

## Constructive Criticism of Community-Based Conservation

We welcome recent discussions evaluating the effectiveness of community conservation agreements (e.g., Kiss 2004; Price & Reichle 2004; Rice & Niessen 2004; Romero & Andrade 2004a, 2004b). We concur with these authors that the limited resources available to support conservation projects in the tropics should be distributed prudently after careful consideration of short-, medium-, and long-range consequences for the preservation of biodiversity and the integrity of local communities. Our experiences have demonstrated, in addition, that it is critical to measure psychological factors influencing conservation-related behaviors, cognitions, and emotions as well as the effects of community-based conservation programs on the beliefs, values, attitudes, and behaviors of local residents (Jones & Young 2004). This area of investigation is not emphasized by most authors but is related to organized attempts by behavioral and social scientists to participate actively in the Society for Conservation Biology (e.g., <http://www.conbio.org/SCB/Publications/Newsletter/Archives/2003-9-November>).

Our conservation efforts are conducted at the Community Baboon Sanctuary (CBS: 17°33'N, 88°35'W), a community-based ecotourism project in Belize formed in 1985 by cooperative agreement among private landowners in eight villages (Horwich 1998). The original goal of the CBS was to preserve habitat for the black howler monkey (*Alouatta pigra*) (Horwich et al. 2001a, 2001b). The CBS, a 47-km<sup>2</sup> reserve with a human population of approximately 1500 individuals, is currently managed by a local board in association with the U.N. Development Programme, the Protected Areas Con-

servation Trust, and the Programme for Belize. Details of the country, the site, and the project are available elsewhere (Horwich & Lyon 1998; Horwich et al. 2001a, 2001b; Jones & Young 2004).

Our project has experienced many of the difficulties detailed in recent reports (e.g., Newmark & Hough 2000; Kiss 2004), such as a primary emphasis on one species, few economic gains for members of the cooperative, and setbacks resulting from primarily local management. Despite ongoing challenges to the success of our community-based conservation efforts at the CBS (e.g., Jones & Young 2004), population density of black howlers increased at this site from 31.9 to 178.2 monkeys/km<sup>2</sup> from 1985 to 1999, possibly representing an indirect measure of benefits to our target species as a result of our project. In addition to this measure of success, maintenance of the CBS is currently financially sustainable through entrance fees and other tourism-related businesses, and our community-based project has affected the preservation of black howlers and other taxa (e.g., the river turtle [*Dermatemys mawii*]; Polisar 1994) at other sites in Belize.

In an attempt to measure psychological (i.e., behavioral, cognitive, and emotional) factors influencing the preservation of biodiversity, Jones and Young (2004) showed that bushmeat hunting at the CBS is driven primarily by utilitarian motives, psychological variables that are possibly explained by the tendency for humans to "discount" future rewards for immediate ones. The results of our studies and related research at other sites in the tropics (e.g., Wilkie & Godoy 2001) highlight the importance of monitoring the consequences of conservation programs for psychological factors related to conservation to evaluate the long-term impacts of community-

based programs and to potentially modify the endogenously and exogenously induced practices of local residents.

Like many groups of insects, the human species is a cosmopolitan taxon with a propensity to modify the environment to its own advantage, a life-history strategy that is fundamentally significant to conservation biology and psychology. We hope that the integration of conservation-related research in these and other disciplines (e.g., sociology and economics) will be achieved in the near future in an attempt to partially mitigate the worldwide biodiversity crisis and to supplement the basic literature of the behavioral and social sciences (e.g., decision theory) and of evolutionary biology (e.g., life-history theory). Constructive criticism of community-based conservation programs combined with applied behavioral analyses of human impacts and programs of behavioral modification has the potential to benefit all stakeholders in the domain of tropical forest conservation.

Clara B. Jones<sup>†</sup> and Robert H. Horwich<sup>\*</sup>

<sup>\*</sup>Community Conservation, Inc., Gays Mills, WI 54631, U.S.A.

<sup>†</sup>Department of Psychology, Fayetteville State University, 1200 Murchison Road, Fayetteville, NC 28301, U.S.A., email cbjones@uncfsu.edu

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## 2004 Tsunami Cleanup

The 2004 tsunami resulted in massive loss of human life and damage to infrastructure. The focus since has rightly been on recovering human communities and infrastructure. There are, however, significant environmental factors that also need consideration. There were many negative environmental impacts such as salt-water intrusion of freshwater areas, resulting in massive die-offs of biota, and burying of some coral reefs under large quantities of sand (Sharma 2005). Levels of damage varied substantially, with some areas (e.g., mangrove ecosystems) less damaged than others. On beaches that were heav-

ily eroded by human land uses (e.g., sand mining and coastal development), the tsunami may benefit natural ecological restoration.

Careful management is needed to ensure that the cleanup does not undo positive effects of the tsunami. Lessons from other ecosystems need to guide the post-tsunami cleanup, and workers should realize that many ecosystems have a well-developed capacity to recover (often remarkably quickly) from natural disturbances, even large, rare ones (Franklin et al. 1985). Experience after major flood events in many parts of the world has shown that catastrophic floods can reshape riparian areas through massive sediment and debris movement (Bayley 1995) and revitalize human-modified aquatic ecosystems with significant positive benefits for many species (Gregory 1997). Similarly, forest wildfires can add substantial quantities of key structural attributes to forests (e.g., dead wood, fire-damaged standing trees) that can be depleted by some types of forestry practices (Lindenmayer & Franklin 2002). The natural materials left after floods, fires, and other kinds of disturbances (e.g., windstorms, hurricanes) can have a significant positive influence on the trajectory and speed of ecosystem recovery (Franklin et al. 2000). Conversely, excessive removal of them (such as occurs with intense post-fire salvage logging of forests) can have major negative effects on both the recovery process and on the persistence of many individual species (Franklin et al. 2000).

Our recent observations from Sri Lanka indicate that enormous quantities of sediment and debris were deposited by the tsunami. Aid agencies have highlighted the need for debris removal (ADB et al. 2005), and this is certainly critical in many places such as roads, harbors, and residential areas. The need for (and extent of) debris removal, however, must be carefully assessed on a case-by-case basis. Large quantities of tsunami-deposited sand on beaches (e.g., on the southwestern coast of Sri Lanka) have im-

proved their suitability for some biota such as five species of endangered sea turtles. Quarantining some areas from intensive cleanup operations could be extremely important for biodiversity conservation. Digging out debris from now-settled beach environments also should be avoided. In other cases, care is needed with stockpiling the debris removed from tsunami-affected places; dumping it into swamps, waterways, or other places will have serious environmental impacts. If these issues are ignored, then long-term, additional environmental problems are inevitable.

### D.B. Lindenmayer\* and C.R. Tambiah†

\*Centre for Resource & Environmental Studies, The Australian National University, Canberra, ACT, 0200, Australia, email davidl@cres.anu.edu.au

†National Institute for Environment, The Australian National University, Canberra, ACT, 0200, Australia

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