European Journal of Sustainable Development (2024), **13**, 4, 458-466 ISSN: 2239-5938
Doi: 10.14207/ejsd.2024.v13n4p458

Collaborative Educational Study on Traditional Medicine and Biodiversity Conservation within UNESCO Biosphere Reserve

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ABSTRACT:
We investigated the potential synergies between Ayurveda and Kampo within the context of biodiversity conservation in Mt. Hakusan Biosphere Reserve, to elucidate the linkages between traditional medicinal practices and conservation efforts.
Methodology: 20 Indian students with backgrounds in Ayurveda and Nature Conservation from The University of Trans-Disciplinary Health Sciences and Technology (TDU) participated in an educational program at Mt. Hakusan Biosphere Reserve in Japan, facilitated by Kanazawa University. The program included lectures, fieldwork, and interactive sessions comparing Ayurveda with Kampo to explore connections with biodiversity conservation. Data were collected through pre- and post-program surveys to assess participants' awareness levels and perceptions, alongside qualitative methods such as participant observations.
Results: Findings indicate a significant increase in awareness about UNESCO Biosphere Reserves among participants following the educational intervention. Students perceived the program positively and expressed interest in further research within Biosphere Reserves. However, some respondents reported only marginal increases in awareness, suggesting potential areas for program improvement.
Conclusions: The study underscores the potential for cross-cultural collaboration in advancing traditional medicine and biodiversity conservation. Positive participant responses highlight the efficacy of educational programs in fostering awareness and interest in sustainable healthcare practices, with implications for future research and educational initiatives.

Keywords: Ayurveda, Kampo, Traditional Medicine, Biodiversity Conservation, Biosphere Reserve, Cross-cultural collaboration

1. Introduction

Increasing environmental challenges and escalating recognition of traditional therapeutic healing practices, brought the intersection of traditional medicine and biodiversity conservation as a topic of significant interest[1]. Ayurveda and Kampo, two ancient healing systems from India and Japan respectively, offer unique insights into the relationship between human health and the natural world. UNESCO Biosphere Reserves, designated areas that seek to reconcile conservation with sustainable development, provide a fitting context to explore the synergies between traditional medicine and biodiversity conservation. Ayurveda, originating in the Indian subcontinent over 5,000 years ago, embodies a holistic approach to health and well-being, emphasizing the balance between

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mind, body, and environment [2]. Kampo, rooted in traditional Chinese medicine and adapted in Japan over centuries, similarly acknowledges the interconnectedness of humans and nature in maintaining health and preventing illness [3]. Both systems rely on botanical knowledge and emphasize the use of natural remedies derived from plants and other natural resources. UNESCO Biosphere Reserves, on the other hand, represent model regions where conservation, sustainable development, and community engagement converge [4]. These reserves aim to foster harmonious relationships between humans and nature, recognizing the intricate linkages between biodiversity conservation, cultural heritage, and socio-economic development. By integrating traditional knowledge systems like Ayurveda and Kampo, Biosphere Reserves offer a platform to explore innovative approaches to conservation and healthcare that respect and harness the wisdom of local communities.

Given the complementary principles underlying Ayurveda, Kampo, and UNESCO Biosphere Reserves, there is a compelling rationale for collaborative educational initiatives that bridge traditional medicine and biodiversity conservation [5, 6]. This study seeks to investigate the potential synergies between Ayurveda and Kampo within the unique context of the Mt. Hakusan Biosphere Reserve in Japan. By engaging students with backgrounds in Ayurveda and Nature Conservation from the University of Trans-Disciplinary Health Sciences and Technology (TDU) in India, alongside facilitation from Kanazawa University in Japan, this collaborative program aims to deepen understanding, foster cross-cultural exchange, and inspire future research and action in the realms of traditional medicine and biodiversity conservation.

