

Co-developing Circulating and Ecological Sphere (CES) pathways for integrated and localized actions towards decarbonization and revitalization

Vibhas Sukhwani¹, Bijon Kumer Mitra¹, Sameer Deshkar², Shreya Joshi², Smita Pednekar², Miki Fukuda¹, Kaoru Akahoshi¹, Eric Zusman¹, Naoki Mori¹, Tetsuo Kuyama¹, Jun Ichihara¹, Satoshi Kojima¹, Mika Tachibana¹

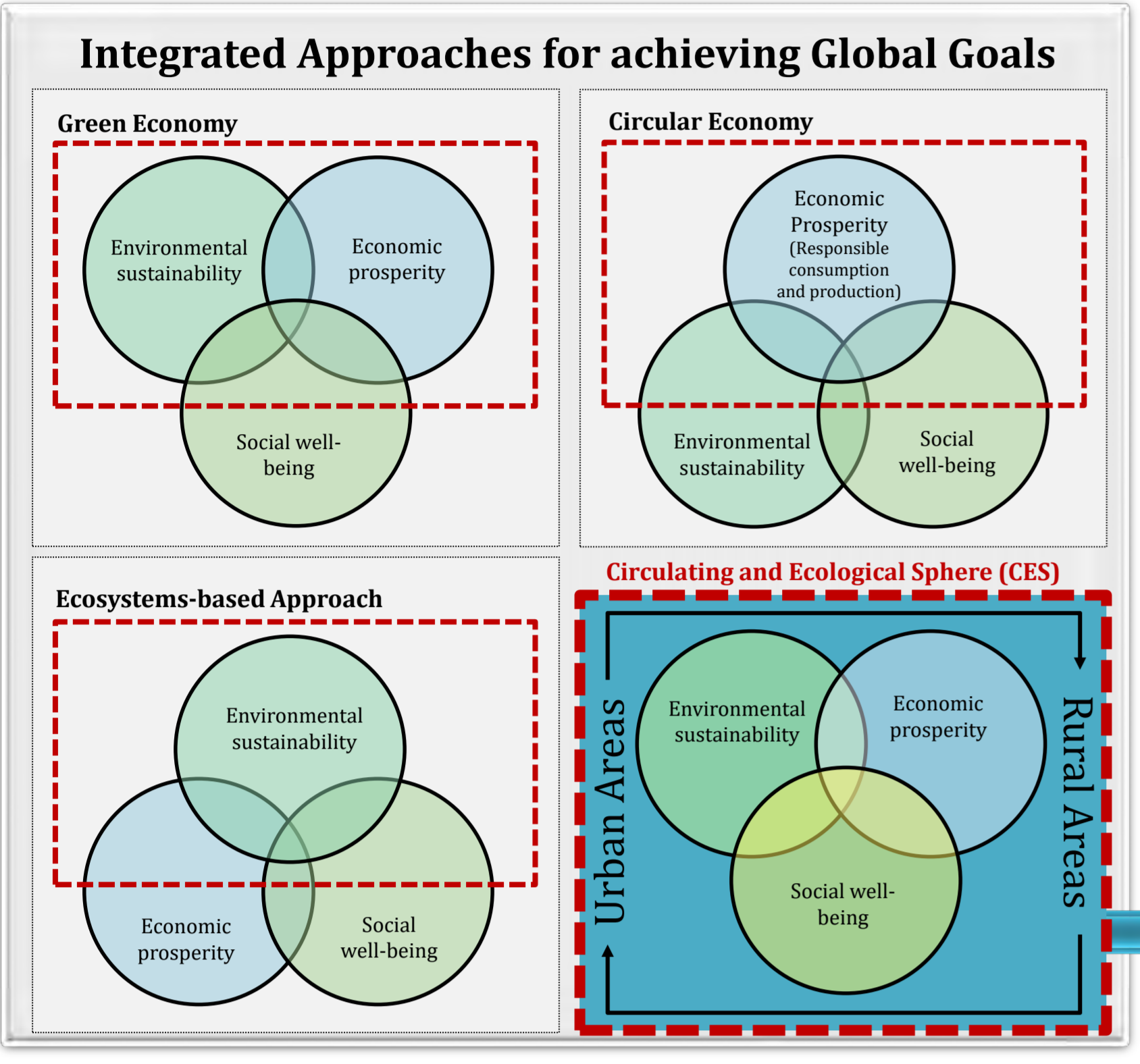
ISAP2023: The 15th International Forum for Sustainable Asia and the Pacific; Pacifico Yokohama; 19 December 2023

- Adopted in 2015, the 2030 Agenda provides a shared blueprint for sustainable development.
- At midpoint stage, almost half of the set targets show moderate or severe deviations from desired trajectory.
- The Asia-Pacific region, in particular, is not on track to achieve any of the 17 SDGs by 2030.

