Building self-reliant SMART villages for inclusive growth through green business and traditional folk art in Uttarakhand Himalaya

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ABSTRACT: The state of Uttarakhand is very rich in terms of forest resources. The rural people of the region are largely dependent on the forest resources for their livelihood needs. They are economically poor and marginalized and due to the factors like poor infrastructure facilities, low agriculture production, small landholding, lack of appropriate technologies human wild life conflicts etc. economy of the people is going weaker.

The state is dominated by the pine (Pinus roxburghii) forests, that produce tons of leaf litter (locally called Pirul) during the summer season. Due to the presence of resin, leaf litter is a major cause of forest fire in the summer season. Huge forest fire in the summer season caused by the leaf litter, adversely affects the biodiversity and crates environmental pollution as well.

Since, the pine needles, cones and other parts of pine tree are freely available in forests and they are almost waste material with hazardous property in terms of the forest fire these can be used for making different kind of products. Livelihood and economy of rural people could be enhanced by making various kinds of valuable and environmentally friendly products from the pine tree parts. This will not only increase the rural economy but also protect the environment in an integrated way in the state.

This paper deals with the making various products by the use of waste pine needles, cones and other parts under the "Green Business" and "Smart Village" concept for the ecological security and livelihood enhancement of the rural people of Uttarakhand state.

KEYWORDS: Uttarakhand, Forest fire, Pine tree (Pinus roxburghii), Green Business, Smart Village, Economic upliftment, Livelihood enhancement, Pine products, Bio-briquette, Decorative items.

I. INTRODUCTION
The Himalaya
The name Himalaya has been derived from two Sanskrit words Hima (snow) and Alaya (abode), i.e., the abode of snow. The Himalaya represents one of the youngest and most complex mountain systems on the planet Earth. The Himalayan Region, encompassing the Hindu Kush Mountains and Tibet Autonomous Region of China, covers an area of more than 3.44 million km2 spread over Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal and Pakistan. It stretches across a length of over 3000 km, from low laying valleys to an altitude of around 8848m asl. The Himalaya is characterised by a high degree of geological fragility, extreme variability of landscapes, rich biodiversity and forests, glaciers, perennial rivers, lakes and wetlands, religious shrines/ monasteries, places of exquisite scenic beauty, and diversity of human races, religions and cultures.

The Indian Himalayan Region
The Indian Himalayan Region (IHR) spans over 5.37 lakh km^2 (0.537 million km2) between $21^057'-37^05'N$ and $72^040'-97^025'E$ and covers nearly 16.2% of the total geographical area of the country (Figure 1). Biogeographically, the IHR represents three biogeographic zones (namely, Trans Himalaya, Himalaya and North East India) and nine biogeographic provinces. Each of these provinces has remarkable cultural, ethnic and biological diversity. The region contains snow-clad peaks, glaciers and dense forests with rich diversity.
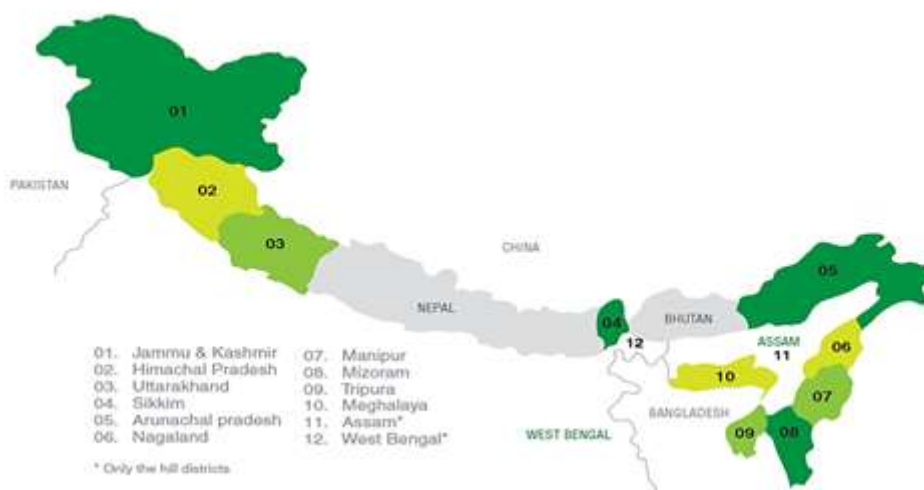
Figure1: Indian Himalayan region (Source: G-SHE, 2009)

Administratively, the ten states i.e. Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura and Meghalaya are fully covered in IHR, while West Bengal and Assam are partially covered including only the hill districts.

