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# Improving livelihoods through conservation and education

## A case study of the Swastha butterfly garden

Magda Rich, Ganga Changappa, Babu Raghavan and Karl M. Rich



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# Improving livelihoods through conservation and education

## A case study of the Swastha butterfly garden

Magda Rich\*, Ganga Changappa, Babu Raghavan and Karl M. Rich

### **Abstract**

In many parts of the developing world, those with physical or mental handicaps are often considered to be a burden on society, with limited to no remunerative activities available in the workforce. Activities such as butterfly farming, which require precision and attention to detail, are potentially relevant for disadvantaged groups as a source of livelihoods. At the same time, such activities can be integrated with community-led conservation efforts as well. We provide a case study of the development of a butterfly garden at the Swastha Centre for Special Education and Rehabilitation in the Kodagu area of Coorg, a region in the state of Karnataka in India through which conservation-based activities are integrated with special education in a manner that builds skills, improves livelihoods, and serves as an important resource for environmental education. Our case demonstrates a scalable means by which butterflies can be used to educate, improve the environment, and offer livelihoods to the disadvantaged in a country where such opportunities are greatly needed.

**KEYWORDS:** Butterflies; conservation; special education; green care; India; therapeutic horticulture

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# Introduction

Butterfly farming has been purported as a means to improve livelihoods in developing countries. Unlike other types of agricultural or rural-based activities, butterfly farming is a low-input practice that necessitates little in the way of infrastructure or capital investment (Procházková and Rich 2011). Rather, successful butterfly farming requires a passion for butterflies and production activities, and necessitates the cultivation of a symbiosis with one's natural environment. Indeed, numerous studies have indicated the positive impacts of butterfly farming on the environment, conservation awareness, and livelihoods, particularly for women and disadvantaged groups (Gordon and Ayiemba 2003; Ickis et al. 2006; Morgan-Brown 2007).

Because butterfly farming is a delicate activity that requires precision and attention to detail, the potential that such activities have for disadvantaged groups such as the disabled is particularly salient. In many parts of the developing world, those with physical or mental handicaps are often considered to be a burden on society, with limited to no remunerative activities available in the workforce. Where employment opportunities are scarce in general, as they are in various rural areas in Africa and Asia, the challenges for those with disabilities are magnified. In this context, activities such as butterfly farming could serve as an important source of livelihoods and capacity building for the disabled. For instance, Gordon and Ayiemba (2003) note that the highest wage earner in the Kipepeo project in 1999 was a disabled man who earned over US\$1,000 annually from butterfly farming. Follow-up interviews in 2012 at Kipepeo in Kenya indicated that a disabled man with elephantitis was one of the top farmers in the project and who earned a few hundred dollars every two weeks from butterfly farming. While this example is illustrative, little research has been conducted that highlights the entry points in which the disabled could be integrated into butterfly-related, or more broadly conservation-based activities in a manner that is both financially sustainable and promotes good environmental stewardship. There has been a considerable amount of research and practice conducted in several European countries (i.e. Netherlands, UK, Norway, etc.) and the USA on the therapeutic impact of linking people with nature, both passively and actively (Hine, Peacock, and Pretty 2008). However, in India and developing countries in general these relatively new alternative kinds of therapy have not been introduced yet on a wider scale.

In this paper, we provide a case study through which conservation-based activities can be integrated with special education in a manner

that builds capacity and skills, improves livelihoods, and serves as an important resource for environmental education for the community as a whole. Our case study focuses on the Swastha Centre for Special Education and Rehabilitation in the Kodagu area of Coorg, a region in the state of Karnataka in India. As part of a Norwegian Research Council project on butterfly farming and livelihoods in India, a model butterfly garden was designed at Swastha to showcase the importance of butterfly conservation in India, manned by disabled volunteers from the school who play important roles in the maintenance of the garden and educating of visitors. This differs from other butterfly-related activities that have a profit motivation, reflecting the current ban on butterfly farming as a commercial activity in India. Nonetheless, it demonstrates a scalable means by which butterflies can be used to educate, improve the environment, and give livelihoods opportunities to the disadvantaged in a country where such opportunities are greatly needed.

Our paper is organized as follows. We first provide some background into the context of our case, including a narrative on our case region (Kodagu), the status of people with disabilities in India, and our study site (Swastha). Based on this background, we provide details on how our model butterfly garden contributes to livelihoods, education, and conservation.