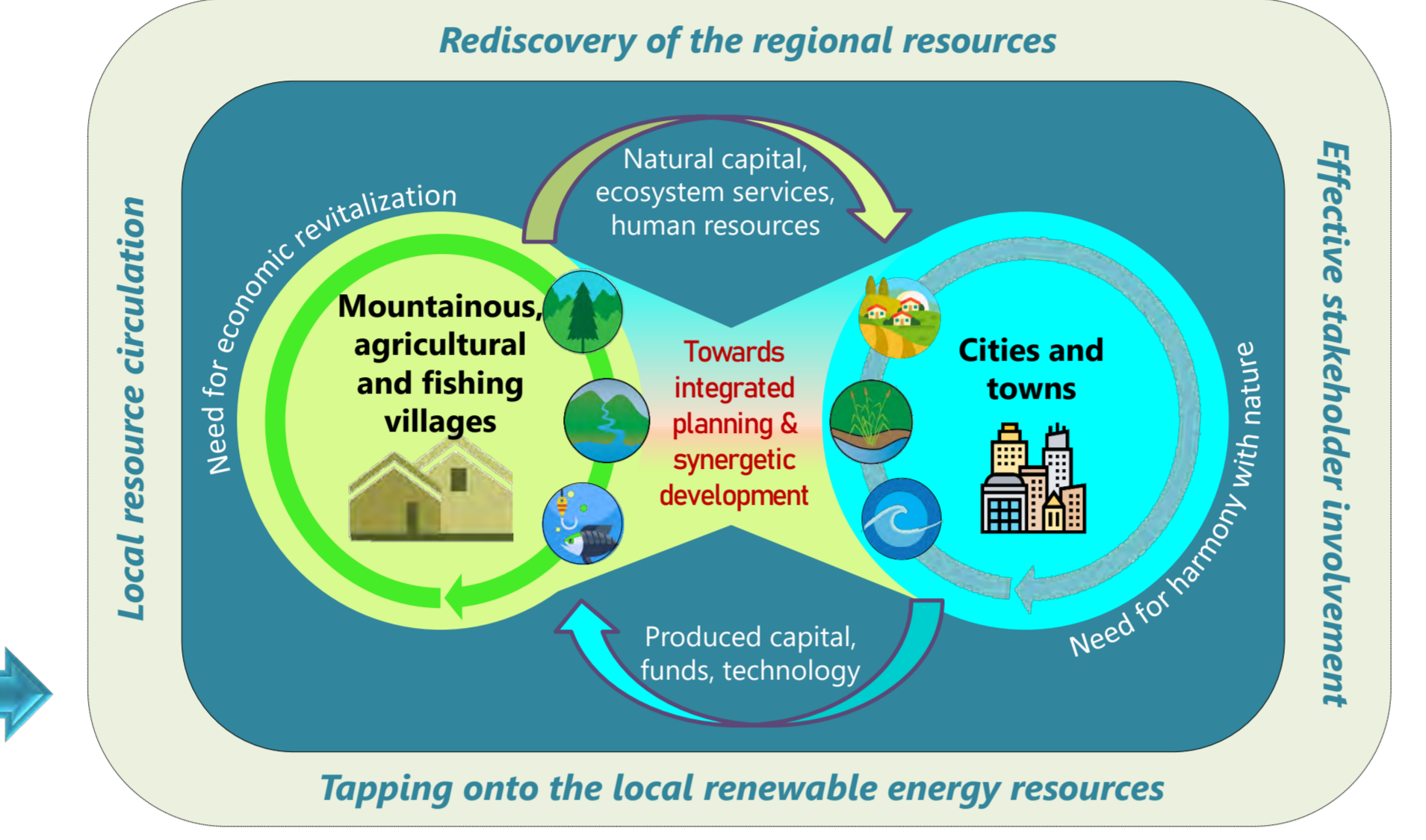
- Adopted in 2015, the framework set clear targets to achieve substantial reduction of disaster risk and losses.
- Till date, DRR planning is not sufficiently considered in policies and investments across sectors.
- The convergence of COVID-19 pandemic with natural hazards has intensified disaster vulnerability in Asia

