Mainstreaming Landscape Thinking in Natural Resources Management Education for Restoration Impact in BIMSTEC region: The Way Forward

Report on a Knowledge-sharing Workshop
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Hosted by the Indian Council of Forestry Research and Education (ICFRE) and Indira Gandhi National Forest Academy (IGNFA) in collaboration with the International Union of Forest Research Organizations under its Special Programme for Development of Capacities (IUFRO-SPDC), Global Landscapes Forum (GLF), and Wageningen University and Research (WUR)

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1. Background

With the start of the UN Decade on Ecosystem Restoration in 2021, as well as many ongoing national and international land restoration-related support and funding mechanisms, it is expected that investments into restoration programmes and projects on the ground will significantly increase. To this end, natural resources managers of all sectors will be challenged to live up to the expectations and lead in the transition towards resilient and sustainable landscapes. This is to be achieved through restoration of degraded ecosystems and the establishment of non-degrading land use practices at scale providing added value to both human wellbeing and ecosystem health and vitality.

In an educational context, the expansion of restoration efforts around the world means that an increasing number of young and mid-career professionals trained as forester, natural resources manager, agricultural specialist, ecologist, spatial planner, coastal zone manager, or other related domains will find their way to a job that is directly or indirectly related to restoration. It is expected that the higher demand for restoration expertise and associated trained professionals will need to be met through adequate vocational, tertiary, and continuing education programmes.

2. Status of Discussions on Restoration Education in the Region

Key experts from various countries in the BIMSTEC region have therefore started deliberating about ongoing efforts to mainstream landscape restoration in current education systems in South Asia. In a first online workshop held in October 2022 the experts took stock of existing natural resources management education programmes and described how restoration issues are being taught at different educational levels in the region. In addition, a good start was made on exchanging views about ways and means to enhance the interdisciplinarity in restoration-related natural resources management education to meet the demand for trained professionals capable of effectively operating and facilitating land restoration programmes.

With the longer-term objective in mind of improving existing restoration-related education programmes the workshop participants further deliberated on the type of knowledge and skills that learners need for landscape restoration. These included (a) knowledge related to basic concepts (e.g. landscape management, ecological restoration, analysis of concepts); (b) ecology (e.g. diverse landscape types, dendrology, agro-biodiversity); (c) stakeholder interactions/social issues (e.g. ownership, livelihood, community consultations and communication, traditional knowledge, participatory learning); (d) implementation & monitoring (e.g. project design and management, effective collection of data and information, monitoring skills at landscape scale); and (e) policy and governance (ownership, policy analysis, conflict sensitivity and management).

Finally, the participants also worked on the question on how restoration aspects in current education systems in South Asia can be enhanced. A diverse array of aspects and approaches that should be considered in mainstreaming restoration in the current education programmes were brought to the table and included – amongst others - revision of curricula (e.g. FLR-oriented field camps, study tours); designing of separate restoration courses with emphasis on practical issues; inclusion of facilitation skills in teaching restoration and provision of internship opportunities in ongoing restoration projects and initiatives.

Overall, it was stated that per se the education system in all countries is sensitised about the restoration issue – a good start to work from here to make it more effective in producing professionals that are prepared to work in the complex social-ecological systems in which landscape restoration initiatives take place.

3. Workshop Objectives

This 2-day in-person workshop in Dehradun is a follow-up activity by natural resources management educators from the region of the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) aiming to further foster and expand collaboration on restoration education in South Asia. More specifically, the following objectives were pursued:

- Expand and foster a regional network of restoration educators in South Asia.
- Learn about developments and approaches pursued in restoration education at global and regional levels.
- Analyse current education systems and identify gaps and potential delivery mechanisms for integrating restoration education content in the region.
- Jointly develop a workplan for collaboration of the network of educators promoting integrated restoration education in the BIMSTEC region.

Main output of this workshop includes:

- Summary of priorities, approaches, and actions to be taken to promote restoration education in the region.
- Collaborative workplan for restoration educators in South Asia.

4. Opening Session

Dr Rajesh Sharma of ICFRE formally welcomed everyone and asked the participants for a self- introduction. After this brief round among the participants, Dr Sharma invited the speakers of the opening session for their keynote addresses.

Figure 1:Director General of ICFRE speaks during the workshop's opening session. Photo credit: ICFRE

Summary of keynote address by Shri. Arun Singh Rawat DG, ICFRE:
Mr Rawat welcomed all the participants to this knowledge-sharing workshop and highlighted that land degradation is one of the current major challenges genitively affecting around 3.2 billion people around the world. He highlighted that the Indian Government's support for restoring degraded lands at this moment is very commendable, and therefore the forestry professionals should work in a multi-disciplinary approach to meet the expectations of society. In this context, the importance of training needs assessment for strengthening restoration education cannot be overemphasized. Finally, he strongly recommended to developing a uniform approach for restoration education in the BIMSTEC region targeting the right stakeholders and institutions.