# An overview of Kodagu

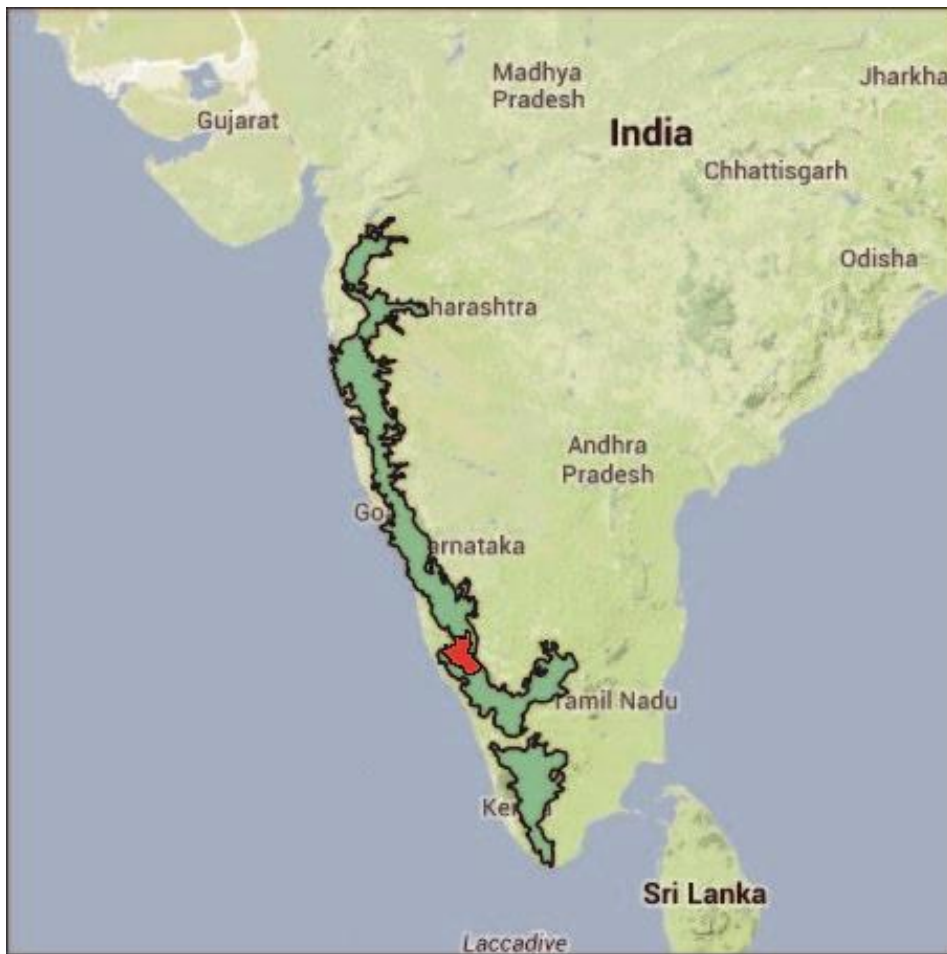
Kodagu District (4,102 sq km) is an administrative unit belonging to Karnataka, situated in the southwest part of the state. It is a part of the Western Ghats region, a mountain range stretching along the southwest coast of India (figures 1 and 2). The Western Ghats is an area with an immense ecological importance. In particular, its morphology has a great impact on the climate of the district – the range of the Western Ghats creates a barrier against the seasonal monsoon rain-soaked winds. As Kodagu is in a close proximity to this barrier, the annual rainfall range differs hugely even in such a small district, with the highest quantity along the mountain range in the West.

Figure 1: Location of the Western Ghats in India



Source: <http://indiabiodiversity.org/map#>

Figure 2 Location of Kodagu district in the Western Ghats



Source: <http://indiabiodiversity.org/map#>

The Western Ghats boast some of the highest levels of biodiversity and endemism in the world. It is one of the eight most important biodiversity hotspots in the world as listed by UNESCO since 2012. More than 50 percent (352) of the 650 tree species found in the Western Ghats are endemic, while 60 percent of reptile and amphibian species and 53 percent of fish species are endemic. In addition to the endemic species, Western Ghats provide shelter to 325 species of flora and fauna that are listed as globally threatened, based on estimates from the IUCN Red List.<sup>2</sup>

One of the most unique characteristics of Kodagu district is the combination of natural forests with agricultural land and practices. Trees cover about 65 percent of the area of the district, making Kodagu one of the most forested districts in the country. As shown in figure 3,