- A legally binding international treaty on climate change to hold the increase in the global average temperature.
- Despite widespread actions, global emissions till date have not been reduced enough to meet the set goals.
- With extensive coastlines and low-lying territories, Asia and Pacific is increasingly susceptible to rising sea levels.

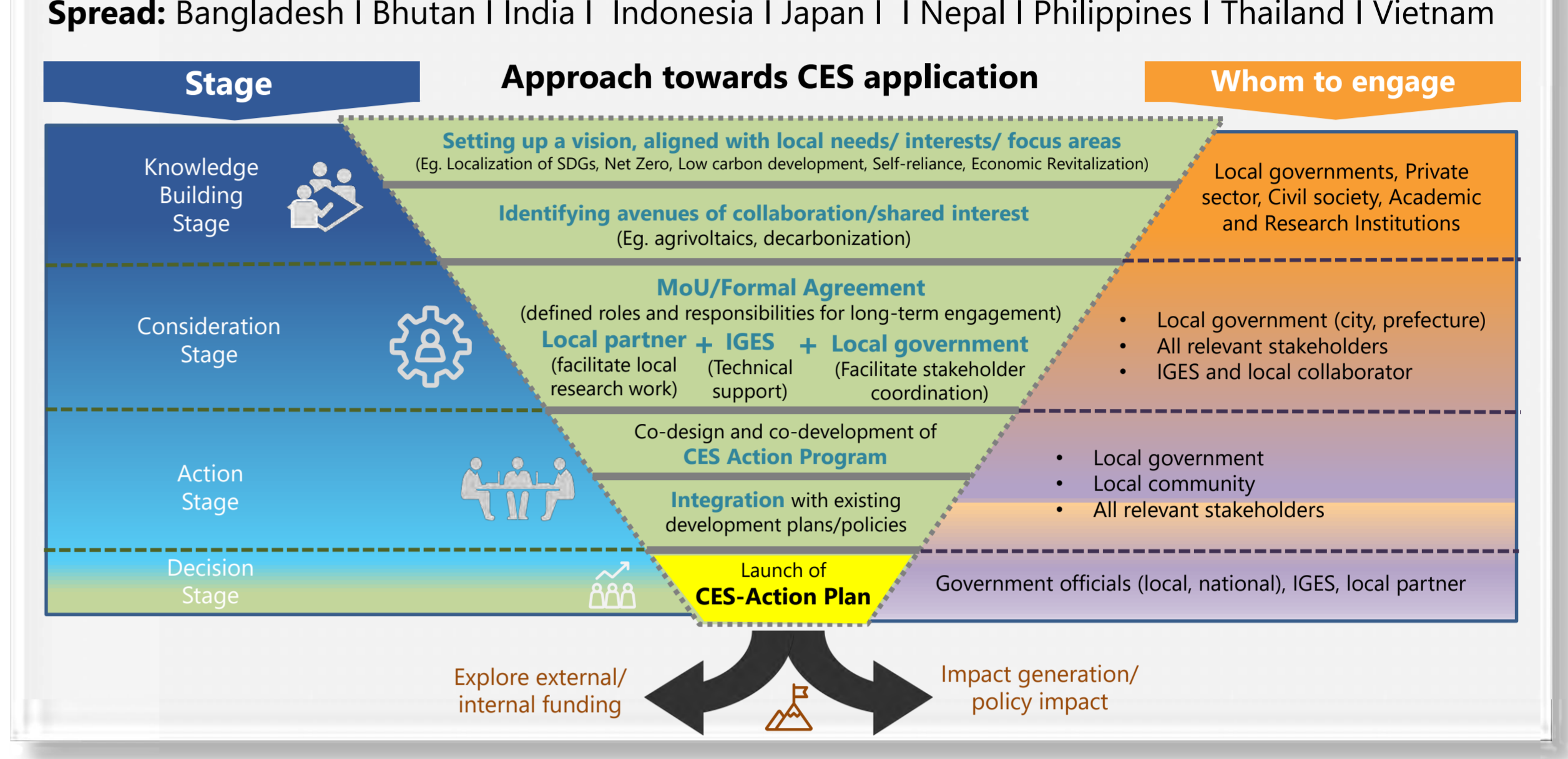
- Adopted in 2016, the agenda presents a blueprint for our shared and sustainable urban future.
- Even with fall in proportion, Asia and the Pacific still has over half a billion slum dwellers
- With rising urban population, Asian countries are likely to face water-energy-food insecurity



