

Centre for Wildlife Studies

Case study on the Intel-powered classmate PC with solar charger

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Summary: In India, the Centre for Wildlife Studies conducts intensive field studies that seek to understand the population dynamics of critically-endangered tiger species. Typical field camps are located in remote areas with no communication facilities and limited or no access to electricity. In order to maximize preventive action, researchers needed a way to manage and process data in the field. The combination of the Intel-powered classmate PC and a solar charger proved to be the perfect solution.

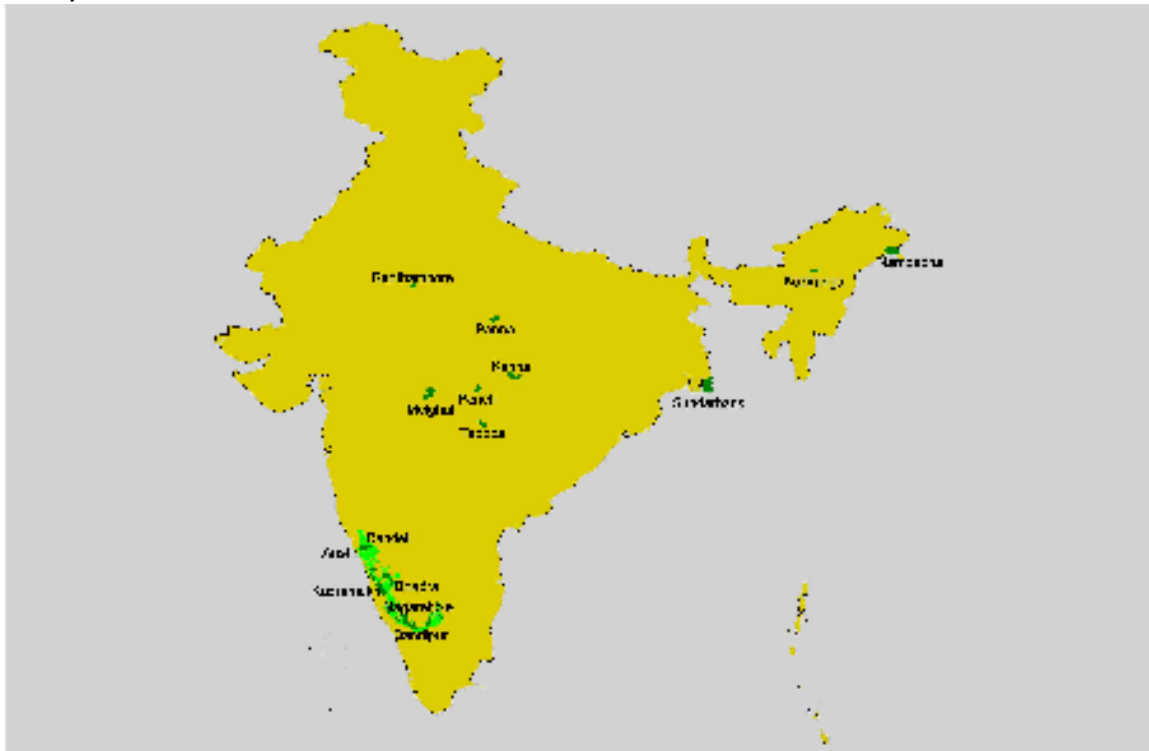


Photo credit: Dr. K. Ullas Karanth

Organization background

The Centre for Wildlife Studies is a non-profit charitable trust that has been carrying out wildlife research and science-based conservation in India for over 25 years. The Centre is the nodal agency implementing various initiatives of the Wildlife Conservation Society's India Program. The Centre carries out intensive field studies in multiple bio-geographic zones within the country, with a primary focus on tigers and their prey (Figure 1). In addition to carrying out ecological research and conservation, the centre also provides training in ecological methods to potential wildlife biologists and amateur naturalists, and offers a formal post-graduate course in wildlife biology and conservation in collaboration with other institutions.

Figure 1: Map depicting field locations where research was conducted (light-green areas depict the Mysore Malenad Tiger Landscape, where long-term research and conservation activities are currently active)



In India and the rest of Asia, the Centre for Wildlife Studies pioneered the application of cutting-edge scientific tools to animal population-monitoring methodologies (for large mammal conservation). The centre is one of few, if not the only research organization in the world to have successfully monitored the status of the endangered tiger and its prey on an annual basis for over a decade. Ongoing long-term studies in Nagarhole National Park in Karnataka represent some of the most significant worldwide contribution towards the understanding of population dynamics of the critically-endangered tiger.

