



## BUTTERFLY STATS

A total of 182 species were recorded along the transects from 2002 to 2005. During four months of the 2003 field season, Vu and his team recorded data for 3,354 individual butterflies representing 129 species, including 20 species that had not been recorded in the previous year. Overall, the number of species and butterflies observed in 2003 were lower than that observed in 2002. The abundance of butterflies in later years was less than previous years (figure 1). Vu suspects this decline is linked to the removal of vegetation along transects, especially where vegetation was cut down to widen the road and make a new road along the forest transects.

Some eco-indicator species of forest health severely declined due to forest destruction along forest transects in 2005 as indicated in Figure 2.

To date, the study has proven the value of using butterflies as ecological indicators of forest health, especially the species *Ragadia crisilda*, *Neope murheadi*, *Myceles misenus* (Satyridae) and *Stichopthalma howqua*, *Thaumantis diores* (Amathusiidae). Vu's research also showed that weather conditions, as well as the time of day, influence the flying behavior of various species. Furthermore, the composition of species differed according to the season: early dry seasons featured more butterfly species and individuals than wet seasons.

Also, some species appeared only during the dry season while others appeared only during the wet season. Finally, the study revealed that some species fly only on mountaintops, while others stay in closed forests. Overall, Vu documented fewer butterflies in forest habitat than in open habitat. Forest butterflies are sedentary and very sensitive to forest disturbance, and so are threatened by habitat modification.

The collected data related to butterfly larvae such as their diet, butterfly habitat requirements and behavior, and species composition and distribution is being used to produce a guidebook on the butterflies of Tam Dao and to establish butterfly farms. These farms could reduce the exploitation of the park by improving the livelihoods of local people who sell farm products.

Vu's project is helping park managers evaluate the effectiveness of their current conservation programs and also helping them design specific conservation measures for particular butterfly habitats and species. The research is also highlighting which butterfly species are endangered or at risk of extinction. By participating in the project, the park staff and biology students have learned how to monitor butterfly populations and how to use their data to measure the success of conservation measures in protected areas.

## FIND OUT MORE

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### Web sites

Butterfly Conservation  
[www.butterfly-conservation.org](http://www.butterfly-conservation.org)

[www.naba.org](http://www.naba.org)

[www.pbbase.com/vulien/butterflies](http://www.pbbase.com/vulien/butterflies)

[www.bughios.com/ced4/butterfly\\_symbols.html](http://www.bughios.com/ced4/butterfly_symbols.html)

### Keywords

butterfly conservation, butterfly farm, eco-indicator, Tam Dao National Park, Vietnam

Volunteers have joined this project through Earthwatch Institute. Read more about this study and other scientific field research at [www.earthwatch.org](http://www.earthwatch.org).