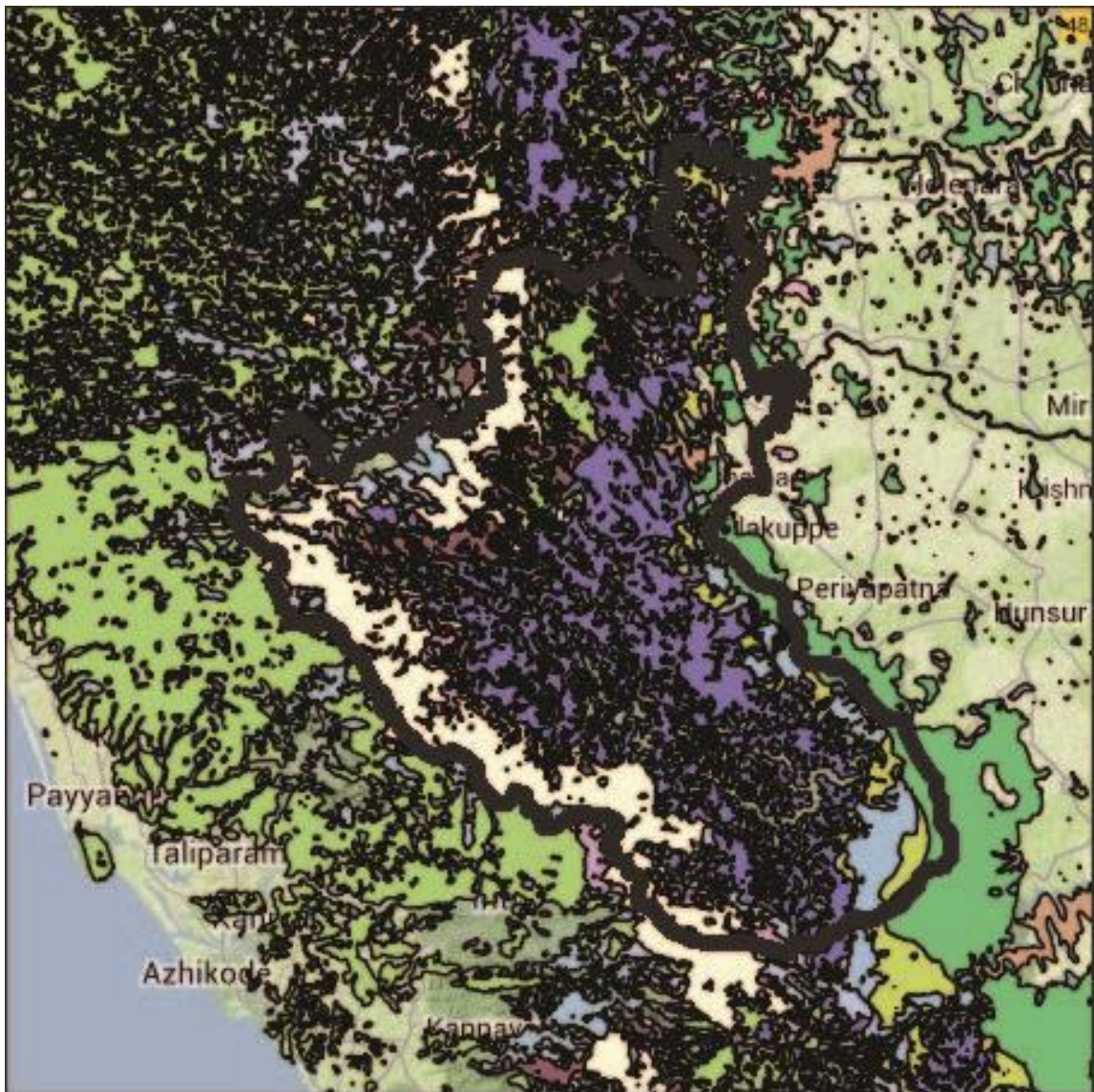
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<sup>2</sup> <http://whc.unesco.org/en/list/1342>











natural forests are concentrated mostly along the Western border of the district, following the topography of Western Ghats. There are three major kinds of forests in the Kodagu District – reserve forests, private forests, and other forests. Reserve forests can be found in the high altitudes along the Western border, in the rugged terrain of Western Ghats. Private forests represent a characteristic feature of Kodagu – a combination of nature and agriculture as these forests provide shelter and shade to the coffee and cardamom plantations that form about 33 percent of the area of the district. Other forests include what are called “sacred groves” that are interesting from a biodiversity point of view. Every village in Kodagu has at least one sacred grove that in total amount to 2550 ha in the district. The biodiversity level of sacred groves is almost as high as that of natural forests which makes them a very important part of the ecosystem, forming islands of good quality natural habitat scattered all around the area.

Figure 3 Vegetation characteristics in Kodagu District



LEGEND

	Primary dry deciduous forest		Wet evergreen secondary or disturbed forest
	Primary moist deciduous forest		Wet evergreen primary forest
	Forest plantation		Degraded formation in the potential area of wet evergreen zone
	Commercial plantation		Treesavanna to grassland in wet zone + Montane grass land

Source: <http://indiabiodiversity.org/map#>

Coffee production plays a major role as an agricultural activity in Kodagu. The large-scale plantation-style production in the district was developed by British planters in colonial times and continued by Indian farmers after independence. Today, Kodagu produces 40 percent of India's coffee, with robusta varieties increasingly supplanting arabica as the dominant variety. The original practice of shade-grown coffee has always been in harmony with the environment, with local trees providing shade for the coffee and refuge and food for local fauna. Unfortunately, the growth of the local trees is very slow. This has resulted in introducing new, exotic trees as an alternative, especially silver oaks (*Grevillea robusta*). While the growth of silver oak is much faster than that of the local trees, there are negative impacts on the local biodiversity. For example, CAFNET India (2011) found that when the amount of the silver oak as a shade tree in a plantation exceeds 30%, it has a negative impact on the levels of species diversity of the bird population in that location.

