

Bhutan Pilot Programme: Can Bhutan be a frontrunner of Leapfrog in Asia?

LCS-RNet will start pilot research on the impacts of integrated low carbon and resiliency - policy responses to climate change on the development path of Bhutan. We conducted preliminary research in fiscal 2015, and will get into full-scale research from fiscal 2016.

The development paths developing countries pursue as they address climate change are one of the keys to climate stabilisation. While the reduction of greenhouse gas emissions is undoubtedly essential for emerging nations currently undergoing rapid development, least developed countries may also end up on development paths that follow the same course as rapidly advancing developing countries.

However, over the long term of the next 50 to 100 years, countries all around the world will aim to transition to low-carbon societies that enjoy prosperous lifestyles achieved through low energy consumption, based in renewable energies for the majority of the energy consumed, while also working towards building just such a society. This transition is impeded by the lock-in of conventional infrastructure and social structures in both developed countries and rapidly advancing developing countries.

Meanwhile, least developed countries already have societies with low energy consumption that use renewable energies, and they have a free hand in that they are unconstrained by lock-in. If these countries pursue prosperity starting from this foundation, they have the potential to achieve a new "leapfrog" type of development when moving towards a low-carbon world.

Bhutan enjoys tremendous hydropower potential (1.5 million KW at present), most of which is already being converted to electricity nationwide, with 95% of its surplus electric power sold to India. Forests, which account for 72% of national land, are protected by the King's decree. Appropriate forest use policies make possible the foundation that enables Bhutan to become a low-carbon nation based on 100% renewable energy use.

Toward carbon neutral nation

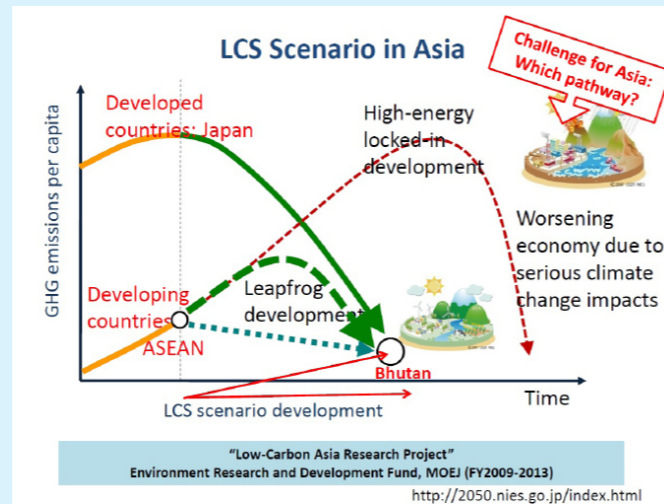
In fact, within its Intended Nationally Determined Contributions (INDC), Bhutan aims to be a carbon neutral nation. Furthermore, the intentions of the nation are also clear. Having reconsidered approaches attaching excessive importance to the perspective of economic growth, Bhutan has set forth indicators of well-being (Gross National Happiness) as the orientation of its national development and advocates for the importance of development that contributes to the well-being of its citizens, based on four pillars: (1) economic growth and development, (2) preserving cultural heritage and passing down and promoting traditional culture, (3) protecting the rich national environment and using it sustainably, and (4) good governance. Citizens' support for these national policies is grounded in not only strong trust in the King's rule, but also in policy-making well-grounded in community-level discussions.

Possibility of Leapfrogging

Conceivable issues for leapfrog-type development include (1) the potential considerable impacts of climate change (on agriculture,

on hydropower) on low-carbon development in an economy that is dependent on vulnerable nature in mountainous terrain; (2) the potential to set forth a concrete and decisive pathway toward low-carbon development against a backdrop of being propelled by a wave of modernisation (from the perspective of energy self-sufficiency and air pollution mitigation, there is a push to introduce electric vehicles in light of an increase of 70,000 vehicles already); and (3) the potential for national government policy to maintain this course during the present period of economic development in the face of development which may be desired by the people, namely the development style advanced nations pursued.

A small country with a population of 700,000, Bhutan is unique in its geopolitical position, due to its geographical location, as well as its environmental conditions in a mountainous region. Thus, although Bhutan has the potential to become a pioneer in leapfrogging, it may not be able to set precedents for other countries. However, if even one independent country is able to successfully leapfrog to a low-carbon society, other countries will not be able to claim such a transition "cannot be done." In this respect, positioning Bhutan as a flag-bearer and front-runner of developing country leapfrogging would act as a driving force for a transition to a low-carbon global society.