Summary of keynote address by Shri. Bharat Jyoti Director, IGNFA:
Mr Jyoti mentioned that in the Indian context, most of the training programs in the agriculture and forestry sectors encompass field-oriented learning, however, some gaps do exist including the lack of teaching a comprehensive landscape approach. He emphasized the importance in restoration education of demonstrating the inter-connectivity within a landscape approach between various sectors beside agriculture and forestry also water management, infrastructure, industry as well as urban development. In this context, science communication and outreach i.e. conversion of scientific evidence to practical solutions and diffusing to various stakeholders play an important role. Mr Jyoti concluded his remarks with a reference to the need for a multidisciplinary team of educators to strengthen restoration education.

Summary of keynote address by Dr Michael Kleine, IUFRO-SPDC:
Mr Kleine highlighted the problems associated with land degradation faced world-wide due to a growing population, over-exploitation of natural resources and unsustainable land-use

practices. A particular concern are drylands around the globe which are severely degraded and soon be uninhabitable causing a lot of migration of people to other regions. In this context, Mr Kleine emphasized the important role of science and communicating scientific evidence to various stakeholders, so that feasible options for adaptation to climate change and sustainable land use practices will find their way into implementation. He also gave a brief account about IUFRO's Special Programme for Development of Capacities (SPDC), its mission, and major activities in contributing to building capacity of forest scientists and forestry professionals around the world. Finally, he concurred with the other key-note speakers for the need of interdisciplinary approaches in restoration education, aiming to ensure that land-use professionals are capable of thinking beyond the own sector and in this way find acceptable solutions to the world's current landscape restoration problems.

5. Restoration Education Developments at Global/Regional level

5.1 Results of the 2022 online knowledge sharing workshop

During the workshop in October 2022, participants collected a wide range of aspects related to knowledge and skills needed for successful (forest) landscape restoration. These can be grouped into knowledge related to basic concepts (e.g. landscape management, ecological restoration, analysis of concepts); ecology (e.g. diverse landscape types, dendrology, agro-biodiversity); stakeholder interactions/social issues (e.g. ownership, livelihood, community consultations and communication, traditional knowledge, participatory learning); implementation & monitoring (e.g. project design and management, effective collection of data and information, monitoring skills at landscape scale); and governance and policy (ownership, policy analysis, conflict sensitivity and management).

From this analysis it becomes apparent that various types of knowledge and skills need to be integrated when teaching aspects of restoration. Thus, for example, discussing "assisted natural regeneration" as a silvicultural measure in a specific forest stand without addressing the causes of degradation, which might be the intensive livestock grazing, will not lead to rapid restoration and rejuvenation of the forest. Therefore, the integration of the ecological, social and economic issues at a broader landscape scale is key to meaningful and cost-effective restoration interventions.

On the question of how to enhance restoration aspects in current education systems, participants brought to the table a diverse array of approaches and aspects that should be considered in mainstreaming restoration in the current education programmes. Major points made include:

- Revise current curricula to better accommodate restoration through e.g. FLR oriented field camps, study tours and term papers on restoration,
- Design separate restoration courses (at different levels) and include more practical aspects of restoration,
- Improve coordination between educational institutions and agencies implementing restoration,
- Mobilise political will in support of enhanced restoration education (i.e. funding),
- Include facilitation skills in teaching restoration,

- Learn from existing best-practice examples (demonstration, on-site teaching), and
- Learn from experiences made in other countries.

Overall, it was stated that per se the education system in all countries is sensitised about the restoration issue – a good start to work from here to make it more effective in producing professionals that are prepared to work in the complex social-ecological systems in which landscape restoration initiatives take place.

Figure 2: Results of the 2022 online knowledge sharing workshop are revisited as a basis for further collaboration on restoration education in the BIMSTEC region. Photo credit: GLF

5.2 Landscape restoration: from global commitment to local action

The Global Landscapes Forum's (GLF) learning team members Kimberly Merten and Varun Tumuluru presented on landscape restoration – and it's beginning in global commitments to its ground level implementation in local action. Kimberly Merten started off by stating that over the past decades 76% of species have been lost due to land degradation, hence why it is vital that we support the UN Decade on Ecosystem Restoration. The Decade is linked to over 600 multilateral agreements including the Bonn Challenge, The Sustainable Development Goals, the United Nations Framework Convention on Climate Change, and the Convention on Biological Diversity among others. Over the course of history, there have been changing perspective in development, conservation, restoration, and education and the need for local action and emphasis as these spheres converge is vital.

