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Opportunities for Butterfly Farming and Gardens in India - Benefits of Education, Conservation and Sustainable Livelihood

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Abstract **– Among insects, butterflies perform diverse ecological roles and are considered as good indicators of a healthy terrestrial ecosystem; however they are inadequately researched as a potential resource in agro-ecosystems. This paper is an off-shoot of a study that attempts at mainstreaming biodiversity conservation as a form of diversification in agro-ecosystems. In this process, it seeks to combine the principles of agricultural production and biodiversity conservation by elucidating the diverse opportunities and benefits that are realizable in butterfly farming and parks/gardens within agricultural landscapes. In this paper we have explored the opportunities for establishing butterfly gardens as a means of providing education, conservation and sustainable livelihoods.**

Keywords **– Butterfly, Sustainable Livelihood, Agro-ecosystems, Alternate Revenues, Parks and Gardens.**

I. INTRODUCTION

India's rich biodiversity is sustained by an oasis of laws and conservation measures that currently protect and conserve flagship species like the tigers and sea turtles, while the entire spectrum of biological diversity lies in the backdrop. Over the years, the growing concern to bring inclusiveness in the conservation agenda has resulted in addressing the essential role of small organisms in natural ecosystems and the value they bring to stakeholders livelihoods. One among them, a very charismatic species of insect, the Butterfly has the potential of being the ambassador for all invertebrates and their occurrence and diversity are considered a good indicator for a healthy natural ecosystem. They help to promote public awareness and provide incentives to agriculturists who maintain indigenous landscapes that sustain their population. In the Indian context, few studies have documented the diversity and seasonal distribution of butterflies (Kunte, 2011; Mathew and Anto, 2007). There is a need for butterflies to be valued beyond their utility as sentinels of the environment and seek tangible incentives to those who directly and/or indirectly conserve them.

II. BUTTERFLY FARMING

On the commercial front, there exists a vibrant world market for butterfly pupae as a cash crop. They have been extensively farmed in privately owned butterfly farms in tropical countries, notably Central America, Southeast Asia and parts of Africa and exported primarily to North America and Europe. The butterfly pupae produced in butterfly farms are exported to butterfly houses who make use of them in breeding and exhibitions. There are currently 102 living butterfly exhibits around the world[1]. Some of them are stand-alone, while many others are part of larger gardens, insectariums, nature parks, or museums.

The global turnover of this trade has crossed over a 100 million USD (Rich et al, 2014a). By giving butterflies a monetary value and establishing a vibrant international market for their trade and display, butterfly farming has improved the management of local forests in many developing countries and given livelihoods opportunities. Scurrah-Ehrhat and Blomley (2006) found that butterfly farming generated an additional 17 percent to the income of project participants in the Amani project in Tanzania, while Gordon and Ayiemba (2003) noted that the top earner from the Kipepeo butterfly project in Kenya, a disabled person could also adopt butterfly farming as a livelihood activity. This is a salient feature where butterfly farming can be "scaled up" and highlighted as a model of sustainable development; linking conservation with livelihoods.

However, the increasing loss of habitat, and the ethical and scientific concerns of farming, chances of cross breeding and introduction of alien species are some of the critical issues facing world trade in butterflies (Boppré and Vane -Wright, 2012). In addition, the industry is replete with significant oversupply of pupae and stagnant demand from exhibitions, which has been exacerbated by recent EU regulations that prohibit the transport of pupae without obtaining a costly veterinary certificate. This has resulted in a consolidation of buyers in Europe and squeezed out smaller suppliers that cannot ship in bulk to reduce the unit costs associated with the new inspection regulations. To govern such challenges, Rich et al (2014a) suggested adoption of individual transfer quotas (ITQs) within the butterfly sector and highlighted the positive dynamics in a simulation model of smallholder butterfly farming, and demonstrated different means by which quotas could be allocated in more equitable ways.

