable developing and Small Island developing states (Prabhakar and Srinivasan, 2009)<sup>15)</sup>. However, procuring and utilizing these funds in an effective manner itself requires appropriate capacity including appropriate

monitoring and reporting procedures.

### 4. WAY FORWARD

In order to overcome the various institutional barriers that have been identified in this paper, there is a need to improve the effectiveness of existing networks. Although they address aspects of climate change adaptation, it is not done in a comprehensive or systematic manner. Often there is considerable overlap in membership countries, institutions and in shared interests. As these efforts are still in early stages of development, there is an enormous opportunity for climate networks to work together and more efficiently help climate sensitive societies share knowledge and resources across geographical, administrative and political boundaries.

Based on the state of current adaptation and their aims, we believe that the three general areas of adaptation interventions can mutually reinforce each other (Figure 1). For example, there is a need for enabling policies to promote community based adaptation (CBA) and education. Experiences from CBA can feed into the formation of effective policies and design of education curriculum that is based on real-world experiences. At the same time, educational activities can help in supporting CBA and in increasing uptake among policy makers.



Fig.1 Inter-linkage between three main categories of adaptation networks

We now highlight three programs that are helping to strengthen the linkages among the three pillars of adaptation planning: the S-8-3 project, UN-CECAR, and the Ibaraki University Network.

### **PROMOTING CLIMATE ADAPTATION: SYNERGY THROUGH THE S-8 PROJECT**

Realizing the urgent need for mainstreaming science-based adaptation in the Asia-Pacific region, the Ministry of the Environment, Japan through its Environment Research and Technology Development Fund (S-8) “Comprehensive research on climate change impact assessment and adaptation policies” (FY 2010–2014), supports studies on climate change impacts and adaptation in Japan and the Asia-Pacific region

([http://www.nies.go.jp/s8\\_project/](http://www.nies.go.jp/s8_project/)). More specifically, the S-8-3 component “Research on the development of vulnerability and adaptation indices for the Asia-Pacific region” is a multi-institutional project, which supports the international climate adaptation community in exchanging information related to vulnerability and adaptation, as well as for disseminating new findings.

Ultimately, the goal of these exchanges is to enable researchers to develop tools for assessing vulnerability and adaptability at the regional and levels. Due to the great interdependency of Japan’s economy with those of Asia-Pacific countries, there is a great opportunity to encourage synergy among existing networks through (i) information collection, (ii) international conferences, and (iii) information sharing (Figure 2).

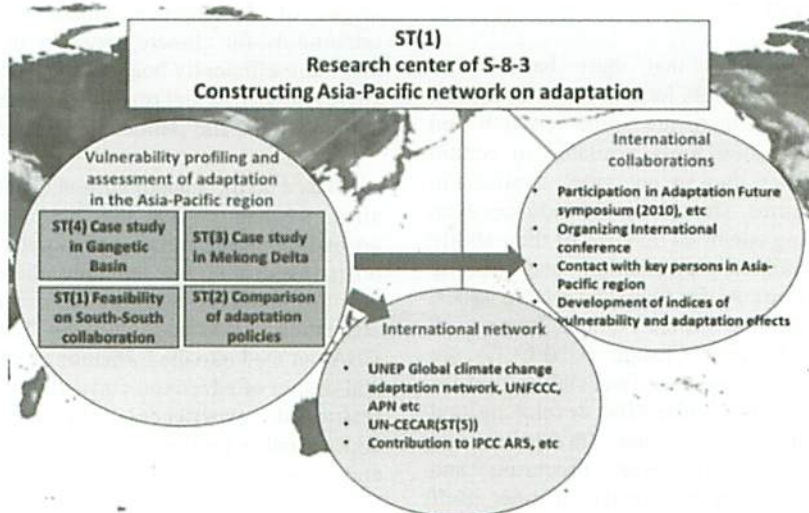


Fig. 2 Role of each sub-group of S-8-3 in strategic project S-8 by MOEJ.