Mrs Merten continued by discussing the ten actions for the UN Decade on Ecosystem Restoration, with GLF and IUFRO's Restoration Education program focussing particularly on building capacities at scale. Restoration Education focusses particularly on building capacities of a new generation of landscape professionals by creating T-shaped restoration professionals for restoration action. Restoration Education began with a Call to Collective action to raise the restoration capacities of individuals, organizations, networks, and wider governance systems which led to the creation of a Pan-African Restoration Education Network to develop and implement training modules and curriculum in key partner universities across Africa.

To transition this wider scale thinking into local action, the GLF, IUFRO, and CIFOR-ICRAF scientists, and key members of the Pan-African Restoration Education network came together during a 2-day workshop in Nairobi, culminating in a Restoration Education Summit at GLF Africa 2022 to create a draft blueprint of the Restoration Education curriculum. The curriculum aims to promote and strengthen integrated landscape mindsets and the skill sets to drive decision making processes to incentivize the stewardship of landscapes through inclusive restoration. Mr Tumuluru explained that the curriculum was developed through in-depth blueprinting and storyboarding phases which included developing assessment matrices and delivery mechanisms to create a fully modular and blended curriculum format for use both on-the ground through satellite courses, and online through blended learning courses.

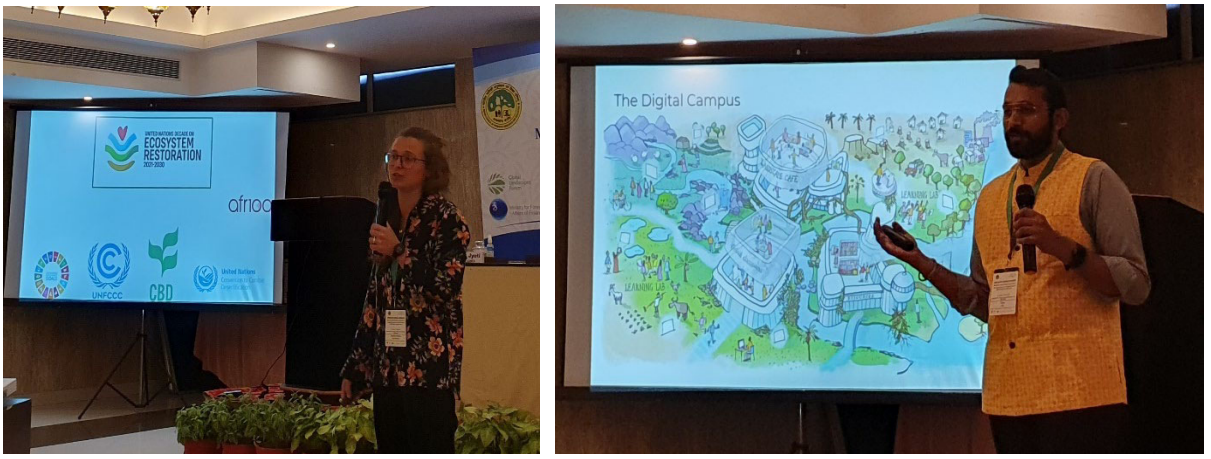

Figure 3:Presentations of regional and global restoration developments showed various efforts to promote and strengthen integrated landscape mindsets. Photo credits: IUFRO

To fulfil the objectives of the course curriculum among others, the GLF is developing the Digital Campus which involves three key sections. First, a 'Landscape Café' where members of the network can connect online and discuss geolocated and contextualised resources, which are to be held on the second section the 'Resource Hub' of the campus. Finally, the digital campus will be home to a robust learning management system, where blended courses and trainings of the restoration education curriculum will be hosted. These will all be connected through learning labs where members of the campus can connect with on-the-ground action.

5.3 Promoting landscape thinking and natural resource education in Malawi

Dr. Steve Makungwa from Centre for Applied Systems Analysis (CASA) in Malawi gave an outlook of how restoration education for practitioners of natural resources management (NRM) should look like. In his presentation, he outlined four principles for designing a curriculum for NRM practitioners, and these included i) interdisciplinarity, ii) competence-based learning, iii) practice-based learning, and iv) experiential-based learning.