Target of the research

Taking this perspective, this research will (1) clarify the necessity of (globally) integrated climate change mitigation and adaptation policies; (2) show the potential for leapfrog-type development in Bhutan, a least developed country already grounded in renewable energy use, by the end of the century when, according to the IPCC report, the world must realise zero-emission societies; and (3) illustrate steps toward the Sustainable Development Goals (SDGs), thereby making it possible to propose guidelines for international cooperation in low-carbon development in Asia. At the same time, (4) on the Bhutan side, this research will provide backing for the nation's INDC and further foster a community of researchers and experts to support low-carbon development policy under the heading of climate change.

History of LCS-RNet

At their meeting in Kobe in May 2008, G8 Environment ministers recognised the need for countries to develop their own visions towards low-carbon societies, and supported the establishment of the International Research Network for Low Carbon Societies (LCS-RNet). In the G8 Environment Meeting (G8EMM) held in Siracusa, Italy, high expectations were placed on LCS-RNet, and the network was asked to report back its network is composed of 15 research institutes from seven countries.



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Further progress of LCS-RNet since COP21

Changing role of science society

Global climate policy crossed an important threshold at COP21. Now, all countries around the world are to work to reduce greenhouse gas emissions, aiming at stabilising the global temperature rise to less than 2 degrees (and working to limit the temperature increase to 1.5 degrees.) In order to achieve this target over the next half century, knowledge and wisdom from around the world must come together. In addition, capacity building hand-in-hand with technology transfer and financing are required to advance low-carbon development in developing countries. Accordingly, the creation of a research community with a sense of ownership in each country is vital to act as a long-term foundation for policy formation. Further, the international community is called on to enter the implementation stage and share scientific knowledge with non-state actors, including civil society, the private sector, the financial sector, and cities—that is, the actors that will be implementing mitigation measures. Research communities themselves must also participate in social change as change agents.

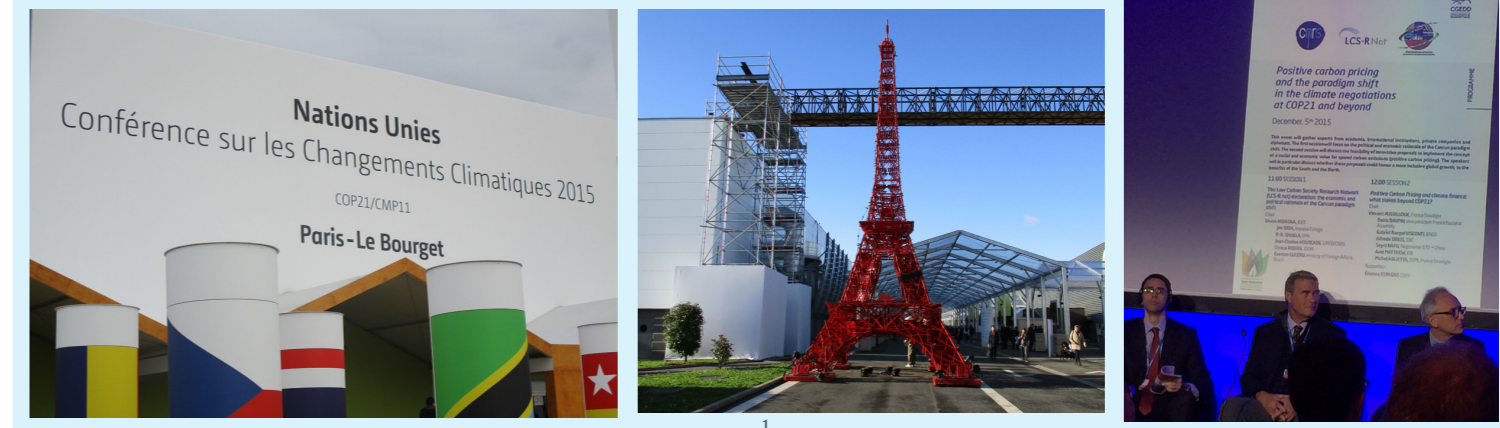
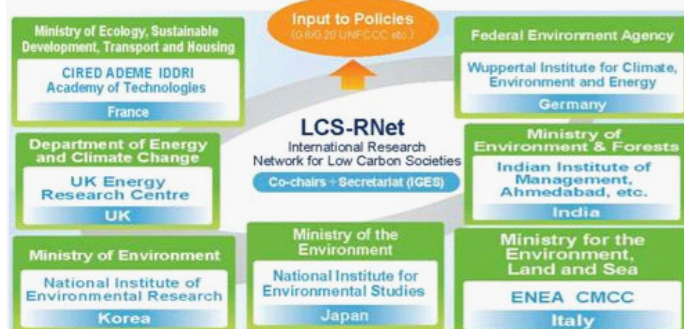
Some research groups have begun to monitor and assess the implementation process of Intended Nationally Determined Contributions (INDCs) and make proposals for improvements. With regard to the Intergovernmental Panel

on Climate Change (IPCC), in the future research groups will work to consolidate information on the current status of essential science and technology, not only globally, but also regionally and for each constituent group. Following the Paris Agreement, the role of research communities in supporting the formulation and implementation of concrete policies grounded in science has become even more important.