Uttarakhand

Uttarakhand was formed on 9th November 2000 as the 27th State of India, when it was carved out of northern Uttar Pradesh. Located at the foothills of the Himalayan mountain ranges (28°43' N to 31°27' N). The area of the state is 53,483 sq.km with the population of 100.86 lakh. it is largely a hilly State, having international boundaries with China (Tibet) in the north and Nepal in the east. On its north-west lies Himachal Pradesh, while on the south is Uttar Pradesh. It is rich in natural resources especially water and forests with many glaciers, rivers, dense forests and snow-clad mountain peaks. Char-Dhams, the four most sacred and revered Hindu temples of Badrinath, Kedarnath, Gangotri and Yamunotri are nestled in the mighty mountains.

The state is bestowed with a variety of natural resources but people of the region are economically poor, marginalized and disadvantaged. Despite of rich indigenous wisdom to manage resources the productivity of agricultural lands is low owing to minimal use of modern technologies. Natural resources are faced with degradation of forests and abandonment of crop land due to low productivity, drying up of water sources, crop damage by wild animals, reduced availability of fuelwood and quality fodder.

An assessment of problems related to agriculture were ascertained, which comprised wild animal threats, impacts of climate change, unemployment (male out migration), low economic returns from agriculture, lack of appropriate technologies, poor infrastructure facilities, rain fed agriculture, fragmented and small land-holdings and predominance of waste lands.

People of Uttarakhand are totally dependent on the natural resources. The state is very rich in terms of biodiversity but due the anthropogenic pressures the loss of biodiversity has been observed at great extent. The state is dominated by the pine forest and in the summer season forest fire is one of the major issues. Pine forests are spread all over in Uttarakhand that produce tons of leaf litter (locally called Pirul). These are inflammable due to the presence of resin and they are a major cause of forest fire in summer. The dried fallen leaves of pine tree in the summer season are very prone to fire and caused huge forest fire leads to the loss of biodiversity and environmental pollution.

Due to above constraints the economy of the state is very poor and peopleare economically weak and are living their lives in poverty. Hence, there is a need to devise possible solutions to bring in improvement in livelihood and increase in income of rural poor, and protect the environment in an integrated way in the state.

Alternative livelihood options for the income generation is one of the possible ways to uplift the economy of the people of the state.

A SMART village Concept

Smart Village is a concept adopted by national, state and local governments of India, as an initiative focused on holistic rural development,

derived from Mahatma Gandhi's vision of Adarsh Gram (Ideal Village) and Swaraj (Self Reliance).

The Eco Needs Foundation has initiated the concept of "Smart Village". Under this project the Foundation is adopting villages and putting efforts for sustainable development by providing basic amenities like sanitation, safe drinking water, internal road, tree plantation, water conservation. The Foundation is also working for inculcating moral values in the society and for improving the standard of living of the villagers. In the concept of "Smart Village" the development of the village shall be based on the five paths Retrofitting, Redevelopment, Green fields, e-Pan and Livelihood.