Dr. Makungwa demonstrated how the four principles had been integrated in a forest landscape restoration (FLR) curriculum for practitioners in Malawi. He showed how the four principles informed the design of the training program, the content, and its delivery methods. The training program was designed to improve facilitation skills of practitioners of NRM (competence-based learning). The training programme was in two parts: i) In-class training that aimed at

building participants' interdisciplinary understanding of the landscapes, their restoration, and the needs and demands of different stakeholders involved (interdisciplinarity); and ii) a guided field implementation of restoration practices (mentorship program) to provide practice-based learning. The delivery of the program followed the principles of experiential learning, which placed participants' knowledge and experience at the centre. This meant that during the training, the participants explored their own experience, related this experience with the new learnings acquired through the program, and applied them into their practical work.

5.4 Outdoor learning and practical training sites in forests landscape restoration

The third session of the workshop was based on outdoor learning and practical training sites in forests and landscapes. The representatives from Thailand, Sri Lanka, Nepal, Myanmar, India, and Bangladesh presented examples of sites in their respective countries and discussed on field activities, teaching aspects and topics included in their higher education programs on nature ecology, land restoration, natural resource management, mangrove restoration, agro-biodiversity, and forest land restoration (FLR) best practices.

For example, Ms. Aye Thiri Htun presented the Myanmar Forest School Training Forest, which covers an area of 202.34 ha located in Maymo Pine Reserved Forest. The site aims to demonstrate practical learning of curricula and support forest conservation, FLR and activities to enhance greener environment and climate change adaptation. It allows learners and researchers to investigate tree species grown in dry hill forest including biodiversity enrichment and growth of indigenous species. Field activities at the site include boundary demarcation, tree identification, forest mensuration, forest inventory, establishing forest fire protection roads, weeding, thinning, natural regeneration and enrichment planting.

Figure 4: Example of presentation of outdoor learning and practical training sites in forest landscape restoration by participant from Myanmar.

Ms. Thilanka Gunaratne presented two restoration sites in Sri Lanka that were established in 2017 in a collaborative effort to train the next generation of conservation leaders. Research on the sites investigates topics such as enrichment of pine plantations, restoration of lower montane forests, biotic and abiotic factors, sociological aspects, and monitoring restoration. The locations are used for educational purposes including introduction of MSc and undergraduate courses. Additionally, publications including *A Guidebook for Forest Restoration in Sri Lanka* and book chapters, for example *Ecological Approaches to Forest Restoration: Lessons Learned from Tropical Wet Asia,* are available as education resources.

The **presentations by each country** of outdoor learning and practical training sites are available on the workshop webpage: https://www.iufro.org/fr/science/special/spdc/netw/flr/ks-ws/rekswf/

6. Gaps and Needs for Restoration Education in the Region

6.1 Global and regional assessment reports on forest education

Janice Burns told that the aim of the global assessment of forest education was to provide an inventory of ongoing activities, key actors, objectives, and achievements on all levels of forest education and to explore new options for activities in addressing gaps in forest education. She added that this study reviewed more than 7000 references, surveyed 2712 persons online, and included around 500 participants in regional consultations. The global assessment was the first of its kind covering all levels of forest education in six regions around the world and it provides a basis for further research and actions to enhance forest and environmental education.

The key findings of the regional assessment for Asia Pacific hinted that many see forest education as under-resourced, outdated, and disconnected from job markets and many opined that there is a need for practical experience, digital tools, and new topics such as forest landscape restoration, cultural value of forests and trees, and addressing gender and social inequalities. She also mentioned that the Collaborative Partnership on Forests (CPF) has established a Joint Initiative on Forest Education providing a framework for global collaboration on the topic. She showed a call to action on forest education, which was launched at the International Conference on Forest Education where regional and global assessment results were presented. The need to promote a more interdisciplinary and holistic understanding of forests was among several actions that the call urges all forest education stakeholders to undertake individually and collaboratively.

6.2 Gaps and needs of current natural resources education programmes related to restoration in the BIMSTEC region

A brainstorming session was organized to discern what are the most critical gaps in the current restoration education programs in the region which would need to be addressed to build capacities in all aspects of FLR. First, the participants endeavoured to understand the kind of skills that are needed for restoration of degraded forest landscapes and the key elements of

field sites that would be conducive to teaching landscape thinking by focussing on the following questions:

(i) What are the kind of landscape restoration situations the trainees are likely to encounter in the particular geography under consideration?
(ii) What would be the skills needed to effectively restore these landscapes?
(iii) Does the training site allow the development of requisite skills of a restoration practitioner?
(iv) What skills cannot be developed here? Would it be possible to add an additional site in the neighbourhood where these skills can be imparted?