LCS-RNet in the next phase

Against the backdrop of such changes, LCS-RNet recognises the need to carry out new activities as a **continuing forum for discussing the future direction of research necessary for climate policies to bring about low-carbon transitions, for conducting comparative research and assessment on actual low-carbon policies being advanced in countries around the world, and formulating proposals** and will undergo a major renewal as it evolves into this new stage.

For example, the following pillars in the next page are among the urgent major issues to be addressed by the international community and the approach to be taken from the research side in order to stabilise the climate, looking toward the five-year period after COP21.



Further Progress of LCS-RNet since COP21

- The urgent major issues to be addressed by the international community.

1. **Creating a long-term (post-2050) strategy** by each country toward the realisation of carbon neutral societies in the latter half of the 21st century
2. Deploying policies in the energy, resources and urban sectors to be developed based on “**carbon pricing**” as a common global policy
3. Promoting cooperation toward “**low-carbon development**” in developing countries: consideration from the research perspective of support measures toward policy scenarios, technology transfer, and domestic institutionalisation of capacity building
4. Setting civil society, the private sector, the financial sector, cities and local groups in motion toward the transformation of society: the **promotion of partnerships between these non-state actors and research communities**
5. Establishing a **global finance system** to promote the transition toward low-carbon societies
6. **Deterring energy consumption** all throughout the consumption, distribution and production processes
7. Regional **integrated mitigation and adaptation measures** to respond to advancing climate change
8. Research communities themselves transforming into “**change agents**” promoting transition

Further development of the organisation, generating greater impact

With a view to enhancing the impacts from research communities in addressing major policy issues such as those outlined above, LCS-RNet will fundamentally aim to bring forth a sustainable world, placing climate policy at the core (by promoting linkages with the SDGs), while also working to expand the scope of its research communities in terms of geography, disciplines, and stakeholders. The Network will also work to identify effective topics for research through close discussions with target entities and disseminate research outcomes while fortifying its coordination with policies and with society.

Future steps for LCS-RNet

1. **Hold annual meetings:** Utilise reports on research, discussions of future key agenda items, and discussions of network administrative policy to accumulate knowledge and then disseminate it to national governments and others around the world.
2. **Transdisciplinary deliberation on major issues** and hold mini-workshops for joint research: small groups will deliberate closely on critical topics several times a year and the outcomes will be linked to discussions at the annual meetings
3. **Generate impact:** The Network will also place emphasis on generating impact in the course of its efforts to disseminate the outputs of its activities, making use of various meetings, media, websites and journals.
4. **Engage in close cooperation with the IPCC**



LCS-RNet Pilot Programme : Integration of Mitigation & Adaptation Policy

LCS-RNet has been carrying out **pilot programmes** conducting research on climate change adaptation and mitigation (CCA&M) in specific regions since FY2014.

In FY2014, LCS-RNet surveyed the energy transport infrastructure and floods/storm surge disaster countermeasures in Jakarta, Indonesia, and conducted research on river basin, ecosystem and flood disaster planning in Silang-Sta.Rosa subwatershed in Philippines.

The **Philippines pilot programme** continued in FY2015 in collaboration with the University of Philippines Los Banos

(UPLB), involving various stakeholders in local government. The local governments have devised a set of priority measures for CCA&M with the support of the pilot project.

The **Bhutan pilot programme**, started in FY2015, plans to develop future scenarios to examine if Bhutan can be a pioneer of leapfrog-type development to low-carbon society.

There are three steps tentatively planned:

- 1) Assessment of vulnerability to climate change;
- 2) Examination of low-carbon development potential;
- 3) Policy recommendations toward low-carbon development.

Philippines Pilot Programme: Case of Silang-Sta.Rosa

Participatory Watershed Land-use Management in the Silang-Sta. Rosa subwatershed, Philippines: An approach for mainstreaming climate change countermeasures into local planning

Significant damage to people and assets are frequently caused by weather-related disasters such as flooding in Southeast Asian countries, especially in their cities, due to climatic and non-climatic (e.g. development) changes. To address these catastrophes, it is necessary to carefully design and plan cities and land-use at the basin level.