Emerged through deliberations on 5th Basic Environment Plan of Japan, Regional CES is an integrated policy approach (covering economic, social and environmental dimensions) to stimulate a self-reliant, decentralized and sustainable society, by capitalizing on the unique characteristics of urban-rural linkages in defined regional space, to simultaneously achieve decarbonization, optimal resource circulation, harmony with nature and economic revitalization.



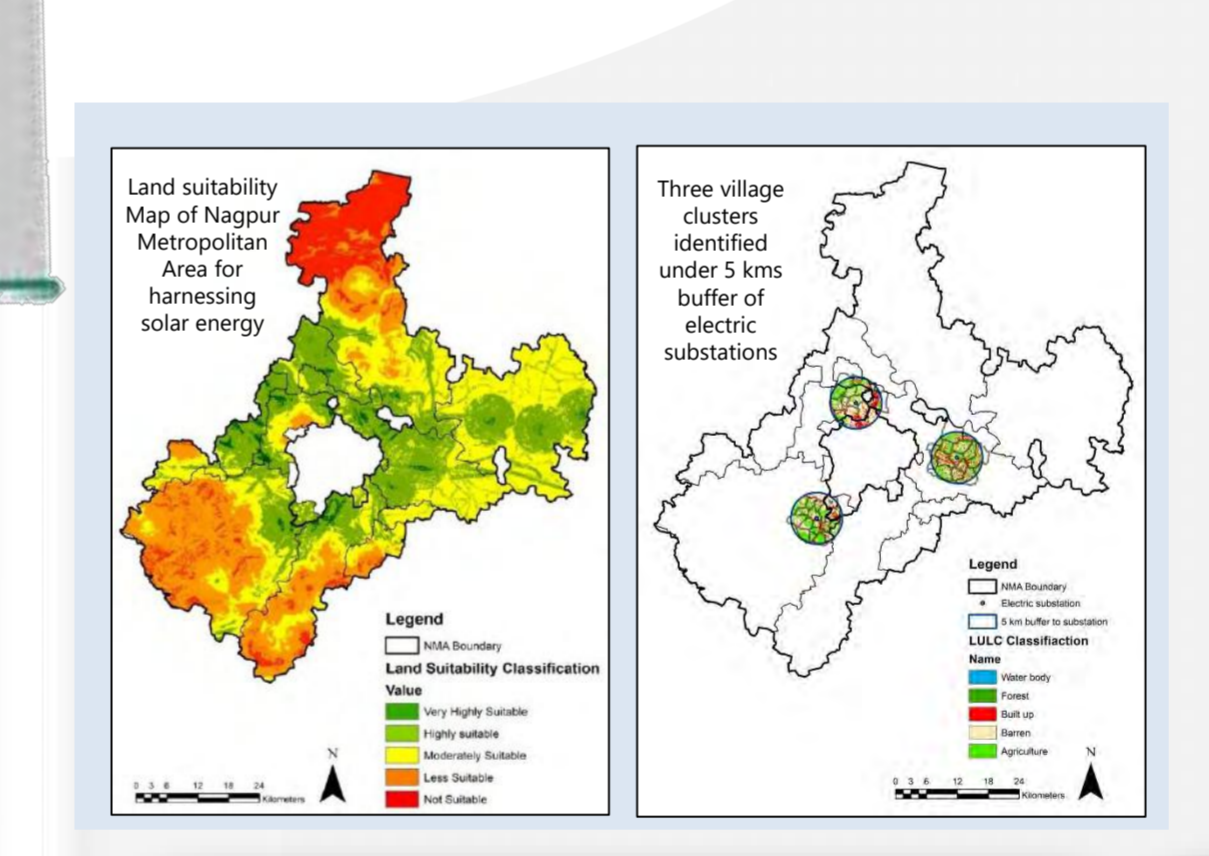
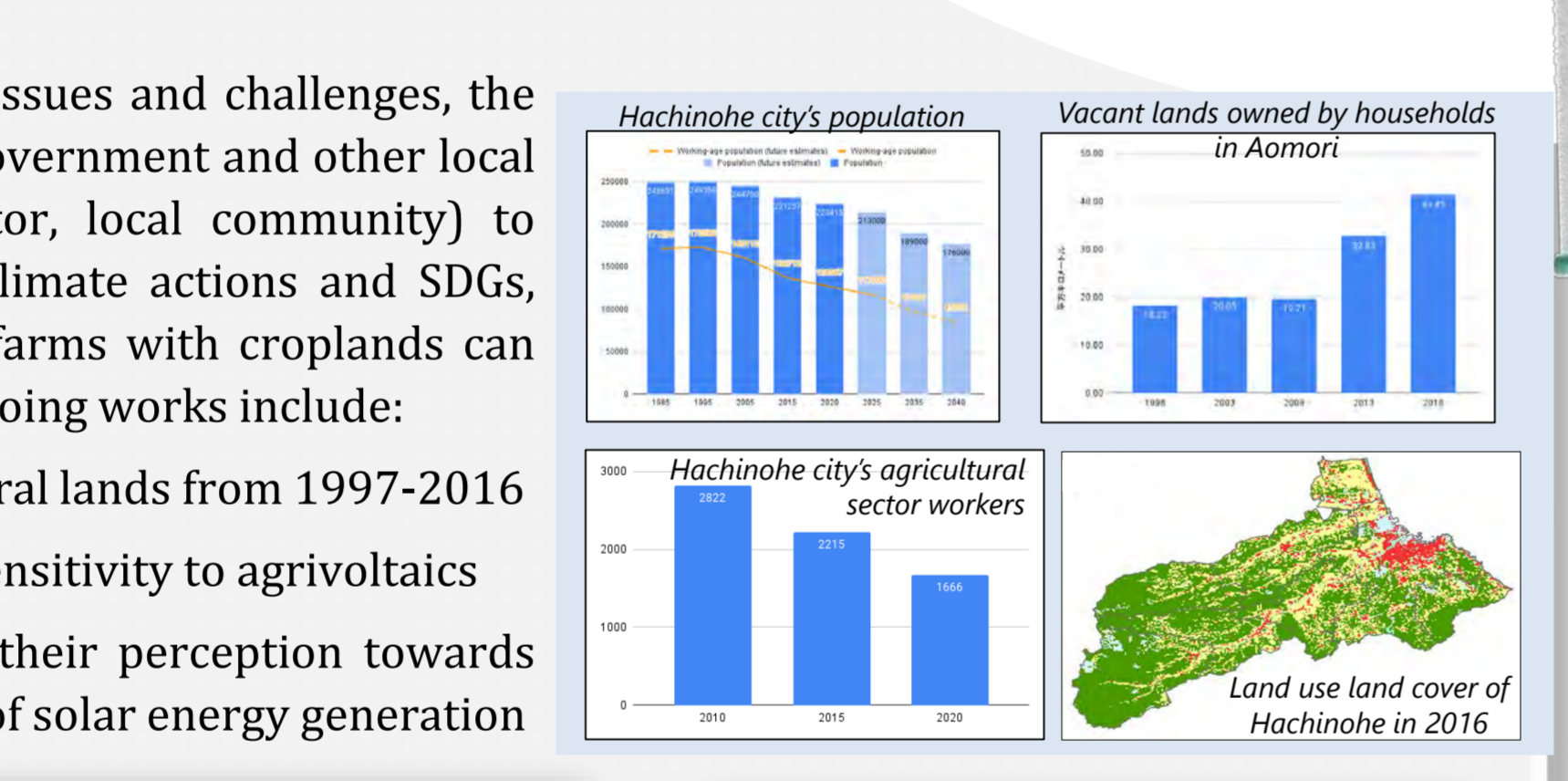
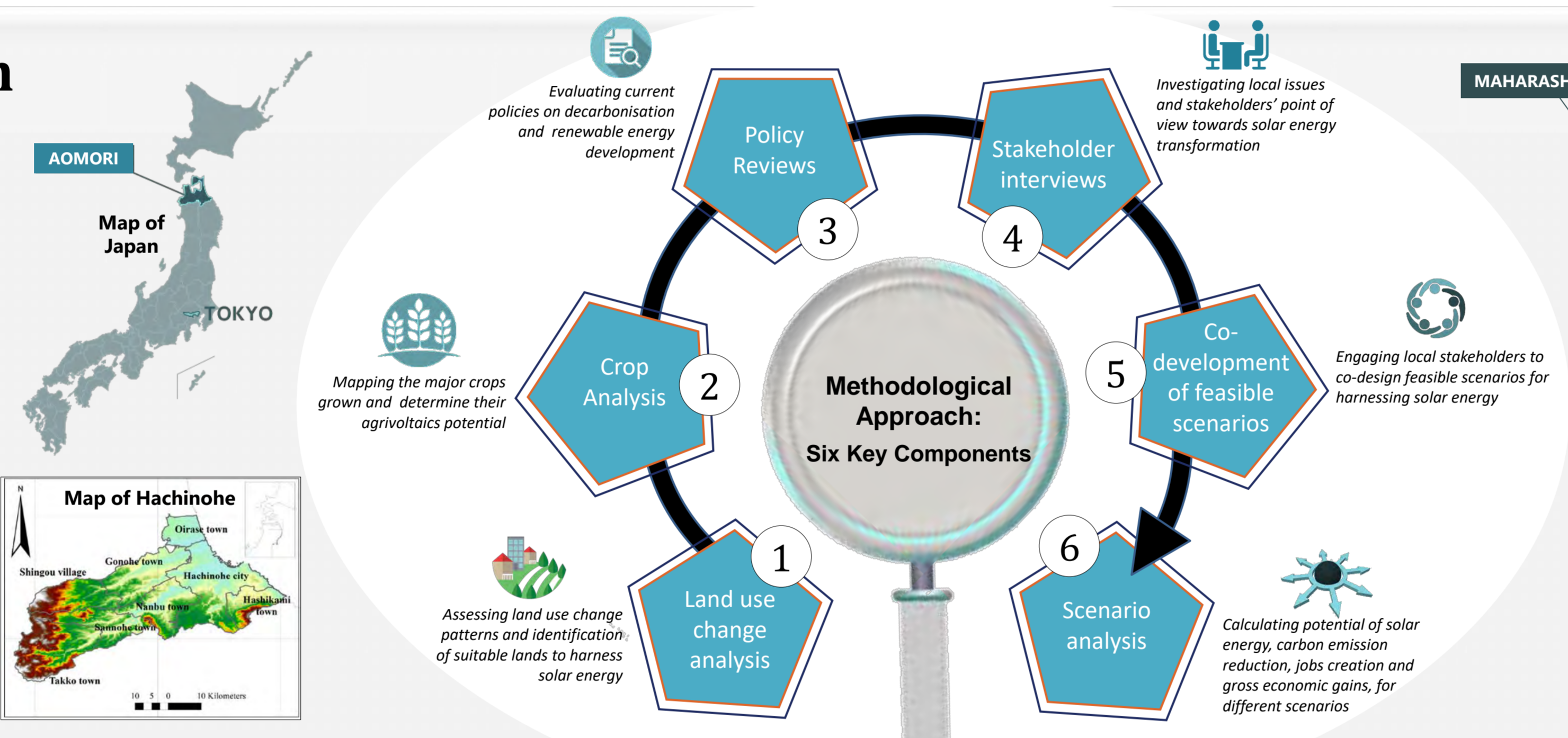
Footprint of CES in Asia: On 14 October 2021, IGES and START International, together with several leading academic and research institutes in South and Southeast Asia, signed an agreement to establish a consortium for advancing the CES concept. Ever since, IGES has been actively working with its regional partners for stimulating integrated and localized actions.