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# BUTTERFLIES OF VIETNAM

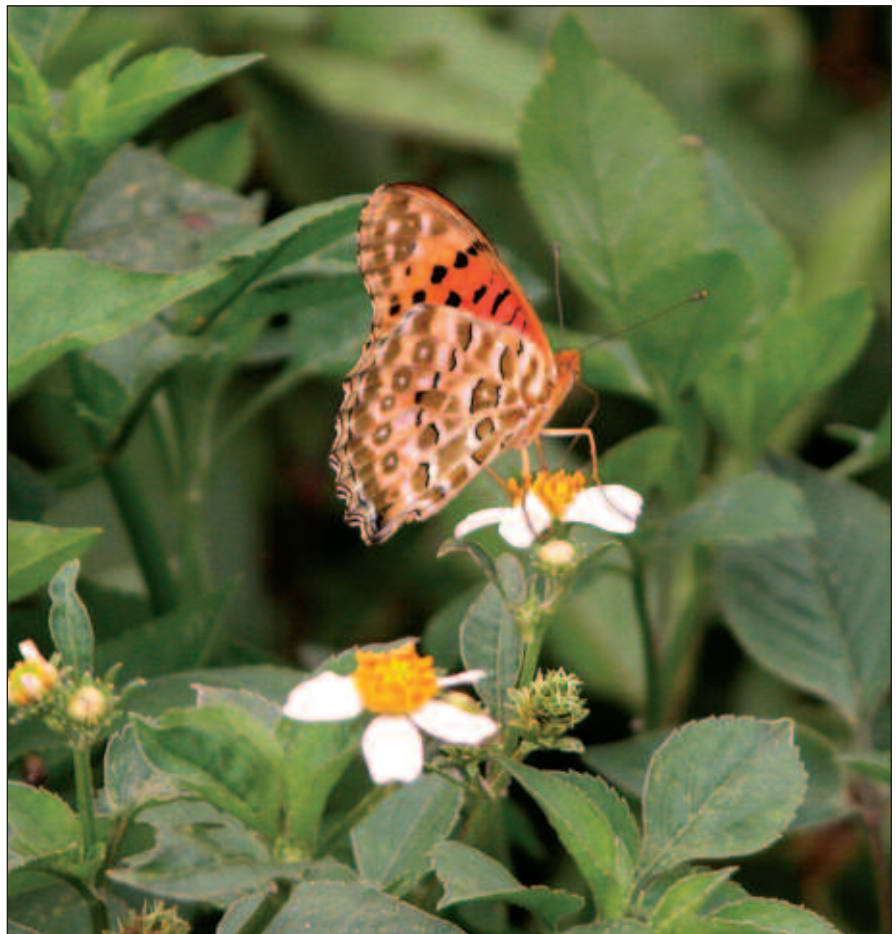
## REVEALING THE HEALTH OF THE FOREST

The butterfly's symbolism in past and present cultures varies as much as the colorful patterns found on its wings. To many ancient civilizations, a butterfly represented the human soul; in fact, the Greek word *psyche* means both butterfly and soul. Native American Indians believed in whispering a secret to a butterfly so that it could be carried to the Great Spirit and granted. Even today, the Chinese and Japanese associate butterflies with joy and happiness. To the biologist, however, the butterfly represents a window into the well-being of an ecosystem.

### BUTTERFLIES IN PERIL

As environmental pollution and habitat disruption increase worldwide, many species of butterflies are on the decline. For example, a recent study in the Netherlands showed that 15 out of 71 Dutch butterfly species have become extinct. So sensitive are butterflies to habitat disturbances that any changes in the forest associated with pollution, deforestation, temperature, light level, or humidity can disrupt butterfly communities. Their response is quite noticeable because butterflies are quick to react, diverse, and relatively abundant; they fly during the day; and they have short-lived generations. In addition, the less a butterfly travels (the more sedentary it is), the more sensitive it is to habitat disruption. Sedentary species are usually found in forested areas or forest canopy, the habitats most often disrupted by pollution or development. Because of these characteristics, scientists consider butterflies the perfect "eco-indicator" of environmental health.

Vu Van Lien from the Vietnam-Russia Tropical Center is leading a research initiative to monitor butterfly populations in Tam Dao National Park in northern Vietnam. Butterflies represent one of the easiest and least-expensive ways to evaluate the success of conservation



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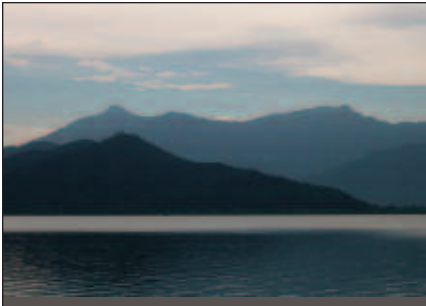


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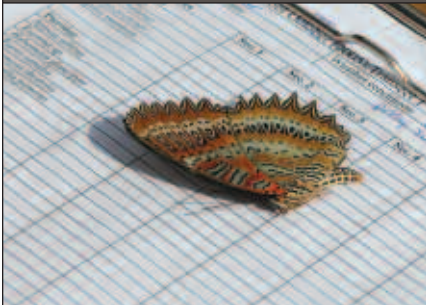


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measures and reverse negative trends in forest loss in protected areas of Vietnam. Although population studies of butterflies have been conducted in other parts of the world, researchers know little about butterfly communities in Vietnam and their response to habitat disruption. Since 2001, Vu has been monitoring butterflies in specific habitats. His goals are to preserve the butterflies in park and to establish their use as eco-indicators in Vietnam by correlating changes in butterfly populations with various kinds of habitat disruption.

### A PARK UNDER PRESSURE

Tam Dao National Park lies 75 kilometers northwest of Hanoi. Spanning 36,883 hectares across the provinces Vinh Phuc, Tuyen Quang, and Thai Nguyen, the park consists of limestone mountains overlooking the Red River delta. A surrounding 15,515-hectare low-elevation buffer zone isolates the park from other high-elevation areas. Tam Dao means three islands in Vietnamese, and refers to the three mountain peaks that dominate the region.

About 150,000 people in 23 communities occupy the buffer zone around Tam Dao National Park, placing a great demand on the park's natural resources. Markets exist for illegally harvested insects, wildlife, medicinal plants, and orchids, all of which are often sold to tourists. Logging and fires that occurred before and after the park was established have caused deforestation on the slopes of the buffer zone, leading to severe erosion and mudslides. This damage

to the habitat has left several butterfly species endangered or threatened. Until recently, butterflies appeared throughout Tam Dao National Park, but now few butterflies can be spotted.