In India, the nascent drive to farm butterflies though hopeful is restricted by law. It is both a boon and bane; such farming provides opportunities to diversify incomes

[1] http://en.wikipedia.org/wiki/Butterfly zoo accessed February 2015

of local communities on the one hand, while unrestricted access to the diversity of tropical butterflies driven by profits could likely jeopardise the sustainable use/trade of butterflies (Johnson, 1998). The Indian Wildlife Protection Act (WPA) has catalogued 412 species of butterflies and is part of the schedule of protected species. The Biodiversity Act and Rules states that access to India's rich biodiversity for commercial/research activity, bio-survey is restricted and requires prior approval from the National Biodiversity Authority/State Biodiversity Boards set up under the Act. While, the rules of the Central Zoo Authority monitor and govern the illegal trade and commercial use of biodiversity and permission is required from this Authority to maintain butterflies in captivity. However, illegal trade in butterflies persist - rare and high-altitude butterflies like Ladakh Banded Apollo, Kaiser-I-Hind and Krishna Peacock are gathered and sold for high prices to various butterfly parks around the world. Many Entomologists have also pointed out that only a small percentage of butterfly species are protected and biodiversity laws are not explicitly well-linked to butterfly conservation (Kunte, 2008).

Even if law-abiding opportunities for export arise within India in the future, it would have to be a niche for certain species as new entrants will have to meet buyer demands and compete with suppliers from countries such as Philippines - one of the major exporter in the sector. Also, any niches that could emerge are likely to be too small and limited in scope relative to existing supplies. On the margin, and at local levels, an expansion of butterfly farming could have some positive impacts, particularly those farms linked with local tourism, though the range of beneficiaries is likely to be small. On the other hand, those oriented exclusively towards export markets are much less likely to be viable, even if demand rises significantly, unless they can provide something significantly unique than the existing offerings. As many species do not breed well in captivity, the universe from which should new, niche supply could come from is likely to be limited.

Opportunities for Butterfly Parks and Gardens

Given the challenges for a new entrant in the exports from butterfly farming, another avenue that could provide diverse incentives are butterfly parks and gardens. It is envisioned as a means to counter the rapid destruction of habitats and create a butterfly friendly natural oasis. Parks are enclosed landscapes within marked boundaries usually found in fragmented urban spaces, while in gardens the landscape spills over to the green space surrounding it. Therefore, most parks have a limited variety of species diversity, while gardens attract butterflies based on the host and nectar plants grown. However, both are used interchangeably and named according to the desires of the proponents of these parks and gardens.

Butterfly parks and gardens have been initiated in India with a diversity of larval and host plants that attract butterflies and aid in the restoration of habitats conducive to butterflies. Unlike, butterfly houses or commercial farms, butterfly gardens are open-air landscapes where only native butterflies are encouraged to habitat/visit naturally. These gardens are traced back to the Drum Manor Butterfly Garden that was opened in 1970 with the primary purpose of butterfly conservation while also attracting curious visitors and educating public (Boppré and Vane -Wright, 2012). These gardens make a significant contribution to conservation, through effective education about butterfly biology as a means to raise public awareness on basic ecological processes, preserving regional butterfly diversity and environmental issues in general.

We realise that butterfly parks and gardens provide opportunities for the public to see them up close and be able to distinguish the varieties of butterflies and understand their life cycle, their host and nectar plants, and their usefulness to society. These alternative revenue streams apart from farming provide aesthetic and recreational services coupled with education and can translate into direct economic values as well as conservation of these species. While the visitations to the parks fluctuate seasonally, the overall response in terms of number of people who visit these parks and gardens are on the rise. A majority of them leave the park having gained knowledge of the unique role butterfly communities play in our natural ecosystem and a sense of responsible environmental stewardship needed on our part to preserve these species. There are currently ten butterfly parks in India located across the country, mainly established by the Government. Chronological, the first butterfly park was established in Bangalore followed by Parks/Gardens in Shimla, Pune, Chandigarh, Sikkim, Goa, Mysore, Odisha, Srirangam and recently at Lodhi Garden in New Delhi.