Figure 5: Group identifies gaps and needs of current restoration education programs. Photo credit: GLF

Then separate groups were constituted to deliberate on the gaps and needs of current restoration education programs and they were asked to do brainstorming around a few basic questions related to restoration education like what, how, where, and by whom. In response to 'what' one group came up with the recommendation that the restoration work should primarily address issues such as felling, grazing, forest fires, mining and poor regeneration whereas another group saw the issue from a different angle altogether and recommended that the answer to the query has to be found in defining vision and purpose for restoration education, and planning for restoration education taking into account different target groups and undertaking SWOT analysis to identify hotspots, training sites and restoration education curriculum.

In response to 'how' one group was of the opinion, that one should identify the primary causes of degradation and address the root issues by thinking of various possible solutions to the identified problems and then undertaking a SWOT analysis to find the most suitable solutions under the circumstances. The other group suggested an entirely different approach by recommending a 60-day long village stay program to inculcate values, cultures and practices of the restoration sites and to undertake a gap analysis. They recommended attachment with institutions that are already doing restoration tasks and informal training programs. Another

important suggestion was to introduce restoration education as a subject in the schools. All the groups wanted the trainees to develop skills such as deciding on choice of species, raising high quality nurseries, mapping the restoration sites, making baseline assessments of soil, vegetation and of carbon contents of the stem, branches, roots, litter, and the soils.

On the question of 'where' it was felt that the traditional field sites for imparting forestry education are almost exclusively focussed on forests and trees with little place for what constitutes a landscape, i.e., communities, habitations, grasslands, fruit trees, agriculture fields, roads and pathways, small businesses, water bodies etc. These traditional sites are, therefore, not very conducive to impart landscape thinking. The discussants felt that the restoration education site should physically demonstrate the restoration learnings required through a successful restoration, or even a failed attempt. The evidence of various causes of degradation, and the interventions carried out for restoration, should be present and easily visible, in the selected site. There should have been stakeholder and local community participation in the restoration activity on the selected site. The complete details and background of the community participation, the roadblocks encountered and the way these were addressed, must be available on the site through on-site catalogues or by way of display on information boards or similar such devices. The discussants, falling back on their long experiences in teaching and training foresters in the BIMSTEC region, felt that the accessibility of the field site, including physical approachability throughout the year and the requisite permissions from authorities, are also critical requirements of the field sites selected for restoration education.

Figure 6: Groups discuss the critical requirements of field sites selected for restoration education. Photo credit: ICFRE

Regarding the issue of 'by whom' the participants felt that the training should be largely imparted by teams of trained and experienced foresters with sound knowledge of silviculture, ecology, agroforestry, soil and moisture conservation, nursery techniques, planning, and management who should be well supported by teachers skilled in social sciences and in communication with local communities. Local extension officials of the agriculture, horticulture, animal husbandry, and irrigation departments many be co-opted as trainers to the extent needed in specific sites.

Figure 7: Participants exchange perspectives on delivery mechanisms and teaching methods for achieving landscape thinking. Photo credit: ICFRE

On the question of skills that cannot be developed on the field sites the groups felt that the basic skills for laboratory analysis and spatial analysis etc may be difficult to develop for trainees that do not have the advantage of formal education in mathematics and science of sufficient length.

At the end Dr Michael Kleine synthesized the overall sense of the discussions and presented a summary stating that the restoration education should have a robust vision and plan and aim not only at restoration of degraded sites but also on changing the business-as-usual scenario to avoid future issues. This would be possible if the restoration education includes within its ambit wider issues such as governance, monitoring, accessing finance through unorthodox means, and developing local businesses through restoration activities. The teachers and trainers should have broader views and motivation and the training sites should be accessible and provide for stakeholders' interaction and, more importantly, should be able to highlight both the success and failure stories.

7. Understanding Transformative Education Principles

Innovating education for landscape restoration: Cora van Oosten
In her presentation she spoke the power of transformative learning. Transformative landscape learning is interdisciplinary and moves across all those disciplines that directly and indirectly connect to landscapes (forestry, ecology, biology, economy, sociology, politicology, and art). She highlighted the need for learners to change their roles from merely consumers of knowledge to co-producers of knowledge. She also emphasised the need for teachers to change their role from experts to facilitators of change. Research institutes, so she said, could help, as they can serve as a breeding ground for learners and teachers to collaborate in exploration, sense-making, and change. She also advocated for a massive move to blended learning, which allows for blending offline with online learning modalities, and connecting hyperlocal learners to translocal action networks. With all this, she concluded, we can build innovative landscape curricula blending of theory with practice and making learners agents of landscape change.