A number of other land use and agricultural practices have significant negative impacts on the environment. For instance, large pieces of land have been turned into monoculture plantations, particularly teak plantations that have shown to be very financially profitable. However, these changes have reduced the amount of flora and fauna species and increased the human-animal conflicts, which in Kodagu mostly means human-elephant ones. Furthermore, the oldest traditional agricultural practice in the district – rice cultivation in lowland paddies – has become financially unprofitable in the recent years. As a result, paddies are being abandoned or converted and used for other kinds of agricultural cultivation, such as ginger production. This change has had a great impact on the hydrological system and cycle of the area since paddies acted as natural reservoirs, storing large amounts of water for several months. When the amount of water stored in paddies falls, so does the amount of ground water, leading to reduced inflows in rivers. Finally, Kodagu has seen a surge in tourism recently, given its short (five hours by car) distance from the city of Bangalore. This has led to a sharp increase in the development of homestays and resorts in Kodagu. While a number of these have been designed with the environment in mind (i.e. Green Dreams Farmstay), the rise in traffic and development could have negative impacts on the natural habitat as well.

# People with disabilities (PWD's) in India

## **An overview of the current situation**

The Persons with Disabilities Act 1995<sup>3</sup> officially recognized seven types of disability exist in India: blindness, low vision, leprosy-cured, hearing impairment, locomotor disability, mental retardation and mental illness. As these can be either born with or obtained during one's lifetime, there are two major kinds of cures or treatments for people – prevention to reduce the occurrence of disabilities and treating existing ones. As India, its economy, and lifestyle develops, the cause and age distribution of disabilities keeps changing. While one of the historically main causes of locomotive disabilities – e.g. communicable diseases such as polio – have been reduced to a great extent (the rate is estimated to be reduced by 50% in the period 1990-2020), the current trend of rising life expectancies brings the problem of disabilities related to old age (O'Keefe 2009). Moreover, malnutrition remains a serious problem in the Indian population, often leading to various kinds of disability. Another matter that the Indian society faces is intensification and quickening of transport that together with poor workplace safety measures lead to an increasing number of disabilities obtained at adult age (O'Keefe 2009).

With a vast majority (85%) of the Indian population sharing the Hindu faith, including beliefs on the matter of reincarnation, human disability is believed to be a punishment for sins committed in a person's previous lives (Sharma 2005). Thus, persons with disabilities (or PWDs) are generally perceived in a very negative way. They are often put in a position of cursed people that are a burden for families, bringing shame to the house. This attitude is mostly the reason why disabled people do not get a chance to become active and respected parts of society. This social sequestering starts as soon as the disability becomes apparent. Families tend to “hide” the PWD both physically and socially by not talking about this person that leads to the disability becoming a social taboo (Sharma 2005).

Even when a child gets a chance to get out of this usual stereotype and starts attending school, they usually do not get further than the primary level of education that lowers their chances of getting a job and makes them remain dependent on their families. However, this is

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<sup>3</sup> See [http://meghpol.nic.in/acts/central/PWD\\_Act.pdf](http://meghpol.nic.in/acts/central/PWD_Act.pdf)

not the fate of all PWDs. For some families, the fact that their child is disabled is one more reason to provide him or her with education because it increases a person's chances to get a job and overcome the social stigma caused by the disability. Unfortunately, the negative attitude is still deeply seeded in the society, so it will need not only making education accessible to the PWDs but also educating the teachers and enlightening the general populace about this matter to make it change.

For many reasons, such as the lack of qualified researchers, poor infrastructure, and social stigma casting a shadow of shame and abhorrence on PWDs, it has been impossible to gather reliable data on the numbers of PWDs in India. In the case of school-age children, out of the approximately 200 million children in India, most policy-making agencies and NGO's generally consider 5-6 percent of these as PWDs, which gives a total number of 10-12 million (Byrd 2010). While the exact numbers are unclear, PWDs face more problems and obstacles on their way to education than the general populace. Children with disabilities are five times more likely not to attend school than healthy children. Some 52 percent of PWDs are illiterate compared to 35 percent of the normal population (O'Keefe 2009). Even when children with disabilities do attend school, the amount of schooling they go through is generally lower than of other children. Often, they only finish the first level, equivalent to five years of schooling. Moreover, there is a possibility (especially in rural areas) that due to the pressing demand of the bureaucratic system some disabled children get listed as pupils at schools but they never get to attend them (Singal 2009).

The tradition of special schools as a place to educate PWDs dates back to the 19<sup>th</sup> century when missionaries established schools for the blind. Since then, while the number of these facilities has been rising, the number of school aged PWDs is still much higher than the capacity of existing special schools (Byrd 2010). These schools have mostly focused on people with visual, hearing, and locomotive impairments, while only a fraction served people with mental disabilities. Even though special schools are nowadays not seen as an optimal way of educating PWDs and their quality in India is rather varied, good special schools do have certain advantages. Teachers in good quality special schools usually have more specialized training; the schools are better equipped for the special needs of the pupils, both in terms of the buildings and learning materials; and teaching is more flexible, depending on the abilities and capacities of the children (O'Keefe 2009).

However, from a sociological point of view, special schools are not always the best solution. PWDs do not learn necessary social skills needed for life in the real world and are often segregated from the general society, which limits opportunities for healthy people to learn and get accustomed to being in touch with PWDs (Singal 2009). In

addition, special schools in India are not run by the government, but by NGOs that are often understood as a charity. As a result, some of them focus just on teaching life skills to the PWDs but they do not provide school education. They are also mostly located in urban areas, leaving the PWDs in rural areas dependent on regular schools (Byrd 2010).

