

Short Communication

The Banteay Srey Butterfly Centre: five years of endeavouring to support conservation and poverty alleviation

Torsten VAN DER HEYDEN

Immenweide 83, D-22523 Hamburg, Germany.

Email tmvdh@web.de

Paper submitted 22 March 2013, revised manuscript accepted 24 May 2013.

Sustainable butterfly farms have been established in several tropical developing countries with the aims of supporting local rural livelihoods and conserving forests with high biodiversity. For example, Kenya (Gordon *et al.*, 2011), Tanzania (Morgan-Brown *et al.*, 2010; van der Heyden, 2011) and Guyana (Sambhu & van der Heyden, 2010).

In 2008, Ben Hayes, originally from the United Kingdom, started the Banteay Srey Butterfly Centre (BBC) near the Phnom Kulen National Park in Siem Reap Province. It was based on the Zanzibar Butterfly Centre, a similar project he started in Tanzania in 2006 (van der Heyden, 2011). Both projects operate within or near protected areas where there is a lot of pressure on natural resources from local communities. Ben Hayes and two Cambodians, Nhoek Sakhaun and Thoung Chantha, are the directors of the BBC. The centre is managed by another Cambodian, Om Srey Vat.

The BBC is in Sanday Village, near the Banteay Srey Temple and the Cambodia Landmine Museum. It offers a live butterfly exhibition to residents and tourists, which is the largest of its kind in Southeast Asia. Hundreds of free-flying butterflies—all of them native species of Cambodia—can be observed in a netted tropical enclosure, approximately 30 m x 40 m. The centre is visited by approximately 10,000 foreign and 3,000 Cambodian visitors every year. They are informed about the different species on display, the butterfly life cycle and their ecology by trained local staff members. Through these talks, the BBC aims to give visitors an increased knowledge of local Cambo-

dian biodiversity and hence stimulate interest in conservation and protection issues.

The BBC also focuses on enabling local rural communities to gain a livelihood by rearing butterfly species and selling pupae to the BBC. Farmers in Sanday Village and remote communities currently farm 35 species of butterflies and moths from various families: *Atrophaneura aristolochiae*, *Attacus atlas* (Fig. 1), *Catopsilia pomona*, *C. scylla*, *Cethosia cyane*, *Charaxes solon*, *Danaus genutia*, *Delias pasithoe*, *Dysphania sagana*, *Elymnias hypermnestra*, *E. nesaea*, *Euploea core*, *E. mulciber*, *Euthalia aconthea*, *E. lubentina*, *Graphium agamemnon* (Fig. 2), *G. antiphates*, *G. doson*, *G. sarpedon*, *Hebomoia glaucippe*, *Hypolimnas bolina*, *Junonia almana*, *Lebadea martha*, *Lexias dirtea*, *Melanitis leda*, *Papilio clytia*, *P. demoleus* (Fig. 3), *P. demolion*, *P. helenus*, *P. memnon*, *P. polytes*, *Parantica aglea*, *Parthenos sylvia*, *Polyura athamas* and *Tirumala septentrionis*. All of these species are farmed every year, but the number of specimens reared and displayed may vary depending on the season.

In small netted enclosures in the farmers' backyards (Fig. 4), female butterflies deposit their eggs on the specific food plants of the respective species. The eggs are harvested by the farmers and the hatched larvae are transferred to their food plants in a "nursery". After pupation, the pupae are sold to the BBC and displayed in the centre (Fig. 5), where the butterflies emerge. The duration of the breeding cycle varies depending on the species. Most species take several weeks to complete the cycle from egg to adult butterfly.

CITATION: van der Heyden, T. (2013) The Banteay Srey Butterfly Centre: five years of endeavouring to support conservation and poverty alleviation. *Cambodian Journal of Natural History*, 2013, 7–9.



Fig. 1 *Attacus atlas* (Saturniidae) (© T. van der Heyden).



Fig. 2 *Graphium agamemnon* (Papilionidae) (© T. van der Heyden).

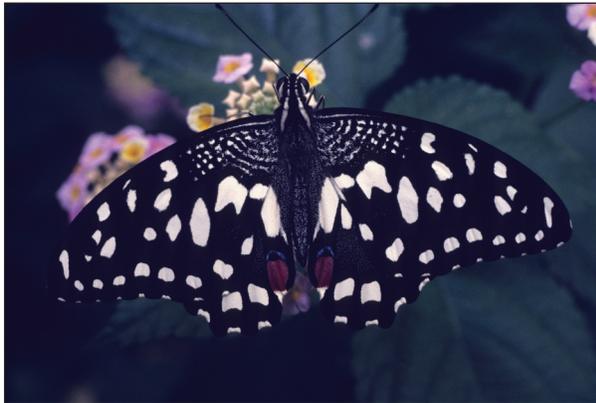


Fig. 3 *Papilio demoleus* (Papilionidae) (© T. van der Heyden).