Moreover, within the realm of traditional medicine and biodiversity conservation, the SDGs serve as guiding principles for promoting holistic approaches to sustainable development [7]. By aligning with specific SDGs such as good health and wellbeing (SDG 3), zero hunger (SDG 2), industry, innovation, and infrastructure (SDG 9), and life on land (SDG 15), efforts to integrate traditional medicine with biodiversity conservation can contribute directly to achieving these global targets [8]. Moreover, understanding participants' concerns and priorities regarding the SDGs offers valuable insights into their motivations and aspirations, thereby informing the design and implementation of educational programs and conservation initiatives. Thus, by contextualizing the intersection of traditional medicine, biodiversity conservation, and SDGs, this study aims to elucidate synergies and foster collaborative efforts towards achieving sustainable development goals, particularly SDG 4, target 4.7 for sustainable education [9], while preserving traditional knowledge and biological diversity. Additionally, from Global Biodiversity Framework (GBF) pertinent targets include Target 3, which emphasizes in situ conservation of biodiversity, including cultural, spiritual, socio-economic values and indigenous territories and rights; Target 4, focusing on the conservation of threatened species, including medicinal ones; Target 9, advocating for sustainable management of wild species benefiting human well-being; and Target 13, promoting fair and equitable sharing of benefits derived from genetic resources, digital sequence information, and associated traditional knowledge [10].

Through a combination of lectures, fieldwork, and interactive sessions, participants explored the rich biodiversity of Mt. Hakusan Biosphere Reserve, examine traditional medicinal practices in both Indian and Japanese contexts, and reflect on the

implications for conservation and sustainable healthcare. By leveraging the expertise and perspectives of diverse stakeholders, this study seeks to elucidate the linkages between traditional medicine and biodiversity conservation, paving the way for informed decision-making and holistic approaches to planetary health.

In the following sections, we present the methodology, results, and conclusions of this collaborative educational study, highlighting its potential contributions to advancing sustainable healthcare practices and biodiversity conservation efforts in UNESCO Biosphere Reserves.

2. Methods

This research engaged 20 Indian graduate students from Trans-Disciplinary University (TDU), who participated in one week program in Japan, by visiting Kanazawa University and staying 5 days inside the Mt. Hakusan UNESCO Biosphere Reserve. Gender distribution was 9 female and 11 males. The age range was from 21 to 31 years, with an average age of approximately 25 years. Educational backgrounds were split, with 10 students pursuing MSc. Life Sciences (Ayurveda Biology) and being Ayurveda physicians and biologists, and the other 10 enrolled in M.Sc. Environmental Studies (Conservation Practice).

Kanazawa University facilitated an educational program focusing on Traditional Medicine, wherein students conducted comparative analyses between Ayurveda and Kampo. Through lectures, fieldwork, and interactive sessions, participants explored the intricate linkages between traditional medicinal practices and biodiversity conservation efforts within the Biosphere Reserve setting.

The research methodology had a multifaceted approach aimed at comprehensive exploration of cultural, historical, and natural facets within the Hakusan region. It encompassed immersive field visits and observation of significant sites, including cultural institutions and traditional villages, alongside guided tours and interactive activities at locations such as Hakusan Sabo Science Museum, Ishikawa Prefectural Hakusan Roku Folklore Museum, and Hakusan Dinosaur Park Shiramine. Participants engaged in workshops and hands-on activities like straw work, textile weaving, and harvesting Finger millet, fostering experiential learning. Expert lectures and presentations complemented these activities, covering topics such as Japanese Kampo medicine and ecological, ecological conservation efforts in Hakusan National Park, and cultural comparisons between India and Japan enrich the research with diverse perspectives. At the end reflective exercises and group discussions helped participants integrate their experiences, while logistical arrangements ensured the smooth execution and documentation of research findings.