The vision of smart village "to demonstrate villages as models of sustainable development based on environmentally responsible individual and collective action for reducing human ecological foot-print and through judicious use of natural resources". This concept has been adopted by national, state and local governments of India, as an initiative focused on holistic rural development, derived from Mahatma Gandhi's vision of Adarsh Gram (Ideal Village) and Swaraj (Self Reliance) (http://saanjhi.gov.in/Guidelines.aspx) popularly known as SansadAdarsh Gram Yojana (SAGY). Also, Unnat Bharat Abhiyan of Ministry of Human Resource Development (Govt. of India) to uplift rural India is a notable effort in this regard. Perhaps in the last few decades the popular Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) has been widely appreciated from different corners of the society, particularly the rural people that emphasized to take up work on natural resource management focusing on water harvesting, irrigation facility, plantation, land development for livelihood support etc. particularly to those from the weaker sections of the society (SC/ST & BPL) and marginal and small farmers (with < 2 ha land) (https://www.nrega.nic.in/).

Livelihood enhancement through "Green Business"

Since livelihood improvement or rural people is a part of Smart Village concept an idea of livelihood enhancement through "Green Business" have taken in to consideration.

Green Business

The green business is the concept to increase the livelihood of the rural people through capacity building, skill development and entrepreneurship development by making various market demanding items made from available natural resources in the sustainable way.

There are plenty of available natural resources in the forests of Uttarakhand. Pine tree (Pinus roxburghii), a plant species of family Pinaceae is found abundantly in the forests. It is the source of fuelwood, timber and resin. The leaves (needles) is fallen in the summer season and cover the forest floor. Since it is highly inflammable and one of the major factors of forest fire a huge damage is caused by the forest fire in Uttarakhand every year resulting the loss of biodiversity and local assets. The cone, contain the seeds of pine tree also promotes forest fire during summer season.

Keeping in view the hazardous nature of pine needles and cone, a concept has been visualized to reduce the amount of pine needles, conesfrom the pine forests and convert them to various products i.e. decorative items, Rakhi's, biofuel (bio-briquettes) and handmade paper so that it will reduce the risk of forest fire in the forest and provide the alternative livelihood to the local people. G.B. Pant National Institute of Himalayan Environment (GBPNIHE), Kosi-Katarmal, Almora, Uttarakhand has already initiated work on this concept and starts making bio-briquettes, rakhis and various decorative items by using the pine needles, cones and bark.

A Rural Technology Centre (RTC) has been established at GBPNIHE to provide training to the various stakeholders including farmers, students, NGOs etc. on various technologies (1) Yield increasing (polyhouse, vermi-compost, bio-compost, etc.), (2) Income generating (cash crop cultivation, vegetable cultivation, horticulture, integrated fish farming, etc.), (3) Life supporting (multipurpose tree and fodder spp. plantation in wastelands, making decorative items from chir pine needle and cone, etc.) and (4) Value addition and other supporting activities (bio-briquetting, decorative items from chir pine needles and cone).

The best thing in making bio-briquettes, rakhis and decorative items that the tree is not cut in any way to make these products. The pine needles and cones that falls on the ground are in a way useless and also responsible for forest fires. The state government has also encouraging the removal of pine needles from pine forests by giving incentives to the villagers.

II. MAKING BIOFUEL (BIO-BRIQUETTES, BIO GLOBULES) BY USING PINE NEEDLES

Briquetting is a process of converting low bulk density mass (dry pine needle) into high

density and energy concentrated fuel bio-briquettes. In first step dry pine needles (Pirul) are collected from the forests during summer (April-June) and air dried for 3-5 days for removing moisture contents. In next step dry pine needles (Pirul) undergoes the carbonization process by putting 10 kg dried Pirul in a pit (1.5.m x1mx1m) with arrangement of a tin sheet to cover the pit. Size of the pit can be increased or reduced depending upon the quantity of Pirul. After loading the dry pine needle into the pit, fire is ignited in the pit and the pit is covered with the tin sheet tightly by sealing the air passages with soil and left for burning for 1-2 hour (depending upon quantity of Pirul). Thus, in the absence of air (anaerobic condition) it burns slowly and about 30% carbonized char (by weight of Pirul) is obtained (i.e., 10 kg Pirul will give rise to 3 kg char). In next step the carbonized Char is taken out from the pit after it cools down and the Char is mixed with sieved soil (clay as a binding material) by adding water in the ratio of 8 (Char): 2 (clay). The material is mixed well to ensure that every particle of char is coated with binder. At last the charcoal mixture is made into bio-briquettes using a specially designed iron mould (Fig 1). The mixture is tightly filled directly into the mould by hammering it on a hard surface to form compact and uniform sized briquettes.