8. Designing elements of restoration education for the BIMSTEC region including delivery mechanisms

This group work session focussed on designing elements of restoration education for the BIMSTEC region and participants worked in country groups to identify learning objectives, activities, teaching methods, and delivery mechanisms. After an hour of discussions, deliberations and brain storming, the presentations have been made in group wise.

The groups identified a range of teaching and learning methods to achieve landscape thinking, including both classroom and practical approaches. They recommended using face-to-face, hybrid and online delivery mechanisms. Among the various approaches to achieve landscape thinking, they mentioned: classroom teaching, field visits to restoration sites, practical learning, assignments, case studies, presentations, guest lectures, interactive sessions, and more knowledge sharing sessions. All groups recognised the importance of outdoor learning and practical experiences, such as visiting field sites to interact with resource persons or stakeholders. Several groups suggested using digital tools and online platforms to enhance learning and information exchange. This ranged from networking and sharing through social media to using virtual learning tools or including virtual reality field site visits.

The groups identified learning objectives and the activities needed to achieve them, such as identifying landscape components, identifying site-specific restoration activities, analysing stakeholders, and conducting stakeholder consultations. Additionally, the groups suggested ways to improve the curriculum, such as introducing innovative teaching methods, encouraging community engagement, and updating the curricula in ways that encompass FLR. They mentioned the need for individual initiative as well as institutional and policy support to initiate FLR education and include it at different levels of education including secondary education, technical education and at university level.

Figure 8: Groups identifying learning objectives and activities needed to achieve them. Photo credit: GLF

9. Developing a collaborative workplan for restoration educators in BIMSTEC

In a final group work session participants collected and discussed elements of a collaborative workplan to guide follow-up actions for restoration educators in the BIMSTEC region.

In a first step, participants worked in country groups and collated **key learnings** obtained in the workshop that should inform more intensive collaborative work among restoration educators in the region. For the individual countries these priority areas include the following:

- Bangladesh: Restoration education should primarily focus on forest landscape restoration through integration of trees into the landscape. Based on a thorough gap and needs analysis of existing natural resources education programmes, restoration education should help to better understanding of local restoration actions and its global impacts as well as promote innovativeness in terms of teaching methods and facilitation during the learning process.

- India: The workshop provided information on restoration and its needs in the BIMSTEC region and beyond helping to shape restoration education, particularly related to the integration of multiple disciplines under the umbrella of ecological engineering, human resources management and economics. The design of such courses with focus on career-oriented learning needs to consider field-based and practical learning, involvement of latest technology and novel practices, teaching of local restoration efforts and application of indigenous knowledge, stakeholder involvement and community participation, and the incorporation of success and failure stories in forest landscape restoration.

- Nepal: An important take-away from the workshop relates to field site-restoration teaching involving the selection of appropriate restoration sites, explaining causes and effects of land degradation, desired restoration outcomes (biophysical and socio-economic), stakeholder interactions, and accessibility. This field-based training should emphasize problem solving and the application of innovative tools, techniques, and locally negotiated ways forward in restoring landscapes.

- Sri Lanka: Highest priority is placed on innovative and integrated teaching along with identifying adequate research and outreach sites. In addition, emphasis is also given to the development of material on landscape restoration tailored to the needs of different stakeholders including the use of geographical information systems and other spatial tools for planning, implementation, and monitoring of restoration activities. Besides testing new teaching methods including FLR games emulating stakeholder processes and conflict resolution, outreach to policy makers and the general public are considered important elements in improving restoration education in the country.

- Myanmar: In the context of the existing natural resources education in Myanmar priority will need to be given to teaching a broad set of key elements of forest landscape restoration, combining knowledge on ecology, natural resources management, social sciences including policy and technical innovation. In addition, traditional ways of teaching (lecture-style sessions) require further development into more participatory and hands-on training modules promoting innovative ideas in capacity building for forest landscape restoration.

- Thailand: Within the rather well-developed educational system on landscape management both at academic and technical levels, greater emphasis needs to be placed on connecting different disciplines and discussing these in the context of restoring landscapes. At the same time restoration education should seek to incorporate knowledge and latest development in next technology for forest landscape restoration aiming at upscaling and enhancing the impact of restoration on nature and people.

Figure 9: Workshop facilitators record participants' reflections on priority areas for the collaborative workplan. Photo credit: GLF

Based on these priority areas to be addressed in developing restoration education in the BIMSTEC region, the participants further discussed opportunities for collaboration among restoration educators. Collectively, the following aspects were brought to the table:

- Sharing of knowledge and experiences on forest landscape restoration and related education. This could include frequent online interactions and meetings, expert consultations, and the development of an online portal.