The first step towards building synergy among the networks is to take stock of adaptation research in the Asia-Pacific region. The project aims to investigate existing case studies and develop adaptation guidelines for each country on vulnerability, impact assessments and countermeasures. By conducting questionnaire surveys with key experts the project identifies various aspects of global change impacts and adaptation. Through these surveys, the project will identify gaps that might hamper strategies and policies for adaptation. The project is designed to seek and support international standardization of the indices used for assessing vulnerability and adaptability. For overcoming narrow, wrongful, irrelevant application of adaptation strategies, the project also supports South-South collaboration.

In addition, preliminary consultations conducted by the authors of this paper reveal that education networks are already working with each other and with other networks to exchange lessons learned (Tamura and Yasuhra, 2011)<sup>16</sup>. However, there is a

need to make these exchanges operational and visible.

## EDUCATION-BASED NETWORKS FOR ADAPTATION

### UN-CECAR by United Nations University

The education sector is in a unique position to reach out to different stakeholders in the early stages of development and is an effective entry point irrespective of the status of each country. The proper designing and implementation of curriculum in higher education can create a momentum for mainstreaming adaptation at all levels of governance. In view of this, the project is promoting the creation and implementation of curriculum for higher education in various scientific fields relevant for climate change adaptation through the network 'UN-CECAR' (Figure 3).

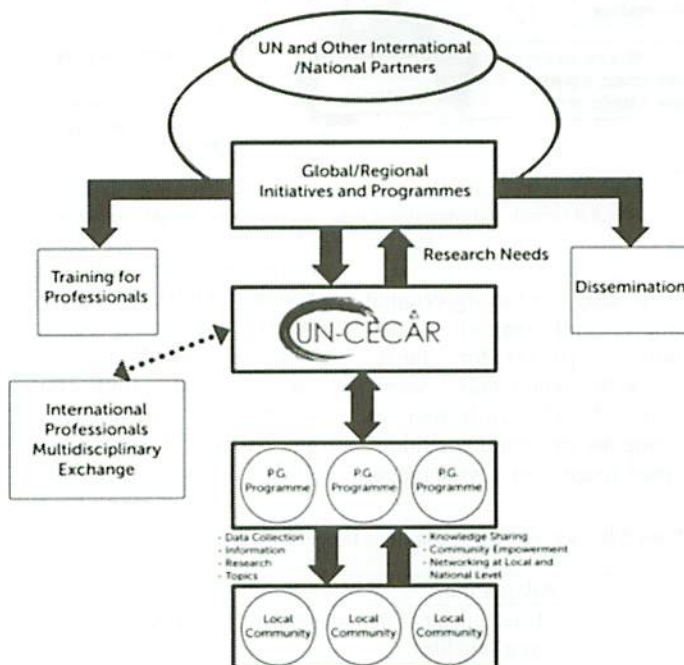


Fig. 3 Outline of UN-CECAR organized by United Nations University.

The United Nations University has been developing UN-CECAR as an international academic platform to strengthen education and research for long-term climate change adaptation. The overall aim of UN-CECAR is to reduce vulnerability to impacts of climate change in the Asia-Pacific by building

climate-risk resilient societies and to enhance local adaptive capacities through higher education institutions.

### Ibaraki University's Network (Figure 4)

At Ibaraki University, the Institute for Global Change Adaptation Science (ICAS) is leading an effort to bring (i) researchers across scientific and social fields together and (ii) various climate networks together to promote discussions among them. With a foundation for conducting research in disaster risk reduction, Ibaraki University is well suited to promote climate adaptation research across various disciplines (Thomalla et al., 2006)<sup>17)</sup>. As one

of its recent activities, the university hosted the international conference “Promoting Synergies Among Adaptation Networks in the Asia-Pacific Region” on January 2011. With participants from twelve countries and representatives and leaders from the major adaptation networks as discussed in Section 2, valuable exchange of ideas and perspectives took place.