Fig. 1. Iron mould for making bio-briquettes

Fig. 2. Steps of making bio-briquettes

Economic analysis of bio-briquetting

The average weight of chir pine needle collected by a hill woman at a time is about 30 kg. Thus, economic analysis of bio-briquettes has been done on the basis of 30 kg Pirul biomass. The carbonization of 30 kg Pirul yields 7.2 kg charcoal, which is sufficient to make 36 bio-briquettes. Total time taken in preparation of one batch of bio-briquettes (36) is 4.33 hours. The production cost of 36 bio-briquettes is Rs. 195.5. Thus, it gives a net profit of Rs. 200.5.

By selling these environment friendly and smoke less bio-briquettes in the local market, local people can earn handsome money to improve their economy. Bio-briquettes can be used in various household purpose such as heating water, cooking and to get warm homes in the heating in winters. A low-cost stove (chulah) is designed for burning bio-briquettes for easy use (Fig. 3). Under NMHS funded project of the GBPNIHE, trained beneficiaries earned about Rs. 60,000 by selling bio-briquettes during the project period in the nearby town.

Fig. 3. Bio-briquettes burning in the low-cost stove (chullah)

III. MAKING DECORATIVE ITEMS BY USING PINE NEEDLES, CONE AND BARK

Decorative items are very important in our lives. In thewhole world, people apply various types of decorative items in their homes, shops, large establishments, offices and many other places. India is a country of festivals and festivals are celebrated here throughout the year. Different types of decorative items related to every festival are used in the country. There is a huge market for these decorative items which is unlimited.
Nowadays, due to the availability of online market, the market for decorative goods has become even more elaborate. Keeping this demand of the market, we can make decorative items in our villages which also have traditional importance and can be made from the available resources around us for free.

Since, in Uttarakhand natural resources are plenty and the pine needles, cones and its other parts are freely available in forests. Pine needles, cones are almost waste material and have hazardous property in terms of the forest fire these can be used for making different kind decorative items. Govt. of Uttarakhand is also promoting the use of Pine needles for local products to avoid forest fire.

Unemployed youth and other backword people could have an alternative livelihood option by adopting such practices to uplift their economic wealth.