- Exchanging of material for landscape restoration and educational material such as guidebooks, scientific and technical publications, case studies, videos, presentations, and textbooks.

- Organising exchange programmes both for teaching staff and students for learning about restoration approaches and relevant educational programmes in the region including guest lectures and visits to BIMSTEC countries' restoration field sites. In addition, internships with organisations and institutions implementing restoration project could be organised.

- Collaborating in regional projects on restoration education and FLR development supported by regional and global organisations through provision of expertise and financial resources.

10. The Way Forward

Reflecting on the presentations of key learnings by country and brainstorming of potential collaborations for restoration educators, **participants identified the main elements of a collaborative workplan.** They worked in groups to define actions for joint projects and collaborations among countries in the BIMSTEC region. These included the following five elements:

- Share Case Studies and Experiences
  Depending on the status of developing restoration education course content in the various BIMSTEC countries, online exchange between the participants could start at any time by building a platform for online sharing of knowledge through videos, FLR site documentaries, and publications. In addition, such exchange could also be promoted by organising online meetings (e.g. workshops, webinars, seminars) bringing the relevant educators together on a bilateral or multilateral basis.

- Curricula
  Preparing new broad curricula for restoration will need the involvement of governmental education departments and require certain levels of logistics and finances. The process could be informed by sharing case studies and experiences in developing interactive and dynamic curricula – amongst others – to also include modules on valuation of improved ecosystem services and sociology. It has also been suggested to develop one semi-structured curriculum for the BIMSTEC region.

- Joint Teaching and Research
  A collaborative approach for content development among the BIMSTEC region is proposed. This should aim at a common curriculum with definitions of learning outcomes for specific restoration sites and taking onboard innovative teaching techniques. A gap analysis of existing natural resources management education programmes would be needed for comparing content among the BIMSTEC region with content available at the global level. In addition, such an analysis would also require to look at field sites and available teaching personnel. The main focus of collaboration should be placed on innovative teaching testing new technologies (e.g. animation, GIS, drone technology for mapping, virtual reality etc.), field visit with night camps with local communities, interactive digital communication, and developing and application of simulation games. Overall, it is recommended to connect research on restoration with content development for education by also incorporating modules that assist students for preparing their own research proposal and seminars.

- Field-Based Learning Site Visits and Exchanges
  Exchange programmes for students and teachers are desired. Closer cooperation could be achieved through preparing a database on sites where people can learn (a geo database), defining criteria for selection of a student exchange program including a monitoring system, disseminating a set of publications and footage on restoration success stories and enhancing graduate research opportunities. Specific learning sites

could be promoted through conferences, webinars, in-person training events as well as online courses.

- Connections
  Overall, for further developing the network of restoration educators in the BIMSTEC region state-of-the-art online communication pathways should be employed including mailing lists, newsletter, blogs with comment section and Q&A, short videos and the like. For further intensification of regional cooperation on restoration education a regulatory body running the platform would be an advantaged as well as the mobilisation of funds and other forms of support.

Participants noted that a workplan should also include a timeline. Given the limited available time during the workshop, follow-up would be required to prioritise actions and develop a timeline for the workplan.

Figure 10: Participants identifying actions for collaboration among restoration educators in the BIMSTEC region. Photo credit: IUFRO

11. Closing of the Workshop

Dr. Michael Kleine gave vote of thanks and provided mementos to the speakers and certificates to all the delegates and participants from the BIMSTEC countries.
At the end of the day all the delegates and participants visited the Botanic Gardens, Herbarium and various museums located in ICFRE and FRI Campus in Dehradun.

Figure 11: Participants visit botanic gardens after closing the workshop. Photo credit: IUFRO

Annexes

Annex 1. Agenda

Workshop Agenda

Mainstreaming Landscape Thinking in Natural Resources Management Education
for Restoration Impact in BIMSTEC region: The Way Forward
Dehradun, India, 31 March to 1 April 2023

31 March 2023

9:00	**Opening Session**
	Welcome Remarks by • **Director General, ICFRE** • **Director, IGNFA** • **Coordinator, IUFRO-SPDC** **Introduction of participants**
09:30	**Restoration education developments at global/regional level**
	Results of the 2022 online Knowledge sharing Workshop Michael Kleine, IUFRO Special Programme for Development of Capacities (IUFRO-SPDC) **Landscape Restoration: from global commitment to local action** Kimberly Merten and Varun Tumuluru, Global Landscapes Forum (GLF) **Promoting Landscape Thinking and Natural Resource Education in Malawi** Steve Makungwa, Centre for Applied Systems Analysis (CASA)
10: 15	**Outdoor learning and practical training sites in forests and landscapes**
	Moderator's welcome **Presentations of outdoor learning and practical training sites in forests and landscapes** All participants
13:00	**Lunch**
14:00	**Gaps and needs for restoration education in the region**
	Global and regional assessment reports on forest education Janice Burns, IUFRO Special Programme for Development of Capacities (IUFRO-SPDC) **Gaps and needs of current natural resources education programmes related to restoration in the BIMSTEC region** Group work activity
15:15	**Break**
15:30	**Plenary Discussions** All participants