III. Case Studies

The Sammilan Shetty Butterfly Park (SSBP), a brain child of Mr. Sammilan Shetty was initiated in 2011 and opened to public since 2013. This park covering an area of 7.35 acres is originally an agricultural farm converted to a natural butterfly garden. The garden hosts more than 114 species of butterflies and is located adjoining the Kanthavara forest in Dakshina Kannada district, Karnataka State. The area also covers a secondary forest of *Hopea ponga*, an endemic tree species that is host to two varieties of Oakblue butterflies. The initial investment for the establishment of the BP was approximately Rs. 0.5 million (besides the cost of owned land), and approximately Rs.50,000/- is spent as the annual recurring costs on maintenance of the BP. An entry fee is Rs.50/- is charged for adults and Rs.25/- for children from July to November period and during off-season, the entry fee is uniform at Rs.30/- for all individuals. In case of school and college students, the entry is free for educational field trips. A vast majority of visited the SSBP out of their own interest to observe and study butterflies that included many butterfly hobbyists, naturalists and photographers. Varying age groups of visitors have been travelling to the park including groups of school/college students as part of their science club and educational programmes. Personal communication with the owner reveals that the butterfly garden helps the family to earn an additional income apart from their agricultural activities that ranges from Rs.5500

per month off-season and approximately Rs.20,000 per month in the months of September to November.

Our study also delved into the rationale and preliminary response to a recent initiative of establishing a butterfly garden at Swastha Centre, a school for the differently-abled children in Suntikoppa, Kodagu district, Karnataka State, India. As a form of institutional innovation, a model Butterfly garden was initiated at the Centre in 2012 as a project supported by the Norwegian Research Council (Rich et al, 2014b). This butterfly garden is established with multiple objectives :- to encourage student volunteers at to learn how to maintain the butterfly garden and learn about butterfly ecology and environment; to provide passive and active nature oriented therapies to improve the well-being of differently-abled children; to serve as a livelihood opportunity and capacity building endeavour; to provide an opportunity for these children to interact with the general public as they have been segregated from the society; and lastly, it is envisaged that when the garden is fully developed, it can attract tourists as part of an eco-tourism package wherein *in-situ* conservation is demonstrated. These two case studies provide evidence of the multiple benefits of income, education and conservation of butterflies within agricultural landscapes.

Exploring Opportunities for Alternative Revenues via Butterfly-friendly Agricultural Landscapes

While butterfly farming for export is currently not a feasible option in India, there is scope for expanding the mechanism of monetising and valuing butterflies more generally as a means of protecting the environment within agro-ecosystems. Mainstreaming conservation as a form of diversification is a potential means through which incomes could be enhanced and the environment preserved. In this process, it seeks to combine the theoretical principles of agricultural production and biodiversity conservation. For example, the development of butterfly gardens as a value adding tool is feasible for coffee growers in Kodagu district, or other districts in Western Ghats particularly given the growing importance of eco-tourism. This district could emulate the model adopted in Costa Rica, where butterfly gardens and other forms of biodiversity preservation have been marketed as part of the value proportion of the tourism experience (Aylward et al. 1996). Several home stays in Kodagu already include nature walks, treks and bird-watching as part of their portfolio of activities in addition to coffee. It could be a way for various types of producers to both add value to production, whether through local tourism. Using the partial budget approach, the establishment cost of a butterfly garden within a coffee farm in Kodagu district has been estimated at Rs.64,000 per acre amortized over the economic life span of the garden assumed at 50 years and Rs.4280 per acre as annual maintenance cost.

In addition, producer-led eco-labelling programs that highlight the protection of local biodiversity could be another way of eliciting consumer response from environmentally conscious segments of society that care about specific species (Chengappa et al. 2014). As the presence of butterflies in an ecosystem represents a useful, low-cost indicator of environmental health, their use as both a performance measure and symbol that communicates to consumers the conservation efforts made by agriculturists could be utilized as a means to add value to producers engaged in sustainable production practices. Linking Payment for Ecosystem Services (PES) with financial and communication mechanisms that add value for agriculturists, and shift the burden of payment from government to consumers who are willing to pay for such goods, could be a more sustainable way of valuing butterflies in the future as well as provide an alternative or additional source of livelihood for those dependent on agro-ecosystems.

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