Targeting the Silang-Sta. Rosa subwatershed, one of 24 subwatersheds in the Lake Laguna basin in the Philippines, this study develops and applies Participatory Watershed Land-use Management (PWLM) into local planning (Endo et al., 2015). PWLM is a science-based holistic approach employing practical tools such as GIS and remote sensing technologies and hydrological modelling with the aim to upgrade Comprehensive Land-Use Plans (CLUPs) by integrating countermeasures into these plans that local governments in the subwatershed are revising. PWLM also introduces participatory methods such as focus group and participatory mapping to engage local stakeholders and utilise their knowledge and skills.

The study shows that flood hazard will increase because of the expected vast conversion of agricultural and forest lands for residential, industrial and commercial use. It also shows that climate change aggravates

this situation (Figure 1). With support from the project, local governments have devised countermeasures for adapting to and mitigating climate change (Table 1). These ecosystem-based “soft” measures such as zoning enhancement and riverbank rehabilitation can avoid or alleviate this potential risk. Currently, local governments are incorporating these measures in the CLUPs as they are revised to inform future development and land-use in each municipality.

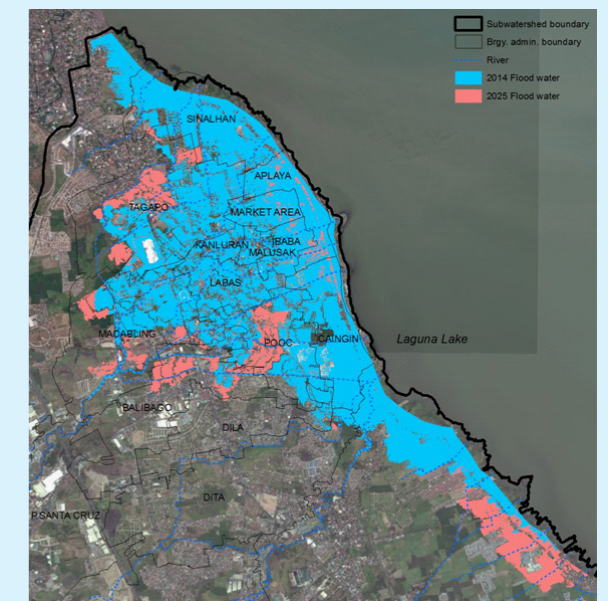


Figure 1 Flood-hazard map in the Silang Sta. Rosa watershed, Philippines.

The zones highlighted in blue and red indicates flood-prone areas expected in 2025 according to the hydrological modeling analysis based on the planned development and land-use in the watershed.

Table 1 Priority climate change actions developed by local governments with support from the project

1. Zoning enhancement To avoid and alleviate climate impact, and to sequester carbon dioxide	2. River rehabilitation To increase water retaining capacity
<ul style="list-style-type: none"> ● Enforce development controls in areas highly susceptible to flooding. ● Strengthen building codes in high-risk areas (e.g. floodwalls, elevated flooring). ● Devise a relocation plan for informal settlers residing in flood-prone areas. ● Mandate runoff mitigation measures (e.g. tree planting, water-permeable paving) where development/land-conversion is made. ● Improve enforcement of zoning ordinances. ● Harmonize land-use among local governments to manage the river basin as a whole. 	<ul style="list-style-type: none"> ● All areas <ul style="list-style-type: none"> ➢ Regular river cleanup ● Upstream area <ul style="list-style-type: none"> ➢ Protection and improvement through replanting of endemic and indigenous plant species ● Midstream area <ul style="list-style-type: none"> ➢ Rehabilitation of easement and riverbanks ➢ Construction of slope protection along riverbanks ● Downstream area <ul style="list-style-type: none"> ➢ Dredging of sediments ➢ Solid and liquid waste management ➢ Planting of endemic and indigenous plant species ➢ Improvement of drainage
3. Capacity development To build and strengthen the ability of local government to design and implement climate actions	
<ul style="list-style-type: none"> ● Needs assessments on climate change adaptation and mitigation and disaster preparedness and management ● Development of campaign materials and training modules ● Conduct of trainings and events to increase awareness and preparedness 	

References: Endo, I., Johson, B., Kojima, S., Chiba, Y., Nakata, M., Bragais, M., ... Macandog, P. B. (2015). Making land-use climate sensitive: A pilot to integrate climate change adaptation and mitigation. Retrieved from <http://pub.iges.or.jp/modules/envirolib/view.php?docid=5598>