The state of Uttarakhand is famous for its scenic beauty and rich traditional culture. It is the ideal tourist destination for visitors. Lots of local and international tourists came here to enjoy the beauty of the state. Therefore, decorative items have good potential in the state.
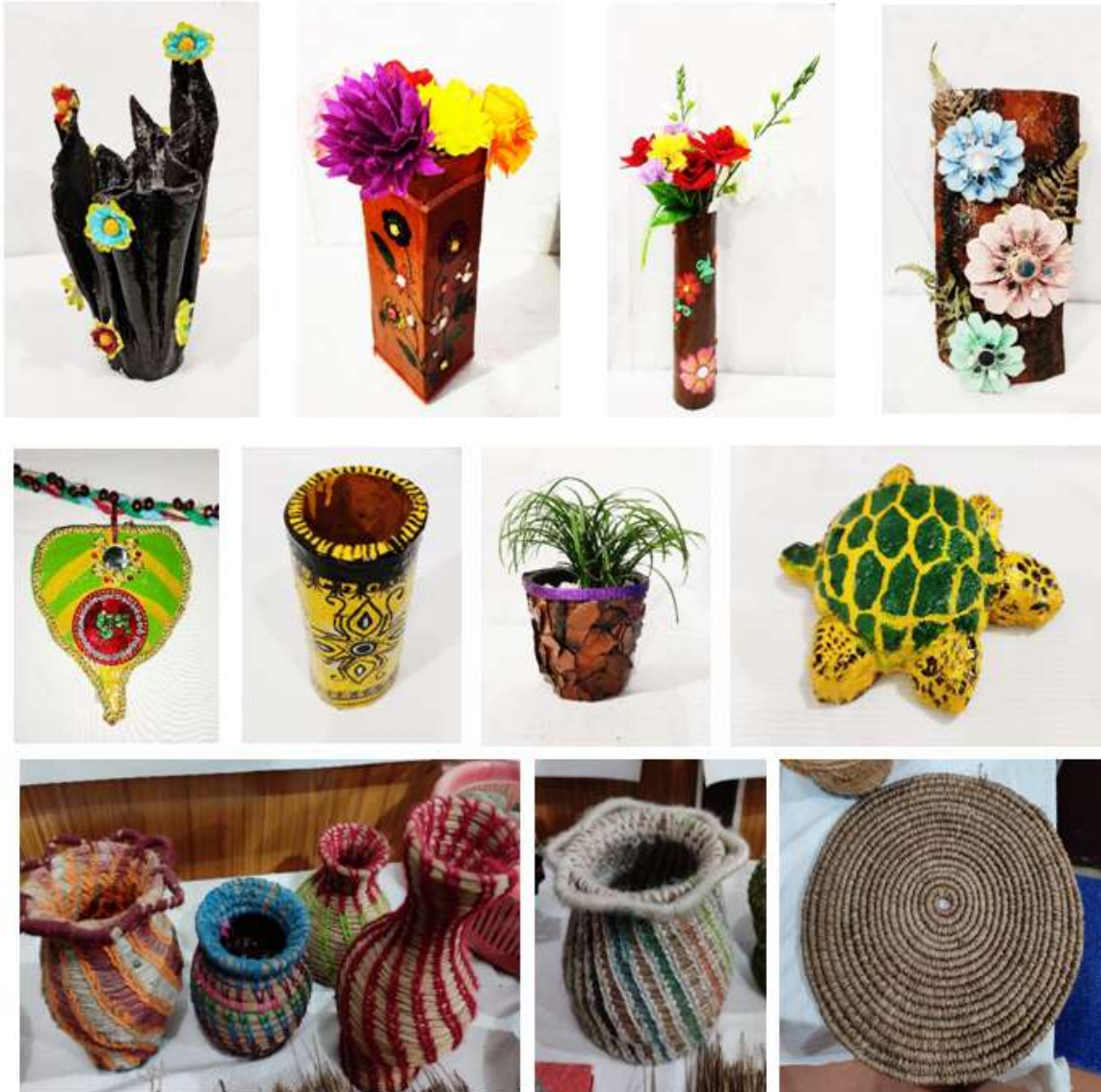

Fig 4. Decorative items made from pine needles, cone and bark

IV. MAKING RAKHIS BY USING PINE NEEDLES, CONE AND BARK

Raksha Bandhan festival is celebrated every year in India. This festival is a symbol of love and dedication of brother and sister. On this occasion, every sister ties a Rakhi on her brother's wrist and takes a promise of protection from her brother. The defence thread that is tied in this festival is made of cotton thread and some other decorative materials. Every year on the occasion of Raksha Bandhan, the local market is filled with Rakhis. People get employment from the sale of rakhis and traders get good profit.

Since last two years GBPNIHE trained some women of nearby villages to make rakhis by using pine needles, cones and bark. The initiative was successful and women made very beautiful rakhis before the festival. They have sold these rakhis in local market and earned some money.

V. LIVELIHOOD ENHANCEMENT THROUGH TRADITIONAL FOLK ART

Traditional folk art of Kumaun region like 'Aipan' has good demand in the market due to the unique and traditional artistic nature. It attracts tourists coming outside of the state and have good demand among the Kumauni people. Keeping in view its importance and economic value, it can be an alternative income source for the rural people who has some skills of drawing and sketching. Therefore, training on Aipan making is proposed under the project activities.