Data collection encompassed pre- and post-program surveys to assess participants' awareness levels regarding UNESCO Biosphere Reserves and their perceptions of the educational intervention's efficacy. Qualitative data were also gathered through participant observations and post-program interviews to delve deeper into the experiential aspects and learning outcomes. This mixed-methods approach allowed for a comprehensive understanding of the participants' experiences and insights gained during

their immersion in Mt. Hakusan Biosphere Reserve and the educational program provided by Kanazawa University.

3. Results

The results of the research indicate that among the Sustainable Development Goals (SDGs), participants were most concerned about achieving good health and wellbeing (25%), while the least concern was expressed towards industry, innovation, and infrastructure (5%) and zero hunger (5%). Prior to the educational program, a moderate level of familiarity with UNESCO Biosphere Reserves was reported, with 45% moderately familiar and 25% somewhat familiar. Following the course, there was a significant increase (52%) in awareness about Biosphere Reserves, with 42% reporting a moderate increase in awareness (Fig 1).

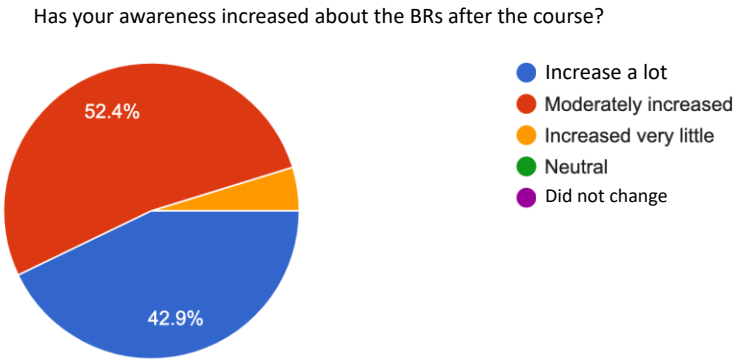

Figure 1. Question on awareness after the course

The program was perceived positively, with 57% rating it as extremely good and 38% as good (Fig 2).

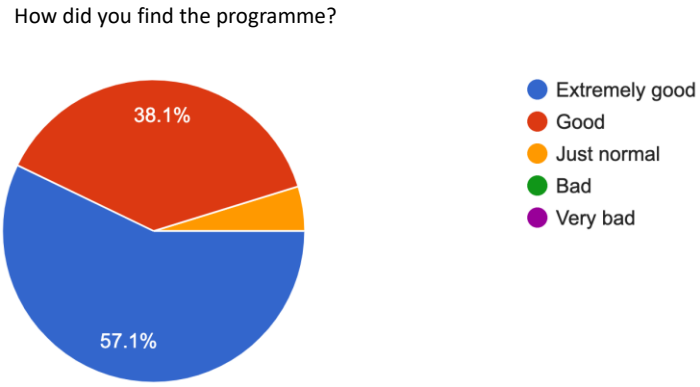

Figure 2. Question on program evaluation

Additionally, there was a high level of interest among participants in continuing studies or research within Biosphere Reserves, with 57% as highly interest and 38% as interested, indicating the perceived value of the educational experience (Fig 3).

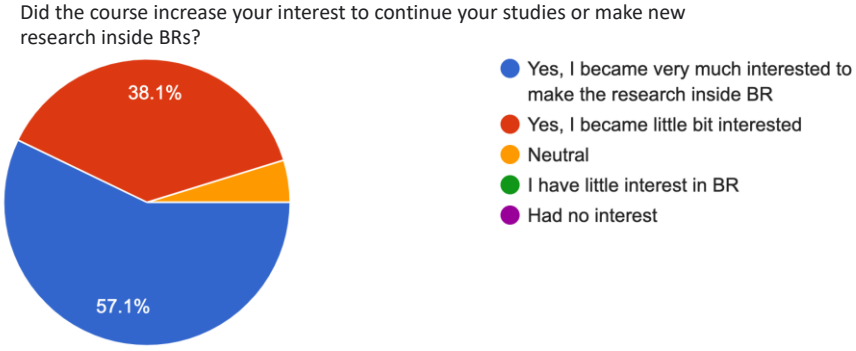

Figure 3. Participants' interest about BR.