Fig. 4 Breeding cage owned by a farmer with the Banteay Srey Butterfly Centre (© B. Hayes).

Because only a few butterflies are caught from the wild to start the farming process, these collections are not thought to harm the wild populations. A number of the pupae reared by the farmers are used for breeding purposes, thus avoiding unnecessary consecutive collections from the wild. To prevent rare or threatened species being caught, the BBC does not buy any rare species and all farmers have been taught to farm only common, non-threatened species.

The BBC buys pupae only from local farmers that are members of the project. By rearing and selling butterflies from home, the farmers are able to increase and diversify their income, which helps to alleviate poverty. The additional monthly income is very variable, depending on how many pupae the farmers produce and of which species, but some farmers have earned US\$ 100 per month from this part time work. This is twice the local average monthly income.

In addition, the farmers are able to gain the knowledge that an intact natural environment is vital for



Fig. 5 Pupae of *Papilio memnon* (Papilionidae) at the Banteay Srey Butterfly Centre (© B. Hayes).

their business, which could motivate them to conserve their natural surroundings instead of destroying them for agriculture or other purposes. Forest clearance and other forms of habitat destruction could potentially be

reduced, having a positive impact on wild species, both plants and animals.

As of March 2013, about 30 male and female farmers work with the BBC. Their business of rearing and selling butterflies is an example of the sustainable use of natural resources. Revenue generated from admission fees to the BBC is used to support the farmers and their families with a supplementary income as well. Additional people from local communities are employed by the BBC to manage the centre, train and support the butterfly farmers, and guide visitors. Part of the revenue from tourist admissions is also used to support conservation projects, for example, biodiversity surveys. The BBC is a member of ConCERT (Connecting Communities, Environment & Responsible Tourism) based in Siem Reap, a network of local partners involved in conservation.

Currently, there are no quantitative or qualitative data to evaluate the impact of the BBC on the conservation of natural resources. I therefore recommend conducting a survey to investigate these aspects and to determine if and how attitudes and behaviours towards natural resources have changed within the local communities. Generally, such a survey or evaluation should be done for all butterfly farming projects of this kind throughout the world to understand their environmental impacts. Morgan-Brown *et al.* (2010) examined a commercial butterfly farming project in Tanzania and found butterfly farmers were significantly more active in forest conservation than other community members because they “perceive a link between earnings from butterfly farming and forest conservation”. It is possible that similarly positive results will be found in other sustainable butterfly farming projects, including the BBC.

A future aim of the BBC is to farm more species of Saturniidae, in addition to *Attacus atlas* (Fig. 1). Research is currently being carried out to increase the number of species farmed and the BBC is also planning to increase the number of farmers involved. To enlarge this business, it will be necessary to export pupae, for example, to butterfly exhibitions in Europe or North America. The BBC is awaiting an export license to do this. Finally, another challenge facing the centre is the production of pupae all year round. Because many of the butterfly farmers are engaged in rice cultivation, little or even no butterfly farming takes place during the harvest period.

I agree with Gordon *et al.* (2011) and Morgan-Brown *et al.* (2010) that initiatives like the BBC are

appropriate to support rural communities in tropical developing countries to improve their living conditions without harming nature.

Acknowledgements

I would like to thank Ben Hayes from the Banteay Srey Butterfly Centre who provided me with information about the project and two of the photographs.

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About the Author

TORSTEN VAN DER HEYDEN—apart from being a teacher of Biology and Geography—is a German independent researcher specialising in Lepidoptera and Heteroptera. He has published papers on butterflies, moths and true bugs, focussing on their biology, ecology and distribution, as well as papers on several butterfly centres and farms and their impact on conservation and protection. The author is a member of various scientific associations and societies, e.g. a fellow of the Linnean Society of London and the Royal Entomological Society, and a member of the Spanish Real Sociedad Española de Historia Natural. He is a member of the editorial boards of *Atalanta—Zeitschrift der Deutschen Forschungszentrale für Schmetterlingswanderungen*, *BV news Publicaciones Científicas* and *Lepcey—The Journal of Tropical Asian Entomology*.