In the same way as education and university degrees improves one's position in a job market, the same raises the chances of employment for PWDs as well. Unfortunately, their condition often remains as a barrier between them and getting a job, with statistics showing the unemployment rate of PWDs to be about 60%. Among PWDs, those with mental impairment seem to have the worst prospects of being employed. There have been several public programs of promoting employment of PWDs, though none of them have been that successful. Even in the public sector where 3 percent of positions are reserved for PWDs, the actual employment rate of PWDs is just 0.44 percent. In reality, only 10 percent of public jobs have been considered as suitable for PWDs, which narrows down the possibilities, as well as the fact that this scheme only applies to people with visual, hearing, and locomotor impairment, and excludes people with mental disabilities completely. While there have been a few successful cases of private companies hiring PWDs, their numbers are minimal: 0.3 percent for large private firms and 0.05 percent for international companies (O'Keefe 2010).

Even though India has made huge progress in developing official laws and programs concerning the rights and situation of PWDs, the enforcement of these laws is often lacking. The first major step forward was the Persons with Disabilities Act (PDA) in 1995, enacted in 1997. The act presents the needs of PWDs as a matter of right and considers their situation in a broader context, so in addition to education it deals with the problems of employment, vocational training, special insurance, etc. The PDA gives specific guidelines about making the assessment and decisions about people who are officially considered as disabled. While this is certainly a step in the right direction, considering that so far there has not been any common method to assess disabilities, it restricts those who are eligible to receive any help under this law to those who need special help at least 40% of the time. In reality, it means that it only supports people with the most severe disabilities while those with less severe ones are left to take care of themselves (Byrd 2010).

A more active step towards the improvement of the situation of the PWDs was the launching of the Sarva Shiksha Abhiyan (SSA) scheme in the years 2001-2002, which provides for educating the disabled through a variety of means that are fit-for-purpose for their learning needs. This program takes a more proactive approach in setting its rules and ideas in action by providing 1200 INR to schools for every disabled child schools accept. Unfortunately, while this money should be used for purposes including teacher training, developing special



learning materials, etc., it is mostly spent on more apparent ones that are easy to showcase for the bureaucratic system, such as new ramps (Singal 2009).

### **Swastha<sup>4</sup>**

In the Kodagu District where our project takes place, the situation of PWDs in 2001 was even worse than in India as a whole. Out of the total number of 6,388 identified PWDs in Kodagu, only 6% have gained some sort of education through government sponsored programs or schools.<sup>5</sup> As a reaction to this situation, the Swastha Centre for Special Education and Rehabilitation opened in August 2003 in Sunticoppa, with the aims of providing PWDs basic academic education and preparing them to live as independently as possible through the provision of useful work skills. The school was the initiative of Mrs. Ganga Changappa who obtained resources from the Coorg Foundation of Tata Coffee Ltd. After the success of this special school, a rehabilitation center opened in Pollibetta four years later. The number of PWDs educated in Swastha facilities has increased from 20 in 2003 to 125 at present.

The special school provides education and vocational training to children between the ages of 6-18 years. It operates both as a boarding school and day school, depending on the needs of the children's families. It is unique in that unlike most special schools that tend to focus on specific types of disabilities, Swastha accepts all PWDs. Swastha takes advantage of its skillful and experienced staff in all positions, including a child psychologist experienced in disability assessment and counseling.

At the special school, children receive academic education up to the maximum extent possible depending on their abilities. Based on their abilities and progress at Swastha, some students also have the possibility of continuing their studies at higher education facilities in regular schools. They also receive practical and vocational training to give them skills to live independently. The rehabilitation center in Pollibetta serves people 18 years and older. Moreover, the school provides PWDs medical care and assistive technologies.

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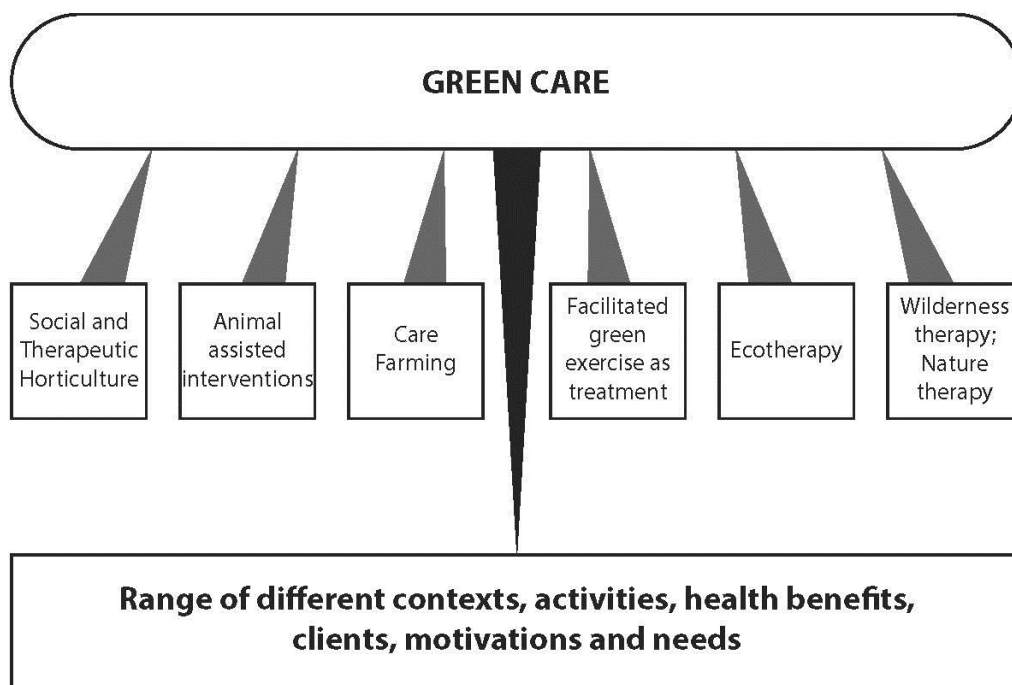
<sup>4</sup> Background data on Swastha comes from <http://thecoorgfoundation.org/swastha.html>