Furthermore, a majority of respondents agreed (43% as strongly agree and 47% as agree) that the course contributed significantly to their studies, demonstrating its perceived relevance and impact (Fig 4).

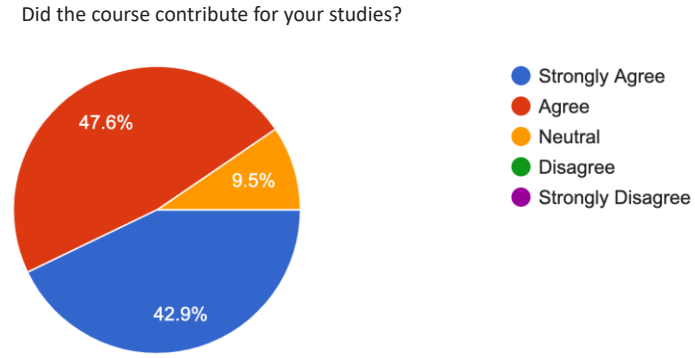

Figure 4. Course contribution for the studies

The environment provided by Mt. Hakusan Biosphere Reserve for learning about local issues was generally well-received, with 52% agreeing and 47% strongly agreeing on its suitability for learning purposes (Fig 5).

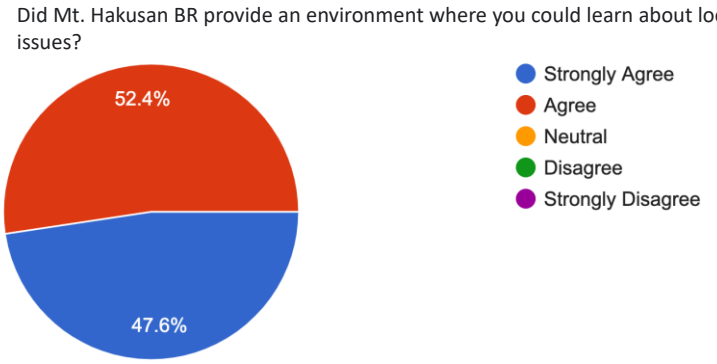

Figure 5. Question if Mt. Hakusan can provide environment to learn about local issues

Finally, the environment provide students to learn about the traditional medical plants with more than 70% agree, and compare Ayurveda with Kampo with 42% strongly agree and 38% agree (Fig 6).

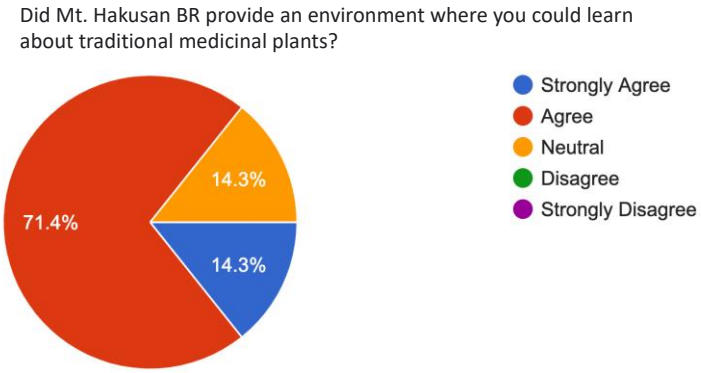

Figure 6. If Mt. Hakusan provided the environment to learn about traditional medicinal plants.

4. Discussion

The intersection of traditional medicine and biodiversity conservation, as exemplified by Ayurveda, Kampo, and UNESCO Biosphere Reserves, presents a promising avenue for collaborative exploration and action. Our study focused on the potential synergies between Ayurveda and Kampo within the unique context of the Mt. Hakusan Biosphere Reserve in Japan. Through a collaborative educational initiative involving students from India and Japan, we aimed to deepen understanding, foster cross-cultural exchange, and inspire future research and action in traditional medicine and biodiversity conservation.

