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Rural technology for green skills and livelihood sustainability in Uttarakhand of Indian Himalayan region

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Abstract: Concerns for the environment in India have led to increasing calls to sensitize youth through Environment Education and strengthen their skills which focus on environmentally conscious sustainable future. Green skilled people with expertise in environment management/conservation along with commitment will help in achieving the sustainable development goals. Uttarakhand region of India harbours rich biodiversity that fulfil the needs of local people. Utilizing the potential of 'Rural Technology' for developing green skills in the region will help in livelihood sustainability in Uttarakhand. This short communication highlights about the opportunities in Rural Technology used for green skills and livelihood sustainability in Uttarakhand of Indian Himalayan Region.

Keywords: rural technology; Uttarakhand; biodiversity; livelihood; local communities

1. Introduction

Concerns for the environment in India have led to increasing calls to sensitize youth through Environment Education (EE) and strengthen their skills which focus on environmentally conscious sustainable future. The significance of EE is now prevailing and youth knows the need of preserving environment for future generation. National Education Policy in India has incorporated EE in its framework. The policy envisions high quality education to all, thereby making India a global knowledge superpower. It is founded on the five guiding pillars of Access, Equity, Quality, Affordability and Accountability. It will prepare the youth to meet the diverse national and global challenges of the present and the future [1] India has a long tradition of holistic and multidisciplinary learning and towards the attainment of such a holistic and multidisciplinary education, the flexible and innovative curricula of all Higher Education Institutions shall include credit-based courses and projects in the areas of community engagement and service, environmental education, and value-based education. Environment education will include areas such as climate change, pollution, waste management, sanitation, conservation of biological diversity, management of biological resources and biodiversity, forest and wildlife conservation, and sustainable development and living. Capacity building of youth for green skills is one of the mandatory requirements of EE on topics like biodiversity, control of pollution, solid waste management, forest conservation etc. For achieving the sustainability of environment along with social and economic perspective, commitment towards nature based activities is necessary [2]. Uttarakhand region of India harbours rich biodiversity that fulfil the needs of local people. Livelihood of people in Indian Himalayan region is dependent on natural resources [3]. The main land use activity in the region is agriculture and is connected to the forests for

providing sustainability. Local people's economy is focused on agriculture, animal husbandry, medicinal/aromatic plant cultivation, forest resources and tourism [4]. The people of the region to earn a better livelihood migrate to plain areas in search of employment [5]. This short note highlights about the Rural Technology used for green skills and livelihood sustainability in Uttarakhand of Indian Himalayan Region.

2. Study area

Uttarakhand State in India have diverse landscapes and biological diversity, located at the foothills of Himalayan Mountain ranges. Land area consists of 56.72 lakh ha, major part is under forests and wastelands [6]. It is located between 28°43′N to 31°28′N latitude and 77°34′E to 81°03′E longitude. There are six National Parks, four community reserves and seven Wildlife sanctuaries which forms the protected area network of the region covering 3.24% of its geographical area [7]. The distribution of temperature condition over Uttarakhand varies greatly from −1.7 °C at Mukteswar to 42 °C at Pantnagar [8]. Uttarakhand Action Plan on Climate Change, Government of Uttarakhand indicates that the annual rainfall in the Himalayan region may vary between 1268 ± 225.2 mm and 1604 ± 175.2 mm [9]. The precipitation that has been forecast shows a net increase in the 2030s with respect to the simulated rainfall of the 1970s in the Himalayan region by 60 to 206 mm. The State has presence of rare and diverse species of flora and fauna. Indian Himalayan Region has trans-boundary connection of protected areas i.e. Indo-Nepal border of Kailash and Kangchenjunga landscapes [10]. State has a population of 10.09 million with 16,793 villages according to 2011 census, which is 0.83% of India's population. Rural population is 69.77% whereas urban population is 30.23 [11]. In biodiversity-rich areas, both conservation and socio-economic development are at the core of discussions among various stakeholders [12]. For promoting the improved livelihood of the people in Central Himalaya of India, there are various innovations being conducted along with conservation and management of natural resources. In this context, a study was carried to evaluate the potential of various solutions/innovations that are being implemented in the Himalayas of India [12]. It was found that only a few are found to be successful in both conservation and sustainable livelihood development. The study revealed that people are still looking for more viable solutions that could help them improve their lifestyle, as well as facilitating ecosystem conservation and supporting existing biodiversity.

3. Green skills

International Labour Organisation, defines green jobs as decent jobs that contribute to preserve or restore the environment [13]. It can be in traditional sectors like construction, manufacturing as well as emerging sectors of green field. Such Green jobs facilitate energy efficiency; limit greenhouse gas emissions; minimize waste and pollution; protect and restore ecosystems; and support adaptation to the effects of climate change [13]. United Nation Industrial Development Organisation (UNIDO) states that green skills are the abilities, values, knowledge and attitude which are required for sustainable and resource efficient society [14]. There are four

groups of work in UNIDO's Green General Skill Index for green occupations which are as follows:

- Engineering and technical skills: Skills involving design, construction and assessment of technology for eco-buildings, renewable energy design and energy-saving research and development (R&D) projects.
- Science skills: Competences stemming from bodies of knowledge broad in scope and essential to innovation activities, for example physics and biology.
- Operation management skills: Know-how related to change in organizational structure required to support green activities.
- Monitoring skills: Technical and legal aspects of business activities.