Aipan is a kind of traditional art which is widely practiced in Kumaun region. This practice goes back to many centuries. Aipan are drawn on the threshold of the house. Traditional Aipan play very important role in every household, without Aipan no ceremony is considered to be complete. On every auspicious occasion Aipan are drawn, so these are part of the ritual in Kumauni culture. It is also made on Chauki (wooden hard board), floor, cloths, and door, door-frames, window, window-frames and interior house walls etc.

Many kinds of geometrical shapes are drawn as Aipan. These designs vary from simple to very complex types. Drawing of Aipan requires high level of skill, as it is very fine work and requires high level of accuracy also. Specific kinds of Aipan designs are used for particular rituals. Such as for wedding ceremony 'Var Chauki' and

'Brahman Chauki' are necessarily used by the bride side. In the same way there are different kinds of Aipans are used for different ceremonies i.e. Shiv Peeth (Used for Shiv Pooja), Saraswati Chauki (Used for Saraswati Pooja), Janeu Chauki (Used in Janeu Sanskar), Namnkaran Chauki (Used in Namkaran Sanskar), Dhuli Arg Chauki (Used in Reception ceremony of groom).Other than these, various items such as Dwar Patra, Var Chauki, Brahman Chauki, Nimbu, Shasthi, Dikare, Soop, Laxmi Chauki, Vasudhara, etc. are also made by the local people.

Aipans are drawn with the help of wet color. The ochre (Geru) is used for making the background for Aipan. Mainly the natural colours are used as the pigments for Aipan. Overnight soaked rice paste is used as the white color. This (white) is the only color which is used in Aipan.

Prospects of Aipan for Socio-Economic Development

Aipan art can be practiced by local people for their income generation. It is very easy to make and it can be drawn by everyone men, women, old and young and incur a low input cost of materials. But with the passage of time and the society going through the modernization phase people does not have much time to make them. People go for the readymade Chauki's/Aipans available in the market. As this tradition gives Kumaun a unique identity so we should do everything possible to keep this age-old art alive.

VI. SKILL AND ENTREPRENEURSHIP DEVELOPMENT THROUGH PARTICIPATORY APPROACH

In order to make rural people self-sufficient in terms of their livelihood, alternative loverhood options should be provided to them. In the present COVID scenario Government of India encourage people to promote Vocal for Local to boost up the economy and to uplift the livelihood of rural people. This concept could only be succeeded by adopting the self-employment through the locally made products.

In order to bring this concept to the ground, first of all rural people will have to be made aware about it. After this, their capacity building, skill development will be required. The GBPNIHE is already working in this direction.

Many people who have received training from the institute have also started benefiting from these employment opportunities.

The most difficult obstacle to make such efforts successful is the convenience of connecting people to the market. For this, the government and the grassroots organizations will have to work together.

Entrepreneurial development of people is also absolutely necessary to adopt market-based industry and make it successful. For this, they have to be trained separately so that they can be connected to the market system and they do not have any problem in it.

This objective can be accomplished by organizing at a rural level. For this, there is a strong need to workat the Gram Sabha level.Each of us

has different interests and skills therefore, people have to choose work according to their interest, knowledge and skill.

To understand the need of people participatory approach should be used to undertake the activities. Selection of beneficiaries, identification of work should be planned through community consultation. Initial community meetings should be organized to decipher aims, approach and possible benefits. Potential community leaders and progressive peopleshould be identified.

All villagers should be given exposure to Rural Technology Centre (RTC) of the Institute and interact them to successful entrepreneur. Thereafter focused trainings and capacity building activities should be organized.

Regular community meetings/interactions should be organized and interactions should be done with various line agencies/govt. institutions to get support from them.

VII.   CONCLUSION

Overall goal of this idea is to uplift the rural economy and the betterment of lifestyle of rural people. On the other hand, biodiversity would be conserved. Success of rural people by adopting this kind of alternative livelihood options will definitely make them smart and the concept of Smart Village wold be successful. As the women are the backbone of mountain socio-economic fabric their capacity building and economic upliftment will contribute to the quality of their life and overall sustainable development of rural people.

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