Our findings indicate a significant increase in participants' awareness of UNESCO Biosphere Reserves following the educational program. This suggests the effectiveness of immersive experiences, such as field visits and interactive sessions, in

enhancing understanding and appreciation of conservation efforts [11]. Moreover, the positive perception of the program underscores its value in stimulating interest and engagement among participants. The high level of interest in continuing studies or research within Biosphere Reserves reflects the perceived relevance and impact of the educational experience, indicating its potential to inspire future conservation efforts [12, 13].

The results also highlight participants' concerns and priorities regarding the Sustainable Development Goals (SDGs). Achieving good health and wellbeing emerged as a primary concern, underscoring the intrinsic connection between traditional medicine and human well-being. By aligning with specific SDGs such as good health and wellbeing, efforts to integrate traditional medicine with biodiversity conservation can directly contribute to achieving global targets. Future discussions should focus on how different cultural contexts influence the prioritization of specific SDGs and how traditional medicine aligns with diverse global health initiatives. Furthermore, understanding participants' motivations and aspirations regarding the SDGs can inform the design and implementation of educational programs and conservation initiatives, ensuring their relevance and effectiveness [14].

The immersive environment provided by Mt. Hakusan Biosphere Reserve facilitated experiential learning and engagement with local issues, particularly regarding traditional medicinal plants and comparative analyses between Ayurveda and Kampo. The positive feedback regarding the suitability of the environment for learning purposes underscores the importance of incorporating hands-on experiences and cultural exchanges into educational initiatives. By leveraging the expertise and perspectives of diverse stakeholders, including local communities and academic institutions, we can further elucidate the linkages between traditional medicine and biodiversity conservation, paving the way for informed decision-making and holistic approaches to planetary health.

Nevertheless, students have expressed some points of the program which should be improved in future; such as the tight schedule and limited interaction time, underscore the importance of balancing structured activities with opportunities for engagement and dialogue. Suggestions for more interaction with local residents and medical practitioners highlight the value of incorporating community perspectives into educational programs, enhancing cultural immersion and understanding of traditional practices. Future discussions should explore how increased community engagement can enhance cultural immersion and deepen understanding of traditional practices, bridging gaps between academic learning and practical, lived experiences. Moreover, participants' desire for additional activities related to healthcare and traditional Kampo medicine underscores the need for a more comprehensive exploration of traditional healing systems within Biosphere Reserves. Integrating hands-on experiences, such as learning traditional methods of medicine procurement and processing, can deepen participants' understanding and appreciation of traditional medicine practices [15]. Furthermore, incorporating case studies and practical exercises can facilitate peer learning and application of knowledge, fostering a deeper connection to the subject. Participants' calls for more immersive experiences in biodiversity conservation within the biosphere reserve highlight the importance of incorporating environmental education into interdisciplinary programs. By incorporating suggestions for enhancing opportunities for interaction and engagement, future collaborative educational programs can further advance sustainable healthcare

practices and biodiversity conservation efforts within UNESCO Biosphere Reserves and beyond. Moving forward, future research should focus on longitudinal studies to assess the long-term impact of educational interventions. Discussions should consider how ongoing collaborations between educational institutions and local communities could contribute to sustained conservation efforts and the preservation of traditional knowledge systems over time.

In conclusion, our collaborative educational study sheds light on the potential synergies between traditional medicine and biodiversity conservation within UNESCO Biosphere Reserves. By fostering cross-cultural exchange, enhancing awareness, and inspiring action, we aim to contribute to advancing sustainable healthcare practices and biodiversity conservation efforts in Biosphere Reserves and beyond. Moving forward, continued collaboration and dialogue among stakeholders will be essential to harnessing the wisdom of traditional knowledge systems and preserving biological diversity for future generations. Furthermore, exploring the replication of collaborative educational models in other reserves can provide adaptable, scalable programs promoting global sustainable development and conservation.

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