<sup>5</sup> See <http://www.census2011.co.in/census/district/259-kodagu.html>

# Green care – an alternative approach to treating disabilities

There have been a growing number of facilities providing nature-oriented kinds of therapies to disabled patients in the USA and several European countries (Hine, Peacock and Pretty 2008). The idea of healing gardens is not new – gardens have for centuries been part of monasteries, prisons, and psychiatric hospitals (Rappe, Koivunen and Korpela 2008). At present, there are several types of therapies based on the type of contact with nature (figure 4). This contact could either passive or active. Passive therapies are those where the patient benefits simply from being in nature, while active ones are those where the patient actively works in and influences the natural environment. One of the most popular active therapies is through horticulture activities during which patients plant and grow vegetables or flowers and receive a chance to participate in daily chores at a farm.

Figure 4 Elements of Green Care



Source: Hine 2008



In our project, we focus on two specific aspects of green care – therapeutic horticulture and ecotherapy – as means to improve and intensify the care that children receive at Swastha as well as a vehicle to promote conservation. Therapeutic horticulture is a therapy that uses plants and horticulture as a way to improve the mental and physical state of the patient. It does this through the combination of active and passive activities such as enhancing patient contact with nature and allowing them to become a part of it by planting and nurturing crops and plants (Aldridge and Sempik 2002). Consequently, such therapy helps patients to better concentrate on their activities, by giving them a sense of responsibility for their work, since otherwise the plants would not grow well. It further raises their self-esteem when harvesting their own products. While therapeutic horticulture tends to focus on the practice of gardening, ecotherapy considers the contact with nature in a broader context. It comprises activities that lead to an individual's understanding of the whole system of nature and imbuing responsibility for its conservation (Burls 2008).

Both therapies have been proven to benefit patients on diverse levels (Burls 2008; Rappe, Koivunen and Korpela 2008; Aldridge and Sempik 2002). They lead to the increase of self-esteem, improvement of social skills through the pursuit of common goals, increased concentration, and have a generally positive effect on wellbeing. They further provide patients with a variety of skills that can increase their employability (Aldridge and Sempik 2002).

# The Swastha butterfly garden – linking livelihoods with conservation and education

As mentioned earlier, disabled people in India face various difficulties throughout their life. Because of the negative perception of PWDs, ordinary people do not respect them as individuals and do not see them as people capable of contributing to society. Unfortunately, when confronted with this attitude of other people, many PWDs lose confidence in their own abilities. However, as noted by the staff psychologist at Swastha, work itself has a great therapeutic impact. When PWDs are able to work and see positive results from their efforts, their self-confidence improves. One of the most successful examples of this therapy has been gardening activities at Swastha, in which children take care of the trees and plants in the school garden and harvest fruits and vegetables that are then used in the school kitchen. In this manner, they have already been practicing therapeutic horticulture.