Green Skill Development Programme of Ministry of Environment, Forest and Climate Change (MoEF&CC), endeavours to develop green skilled workers having technical knowledge and commitment to sustainable development, which will help in the attainment of the Nationally Determined Contributions [15]. Under the programme, the vast network and expertise of ENVIS Hubs is being utilized for skill development in the environment and forest sector. List of courses includes water budgeting, propagation and management of bamboo, greenbelt development for industries, cleaner production assessment, Wildlife Management using Geospatial Techniques, Emission inventory, Forest Fire Management etc. Mainstreaming such skills shall develop responsible behaviour among society leading to improved environment. It shall imbibe the culture of green skills among the youth by promoting innovations and sustainable technologies.

4. Rural technology complex

G.B. Pant National Institute of Himalayan Environment (GBPNIHE) which is an autonomous institute of MoEF&CC has developed Rural Technology Complex (RTC) in their Headquarters in Almora, Uttarakhand in the year 2001. This complex aims to address the needs of local communities in the hilly areas with respect to the local specific technology interventions. The vision of RTC is capacity building of Himalayan mountainous communities for improving their life by effective management of natural resources and dissemination of knowledge through training on various rural technologies [16]. Village resource mapping and assessment is conducted for collection of village baseline data. Technologies like Pine processing, bio briquetting, polyhouse protected cultivation, vermin-composting, and integrated fish farming are promoted in the region through RTC (**Figures 1** and **2**). Local communities nearby are benefitted from RTC by active participation in the training programmes [16]. Sekhar [17] has indicated that participation of women in the rural economy is significant. Women's development and awareness through education is very important factor. In the Pine needle processing unit of RTC, women groups of nearby villages have been successfully engaged in collection of pine needles. The intervention yielded benefits of i) reducing fire intensity in surrounding Pine forests, and ii) improving livelihoods of local communities. gained popularity for eco-friendly pine needle based products such as file covers, meeting folders, carry bags, envelops, etc. Also, the conversion of pine needles into smokeless bio-briquettes is receiving appreciation of rural masses. This venture, while addressing the issue of

forest fire has contributed equally for rural livelihoods promotion by effectively engaging with rural women groups [16]. Livelihood opportunities (**Figure 3**) may also be accessed with the State Government departments like promotion of local product, preparation of handicraft items, promotion of local food items, exploring the potential of ecotourism in adjacent areas, etc.

Figure 1. Vermi-composting rural technology in the region which replenishes soil fertility.

Figure 2. Shadenet house in the area which protects crops from harmful ultraviolet.
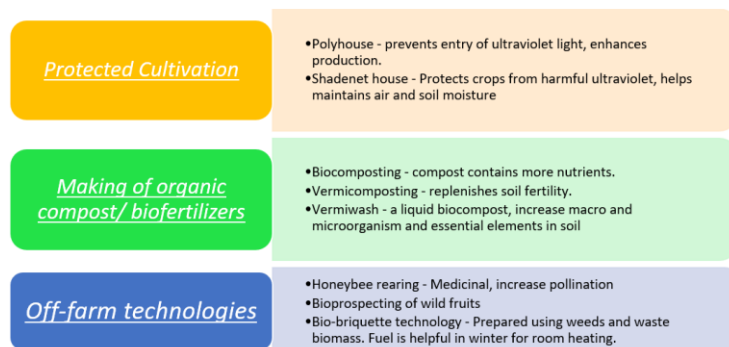

Figure 3. Opportunities in rural technologies for the region.

5. Conclusion

Agriculture is the main economic activity in the region and such technology parks shall provide the desired solutions to upgrade the livelihood of locals and as well as protect the environment of region. Moreover, it can provide better direction for sustainable development of the hill regions for better quality of life. Environment stewardship shall lead to think about the sustainable use of biological resources and ensuring their active participation in natural resource management that caters

ecosystem functions and services. It shall also develop the skills of local people and promote a culture of entrepreneurship in rural areas by adopting clean green technologies in various sectors. As rightly said by Padma Bhushan Dr. Anil P. Joshi that true capital of a nation is its natural resources and such parks would strengthen the green skills in the region and further contributing to rural economy. It will also help in controlling the migration of locals for jobs/livelihood. Further in future, detailed research may be conducted to analyse the impact of green jobs in the region that would be of paramount importance.

Author contributions: Conceptualization, RJ and KP; formal analysis, RJ; writing—original draft preparation, KP; writing—review and editing, RJ and KP. All authors have read and agreed to the published version of the manuscript.

Conflict of interest: The authors declare no conflict of interest.

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