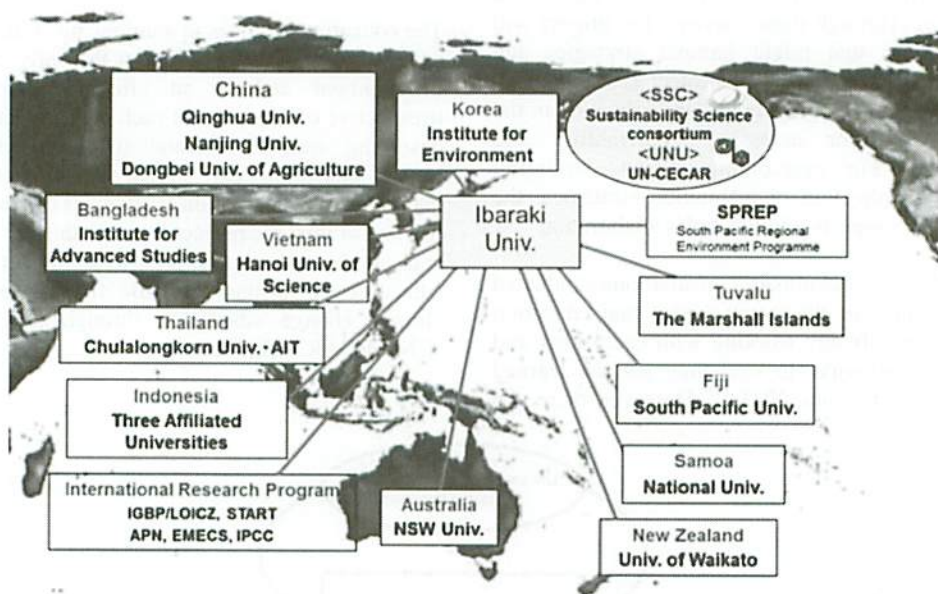


Fig.4 Research and educational network formed by Ibaraki University.

Ibaraki University is also conducting original research developing information and communication technologies (ICTs) for climate adaptation. To cope with compound events, adaptation strategies include the collection of information for monitoring the structural conditions of infrastructure and urban space over a wide range,

using application of ICT such as global positioning systems (GPS), geographical information systems (GIS), and remote sensing (RS), designated as “3S-ICT”. In addition, sensing IC-tags in 3S-ICT are also planned. Thus, this combined group of technologies is designated as “4S-ICT” (Yasuhara et al., 2010)<sup>18)</sup>. A summary of each ICT tool within 4S-ICT is shown in Table 5.

Table 5 Roles of 4S-ICT in adaptation to climate change (Yasuhara et al., 2010)<sup>11)</sup>

Tool	Adaptation
RS	Measurement of time-dependent variations of meteorological conditions using satellites
GPS	Measurement location information of infrastructure including natural environments
Sensor IC-Tag	Time-dependent health monitoring of infrastructure
GIS	Decision of critical values of natural environments, based on mapping of CO <sub>2</sub> density and other environmental information over wide ranges of objective areas



Advantages of sensing IC-tags include the following:

- availability for collection of information for long-term and large-scale infrastructure such as embankments or bridges and widely various aerial spaces
- availability of many locations for infrastructure and aerial spaces
- cost savings

For adaptation against global warming-induced single or multiple natural disasters, innovative 4S-IC technology can facilitate selection of a proper adaptation strategy or policy corresponding to individual situations of the appropriate site.

## 5. CONCLUSION

In spite of the urgency to address climate adaptation, especially in developing economies of the Asia-Pacific region, many of these efforts are constrained by administrative and geopolitical limitations. With continuing integration of the economies in the region, Japan can not only take a lead in facilitating adaptation capacity building in the Asia-Pacific, it can become more secure by empowering those economies, which Japan is inter-dependent on. This paper has identified several networks that are promoting adaptation in the Asia-Pacific region and how activities supported by the Japan's universities and the Ministry of Environment are spurring discussions among these seemingly disparate groups. There is still and unrealized potential for stakeholders to come together and form a broader community for sharing science-based information and knowledge for through cross-collaboration in education, scientific research, and information and communication technologies, which are still critically lacking in many developing countries. These activities identify best practices in both Japan and developing countries. Moreover, they foster synergistic strategies that make the best use of limited resources and help to overcome competing priorities including the reduction of poverty, pollution and greenhouse gas emissions. Nevertheless, in facilitating these collaborations, care should be taken so that no individual networks are marginalized as they each have their strengths and diversity is the key to the success of the broader adaptation research community. This means that the networks should continue to have their distinctive role and identity within the adaptation domain while maintaining

'bridges' with other networks.

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