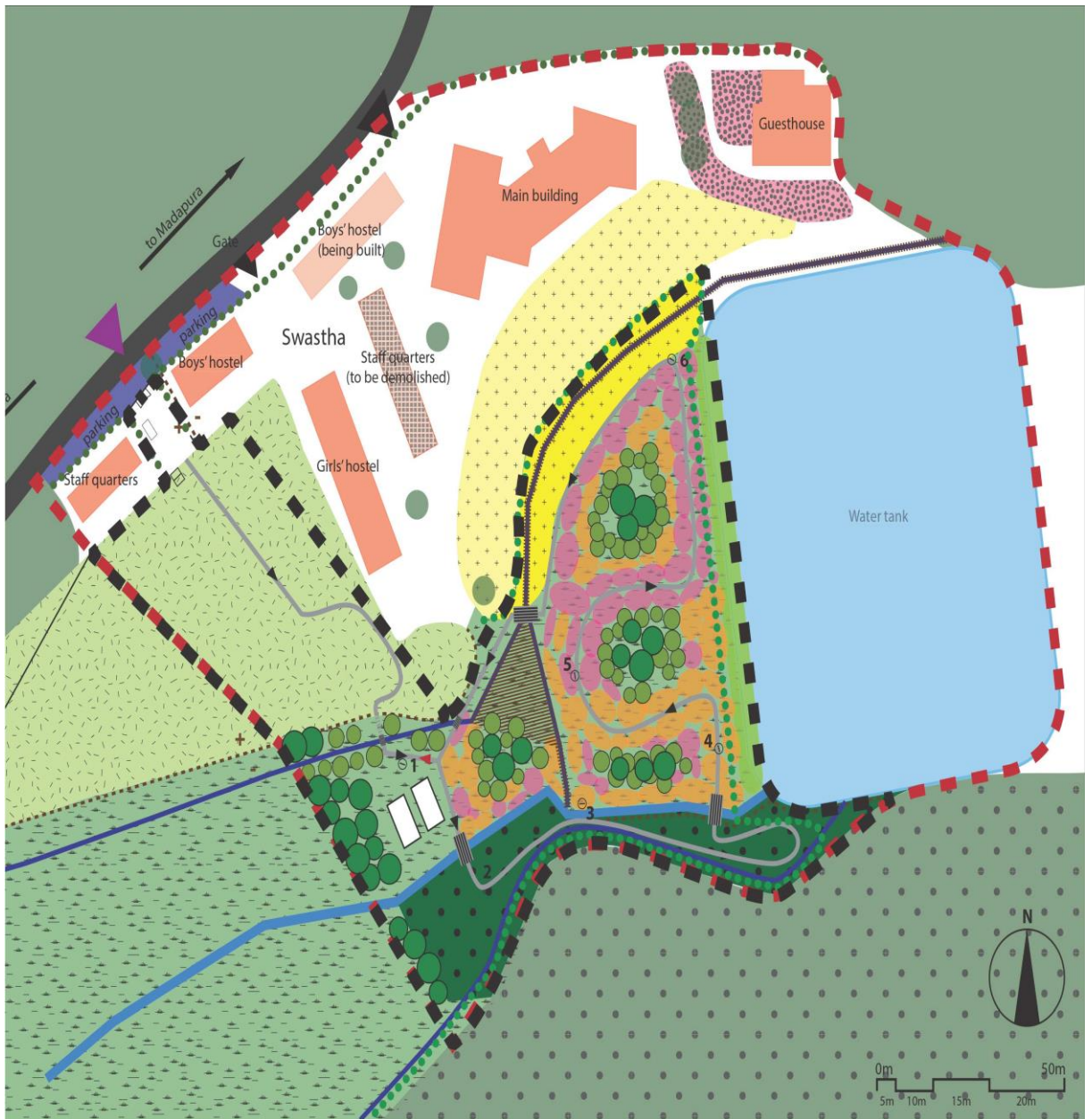
Moreover, as noted earlier, the Kodagu region is one where biodiversity and the environment are under threat from a number of economic drivers, and where awareness about the need for conservation is low (Hoerisch 2002). Consequently, an opening exists to merge these two areas – improving livelihoods and skills among PWDs with a means to raise general public awareness on the environment.

Our Swastha butterfly garden project aims to achieve both of these goals. We first want to deepen ongoing therapeutic horticulture therapies already conducted at Swastha by enlarging the existing crop garden and bringing it into the broader context of ecotherapy that will show and explain to Swastha students their role in the conservation of the natural habitat. This will be achieved by giving students responsibilities to nurture the garden, providing them with gardening skills that could lead to future gainful employment. Second, the Swastha garden will serve as a regional exemplar by which the community and visitors learn about Kodagu's fauna and flora and the problems and threats faced in the district. We hope that this will increase the environmental awareness of visitors to the garden since environmental responsibility in India on a personal level is generally very low.







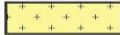





There are three main reasons why we decided to conceive the project as a butterfly garden. First, butterflies are very vulnerable to negative changes in their habitat, so some scientists use them as a biological indicator of the state of the environment. During their life, butterflies need three basic things – host plants for the larvae, nectar plants for adults, and a healthy environment without chemicals. Butterflies are quite particular in the species of plants used for feeding or breeding, and those species are always local. Thus, the existence of butterflies is tightly linked to the presence of these specific host plants that clearly demonstrate the complexity of the environment where different parts of the ecosystem are dependent on each other. Secondly, given their beauty and charisma as a species, they are a great tool to educate people about ecology and environmental issues. Third, India does not allow other types of captive butterfly activities, such as butterfly farms that are an important source of livelihoods in Africa and Asia (Rich et al. 2014). This precludes the development of commercial activities, but allows the possibility of gardens as a source of education and livelihoods for PWDs at Swastha. Moreover, it shows more generally the possibility of scaling up this vision in other special schools in India and beyond.