CASE ANALYSIS

Case of Hachinohe, Japan

Background: Hachinohe is a regional industrial and commercial centre in southeast part of Aomori Prefecture. Its pacific coastal areas are equipped with large-scale industrial, fishing and commercial ports and the key industries in surrounding municipalities are agriculture, livestock farming and forestry. Like many parts of Japan, Hachinohe is faced with the issue of depopulation, which is causing serious concerns in maintaining basic services. The increase in vacant houses and underutilised agricultural land further brings environmental and socio-economic challenges. Presently, Hachinohe is committed to become carbon-neutral by 2050, in lines with the Japan national government's vision. However, there is a limited clarity on policy level pathways towards stimulating local actions on it



Ongoing Research Works and Derived Results

Based on a comprehensive understanding of local issues and challenges, the IGES team is working closely with Hachinohe city government and other local stakeholders (including civil society, private sector, local community) to establish a CES-based model for localization of climate actions and SDGs, which can showcase how the integration of solar farms with croplands can support revitalization of depopulated areas. The ongoing works include:

- GIS analysis reveals a decline (8.61%) of agricultural lands from 1997-2016
- Assessing the local cropping patterns and their sensitivity to agrivoltaics
- Engaging with local community to understand their perception towards agrivoltaics and co-designing feasible scenarios of solar energy generation



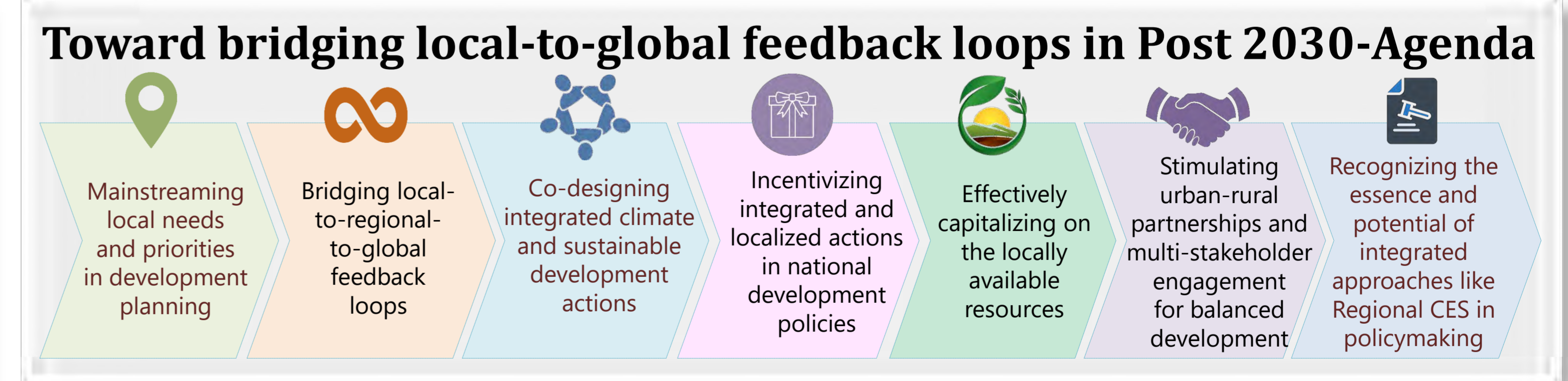
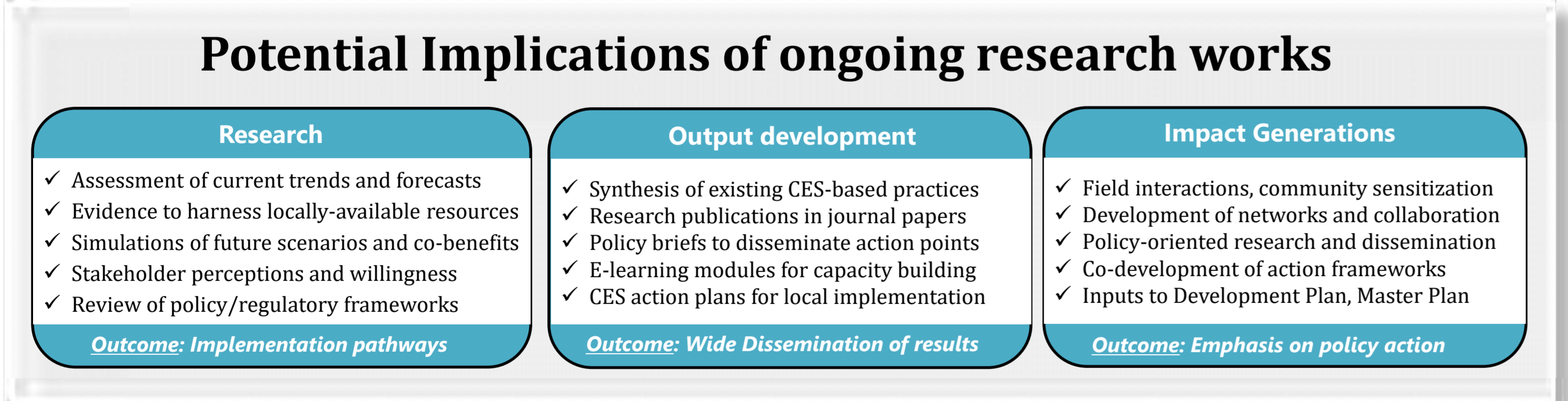
Case of Nagpur, India