	Synthesis Moderator
16:00	**End of Day 1**

1 April 2023

9:00	**Understanding transformative education principles**
	Education Innovation for Landscape Restoration Cora van Oosten, Wageningen University Research (WUR) / Global Landscapes Forum (GLF)
	Questions and Audience Discussions
09:30	**Designing elements of restoration education for BIMSTEC region including delivery mechanisms**
	Moderator's welcome
	Group Work
11:00	**Break**
11:30	**Plenary Discussions** All participants
	Synthesis Moderator
13:00	**Lunch**
14:00	**Developing a collaborative workplan for restoration educators in BIMSTEC**
	Defining joint projects Group Work
	Operating a collaborative platform on restoration education in BIMSTEC region Group work
15:00	**The Way Forward**
	Plenary Discussions All participants
	Synthesis Moderator
15:15	**Closing Session**
15:30	**End of Day 2 –** Optional: Visit to Botanical Gardens or Bamboo with focus on training and educational aspects

Annex 2: List of Participants

Name	Country	Affiliation
Michael Kleine	Austria	IUFRO-SPDC
Danesh Miah	Bangladesh	Institute of Forestry and Environmental Sciences, University of Chittagong
Ariful Hoque Belal	Bangladesh	Bangladesh Forest Department, Planning Wing, Dhaka
Janice Burns	Canada	IUFRO-SPDC
S.K. Awasthi	India	Indira Gandhi National Forest Academy (IGNFA)
Annie Biju	India	Joint IUFRO-IFSA Task Force on Forest Education
Arvind Bijalwan	India	Uttarakhand University of Horticulture and Forestry, Ranichauri
Kanchan Devi	India	Indian Forest Service
Shilpa Gautam	India	ICFRE
H.S. Ginwal	India	Forest Research Institute (FRI), Dehradun
Krishna Giri	India	Indian Council of Forestry Research and Education, Dehradun
Bharat Jyoti	India	Director, Indira Gandhi National Forest Academy (IGNFA)
Promode Kant	India	Institute of Green Economy
Parvinder Kaushal	India	Uttarakhand University of Horticulture and Forestry
Manish Kumar	India	ICFRE
Praveen Kumar	India	Dr. Y S Parmar University of Horticulture and Forestry, Nauni-Solan, H.P.
Sangeeta Mahala	India	Forest Training Institute, Chail. Himachal Pradesh
Gaurav Mishra	India	ICFRE
Vinay Kant Mishra	India	ICFRE
Ismita Nautiyal	India	ICFRE
Sandeep Pandey	India	ICFRE
Muthu Prasad	India	ICFRE
A.S. Rawat	India	Director General, ICFRE, Dehradun
S.P. Sati	India	Uttarakhand University of Horticulture and Forestry
Rajesh Sharma	India	Indian Council of Forestry Research and Education (ICFRE)
Sanjay Singh	India	Indian Council of Forestry Research and Education (ICFRE)
Priyanka Thakur	India	YS Parmar University of Horticulture and Forestry
Sai Varun Tumuluru	India	Global Landscapes Forum (GLF)
Amol Vashisht	India	Uttarakhand University of Horticulture and Forestry, Ranichauri
Steve Makungwa	Malawi	Centre for Applied Systems Analysis (CASA)
Kimberly Merten	Malta	Global Landscapes Forum (GLF)

Name	Country	Affiliation
Aye Thiri Htun	Myanmar	CFDTC, Training and Research Development Division (TRDD)
May Ko Thein Lwin	Myanmar	University of Forestry and Environmental Science, Yezin, Myanmar
Cora van Oosten	Netherlands	Global Landscapes Forum (GLF), and Wageningen University and Research (WUR)
Krishna Raj Tiwari	Nepal	Institute of Forestry, Tribhuvan University, Kirtipur
Bishnu Dhakal	Nepal	Forest Research and Training Centre (FRTC)
Thilanka Gunaratne	Sri Lanka	University of Peradeniya
A.K. Isuru Jayantha	Sri Lanka	Forest Department of Sri Lanka
Maelim Somporn	Thailand	Kasetsart University