Figure 5 illustrates the design of the butterfly garden. The piece of land chosen for the garden is an abandoned paddy field, about one hectare in size, which borders the land of the school and a water tank. The garden has four main parts that address different topics and parts of the ecosystem of Coorg – a tree and nursery section, coffee plantation section, a section devoted to butterfly host plants, and a crop garden. The tree and nursery section introduces Coorg and butterflies to visitors. In order to promote an active approach to conservation, there will be the possibility to buy seedlings of local butterfly host plants to allow visitors to create their own butterfly gardens at home. The next part introduces visitors to the coffee production systems that exist in Coorg, particularly the use of shade-grown coffee. While shade-grown coffee is an important part of the ecosystem and can have positive benefits on local biodiversity, the negative impacts of the Silver Oak species used as a shade tree will be highlighted to visitors. The third section of the garden is dedicated to butterfly host plants, forming a type of “butterfly island” that explains the dynamics of a butterfly’s life cycle and their role in the whole ecosystem. This area is designed to attract the maximum number of butterflies possible. The last part enlarges the existing crop garden to highlight local crops and their production in Coorg.

















Figure 5 Swastha butterfly garden design



## LEGEND - existing features

	Paddy		Entrance to the Swastha special school
	Dry forest		Stream
	Coffee plantation		Important tree
	Crop garden		Trench (height app. 1-1.5 m)
	Flower garden		Terrain step (height $\geq$ 1 m)
	Forest		Irrigation canal

## LEGEND - new features

	Main entrance		Pathway
	Crop garden extension		Staircase
	Coffee plantation extension		Bridge
	Tree		Hedgerow
	Shrub		Information board + trashcan
	Larvae host plant		Nursery à 5x10 m
	Adult host plant		Project boundary
	Water shore biotope		Area directly affected by the project

## INFORMATION BOARDS

- |  |   |
|--|---|
| <p><b>1</b> Butterflies in general<br/>- taxonomy<br/>- ecology</p> <p><b>3</b> Butterflies and coffee<br/>- coffee production in Coorg<br/>- connection butterflies-coffee</p> <p><b>5</b> Butterfly life cycle: adult<br/>- adult life<br/>- species</p> | <p><b>2</b> Butterflies in Coorg<br/>- species<br/>- challenges and problems that butterflies face (habitat loss etc.)</p> <p><b>4</b> Butterfly life cycle: egg+larva+pupa<br/>- stages of the life cycle, host plants etc.</p> <p><b>6</b> Fruits and spices of Coorg</p> |
|--|---|

Source: Developed by the authors

During the design process, there were several major issues to face. First, since it is not possible to keep any type of wild animals in captivity in India, there are no enclosures in the butterfly garden. Because of that, we cannot guarantee the presence of butterflies at any given time. On the other hand, the display of plants and trees will be permanent, as will a number of educational materials and information boards that will make the visit interesting even when the number of butterflies is low. Second, the terrain of the butterfly garden area is rugged which necessitated the construction of a staircase and several bridges. Thus, it is not a barrier-free facility. However, because of the

people running the garden and their experience, providing help to people with mobility problems will not be a problem.

In addition, since the butterfly garden is situated in a former paddy field, it becomes very marshy during the monsoon season. In order to control water during this season, the natural stream and a couple of existing canals that were almost lost due to the lack of maintenance were cleared and connected with the water tank. This solution will lead to the formation of a little “lake” in the triangular trench in the middle of the garden during the monsoon season but the rest of the garden should not be flooded and thus can be open to the public without interruption. Finally, we needed to consider how to deal with a fence that encloses the water tank and surrounds the coffee plantation. The fence needs to stay for safety reasons, implying that the shore of the water tank will be separated from the butterfly garden itself. In order to minimize the negative impact on the garden, the wire fence will be covered with voluble plants that are butterfly species.

In order to improve the general perception of the PWDs, visitors to the garden will be in touch with the Swastha children who will run it. As a tourist attraction, the garden will utilize people working on different aspects of the gardens, providing a variety of possibilities and skills for children with different kinds of disabilities. This will both improve the future livelihoods of those associated with the garden, but also sensitize visitors to ways in which PWDs can be productive contributors to society.

# Conclusion

Sustainable conservation-based activities require the creation of links between environmental protection and livelihoods of impacted stakeholders, including both providers of conservation of activities and their clients. In an ideal situation, such activities empower local populations to manage their own local resources, while developing sustainable means of generating income (Hughes and Flintan 2001). In India, many conservation programs have often been at odds with local indigenous populations, with the displacement of populations and limits placed on economic activities. Not surprisingly, these encroachments by government have often been met with local resistance (Gubbi et al., 2008; Torri 2011). A crucial need, then, is to identify sustainable conservation programs that can be led from the bottom-up, taking into account the needs, constraints, and context of local stakeholders in the process. Similarly, there are needs to address information gaps and other constraints among the potential users of conservation activities, so that perspectives and awareness can be aligned.

In our project, we have outlined a means by which livelihoods and education can be blended in a manner to foster environmental protection and awareness. Butterfly gardens can provide an important interface through which lives and the environment can be changed and improved. On the supply side, they can be used as a tool for rehabilitation and skill development among disadvantaged groups. On the demand side, they can foster awareness on the need for environmental protection. They represent a low-cost, scalable means to mainstream conservation efforts into everyday activities and help to promote social awareness of the plight of disadvantaged groups. An expected outcome of this project will be to highlight Kodagu as a center of environmental awareness and biodiversity preservation, leveraging its resources as a source of environmental inspiration for the rest of India and other developing countries.

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