The Centre for Wildlife Studies is recognized as a Scientific and Industrial Research Organization by the Government of India's Ministry of Science & Technology. Research associates at the centre have published more than 100 scientific articles in peer-reviewed journals of international repute, and staff members have written over 500 popular articles published in leading dailies and magazines. The trust has also published over 11 books and technical volumes in English and other Indian languages.

In addition to scientific studies, the centre is actively involved in the conservation of wildlife and their habitats in Karnataka. Partnerships with several organizations help to ensure that the last remaining strongholds for wild animals are effectively preserved and managed using science.

Field research and the need for technology

The center's primary field-based activity is the collection of data pertaining to animal populations. Various techniques are used, including camera-trap based capture/re-capture surveys of tigers, leopards and hyenas, and line-transect surveys for a variety of other species. Assessments of the distribution and status these large carnivores are based on an occupancy framework.

Another research focus is the documentation of human impact on wildlife and their habitats. In collaboration with several partners, studies have been conducted on the impact of livestock grazing, forest fires, hunting, and extraction of non-timber forest products.

All research activities, whether biological or assessing human impact, involve the collection and documentation of spatial data using photography and Global Positioning System (GPS) devices. While protocols for data collection are well-established, there is a clear need for technological solutions that improve data collection and management in the field. Typical field camps are located in remote areas with no communication facilities and limited or no access to electricity, staffed with research teams that do not return to the head office for several months at a time. Under such conditions, several constraints must be addressed:

1. Managing spatial and GPS data is problematic; efficient management requires frequently downloading and cleaning up the GPS data. GPS devices have limited memory, necessitating the periodic download and modification of data. Additionally, without the ability to transfer GPS data to a GIS platform, significant amounts of information must be recorded using pen and paper. Without a basic field-based computing facility, written data must then be digitized, processed, and screened in Bangalore. This alternative limits preventive action because it can lead to data errors, is expensive, and is time-consuming.
2. Survey planning conducted solely in the head office is inefficient and frequently inaccurate; efficient planning requires modifications to the plan from the field. Initial survey planning requires resources that are not available in the field. However, this approach is often hampered by lack of spatial information and

reliance on outdated paper maps, especially for landscape-level surveys. A mobile computing facility to view and update spatial information and plan activities would fundamentally address this constraint.

Previously tested solutions

To overcome these problems, field teams were initially provided with standard laptops and AC-DC converters which could be connected to vehicle cigarette lighters. This solution proved expensive and the hardware was not rugged or suitable for dusty environments. Moreover, the setup was bulky and difficult to transport on foot. An ideal solution would include a smaller form factor, alternative power supply, longer-lasting battery, shock-resistance, and dust-proofing.

Intel-powered classmate PC solution

The combination of the Intel-powered classmate PC and Tata BP solar panel proved to be an ideal solution. This setup is currently meeting all field requirements at the pilot field site. The classmate PC running GIS software (ArcView GIS), a GPS data manager (DNR GARMIN) and a database package (MS Access), which enables:

- Management and processing of field data
- Enhanced decision making for occupancy and scat surveys
- Rapid field/office transfer of information (using email and USB drives)
- Use of a standard database for tracking field activities, data forms and vehicle maintenance

Given the small form factor, an initial concern was the ability to run compute-intensive GIS applications. Thus far, there have been no issues related to the display or processing of data in this application, both operations that require reasonable graphics, RAM and processing power.

The ability to charge the PC in a field vehicle using the solar panel is an eco-friendly and inexpensive solution. The existing panel configuration is able to recharge the battery bank within a day, although the panel's ability to charge a completely discharged battery remains to be tested. The long battery-life provides additional power to work for approximately 4 hours into the night.

Possible improvements to the current solution would include a backlit keyboard or LED light on the screen, to eliminate the need for an external light source while working at night. Additionally, the use of flexible solar panels would enable their incorporation into a variety of materials and eliminate the need for permanently fixed panels and charge controllers.

Appendix 1 – Photographs of the Intel-powered classmate PC and solar charging solution deployed in the Bhadra Wildlife Sanctuary in Karnataka

1A - Field use – upload of field data from the Garmin GPS unit to the classmate PC



1B - Field use – Download of map data from the classmate PC unit to the Garmin GPS unit before data collection in the morning



1C - Field use – Analysis and data entry at the field station; classmate PC and Solar panel pictured here