### WALKING THE LINE

Vu mapped out five lines, or transects, that extend hundreds of meters through the park. The team samples and monitors butterflies and conditions along these transects, especially in study areas spaced about every 100 meters. The results obtained from these representative areas give an indication of the butterflies and conditions found throughout the park. By monitoring butterflies at approximately the same time each year, Vu can assess population trends for various species. Vu's five transects correspond to the following habitats:

- 1) closed forest with a canopy height of 5 to 13 m and forest cover of 70 to 80 percent
- 2) disturbed forest with a canopy height of 3 to 10 m and forest cover of 55 to 60 percent
- 3) regenerating forest, grass, and agriculture land grass cover of 60 to 80 percent
- 4) forest along the local road with forest cover of 10 to 15 percent
- 5) disturbed forest and shrub with forest cover of 50 to 60 percent.

The first four transects occur at elevations from 900 to 950 meters and the fifth transect has an elevation from 950 to 1200 meters.

Individual number

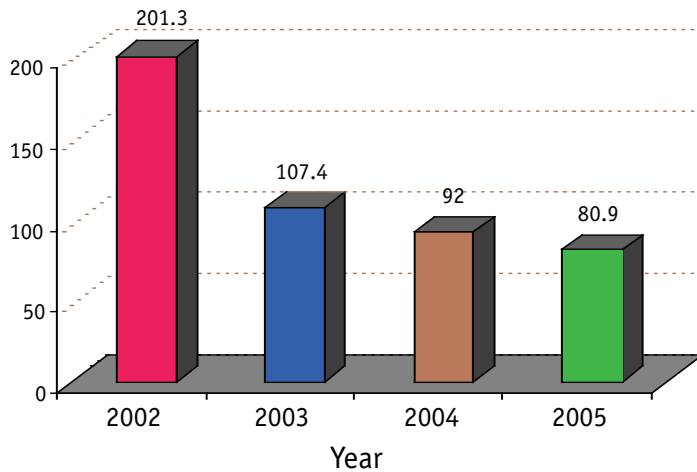


Figure 1. Butterfly community abundance of July to September from 2002 to 2005.

### TO CATCH A BUTTERFLY

A skill volunteers quickly develop on this project is the ability to tell a butterfly from a moth. According to Vu, several physical and behavioral characteristics distinguish the two winged insects. Butterflies tend to have clubbed antennae that end in thickened knobs, whereas moths have antennae that taper to a point. Most butterflies fold their wings together over their back, although some species spread their wings apart at rest; moths more often spread out their wings. Butterflies feature colorful wings with bold patterns whereas moth wing markings are more subdued. Finally, butterflies travel during the day, rarely at dawn, whereas moths are mostly nocturnal.

There is also a knack to catching butterflies without damaging their delicate wings. Vu uses hand-held nets made of a soft, transparent material like mosquito netting. The corners of the net are rounded to avoid hurting the butterflies. Ideally, the butterfly should be caught in a sweeping motion so the net can be twisted over to prevent the butterfly's escape. The team handles butterfly specimens lightly to avoid touching the scale-covered wings, using fingers or forceps applied to the body, not the wings, if they need to be moved. The team also collects and raises butterfly larvae for identification.

(butterfly number + 1)

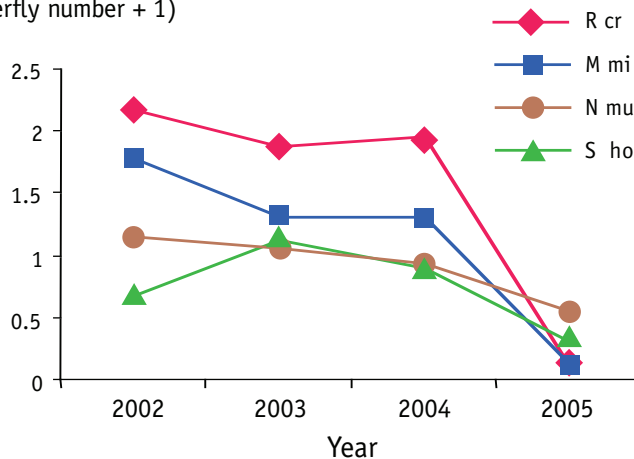


Figure 2. The decline of populations of some indicator species from 2002 to 2005

R cr = *Ragadia crisilda*; M mi = *Micalales misenu*; N mu = *Neope murrhead*; S ho = *Stchopthalma howqua*



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