Background: Nagpur is one of the fast-developing metro cities of central India and is being developed as one of 100 smart cities in India, with emphasis on sustainability and decarbonization. The wider region comprises farmlands, forests, water bodies and is a hub of industrial activity. Located in an arid zone, Nagpur experiences extremely hot summers, with peak temperatures as high as 48°Celsius. Due to rapid urbanization, population growth and changing climate, the region is faced with growing concerns of water-energy-food resource insecurity. While Nagpur city has limited renewable energy resources, the rural livelihoods are also increasingly vulnerable to climate change. Recognizing the Government of India's priority on improving farmer's incomes, it is important to bridge the urban and rural needs through circulating local renewable resources, and CES approach provides an optimal pathway.

Ongoing Research Works and Derived Results

Leveraging the vast tracts of agricultural lands in Nagpur's wider region, the IGES team is working together with VNIT and local stakeholders to enhance regional energy security through agrivoltaics systems, the co-benefits of which include improved agricultural productivity, reduced carbon emissions, water conservation and economic revitalization. The ongoing works include:

- GIS simulation reveals suitability of areas around Nagpur city for solar energy
- Three village clusters are identified for feasibility evaluation of agrivoltaics
- Co-developing village-level CES action plans, with community consultation



Acknowledgement of Ongoing projects:

 IGES funded SRF Project 'Applying CES approach for carbon-neutral city-regions and rural revitalization: Bridging local-to-global feedback loops for Post-2030 Agenda'

Wellcome Trust funded project 'Leveraging Co-benefits for a Healthy Net-zero Transitions in Japanese and other G7 Cities: A Scalable Approach for Transformative Change'

CDRI fellowship project on 'Feasibility Study for the Development of Agri-voltaic Systems to Ensure Energy Security in the Nagpur Region'



KEY REFERENCES

[1]. United Nations (2023) The Sustainable Development Goals Report 2023: Special edition, Towards a Rescue Plan for People and Planet. https://sdgs.un.org/sites/default/files/2023-07/The-Sustainable-Development-Goals-Report-2023_0.pdf

[2]. Sukhwani V, Mitra BK, Takasawa H, Ishibashi A, Shaw R, Yan W (2019) Urban-Rural Partnerships: A win-win approach to realize Regional CES (Regional Circular & Ecological Sphere). Compendium of Good Practices from Japan. Yokohama, Japan: IGES. pp 27.

[3]. Sato H, Mitra BK, Dasgupta R. et al. (2023) Assessment of alternative land resource utilisation towards Net-Zero and regional revitalisation through the circulating and ecological sphere in depopulated city regions in Japan: a case study of Hachinohe City Region. Sustain Sci 18, 2151–2168.

[4]. Morey B, Deshkar S, Sukhwani V, Mitra P, et al (2022). Towards Circulating and Ecological Sphere in Urban Areas: An Indicator-Based Framework for Food-Energy-Water Security Assessment in Nagpur, India. Sustainability. 14(13):8123. <https://doi.org/10.3390/su14138123>

¹ Institute for Global Environmental Strategies (IGES), Japan; ² Visvesvaraya National Institute of Technology (VNIT), India