# Kuno Wildlife Sanctuary - an ecological treasure

*Highlights of the Annual report (2007-08) of the Ecological Monitoring Station (EMRS) at Kuno Wildlife Sanctuary, MP*

***Editor's note :***

*This the second report we have published about the amazing research going on at Kuno Wildlife Sanctuary. Kuno Wildlife Sanctuary is well known to many levels of the "conservation inclined" the world over primarily because it is the one of three localities proposed by the Asiatic Lion PHVA in 1993, which was selected as a possible second home for the Critically Endangered Asiatic Lion. Because of this, the Government of India and the Government of Madhya Pradesh invested significant money and man power for the build up of the area including relocation of a large number (24) of villages from within the Sanctuary.*

*Relocation took quite some time and as that project progressed, it was noted that the locality possessed many other attributes besides habitat suitablity for Asiatic Lions. It is a unique and precious area which deserves restoration & preservation in its own right, whether it gets lions or not !*

*Although this publication's host, Zoo Outreach Organisation, has a great interest in Asiatic Lions, having organised the Population and Habitat Viability Assessment Workshop PHVA in Baroda in 1993, which decided as a group that an alternative site for lions should be investigated, we are equally impressed with Kuno as an ecological treasure, whether or not the lion project takes place or is successful.*

*Kuno Wildlife Sanctuary could become one of the important "academic tourism" sites in the whole region. I say "academic tourism" because only individuals or groups who have the capacity or conservation savy to appreciate its amazing features might make the long trek from civilisation to see it. I hope our readers will take interest in the progress of this amazing natural national treasure.*

***Sally Walker, Editor Emeritus, ZPM***

**a project of**

## Ecological Monitoring and Research Station Report

**Introduction**

In 2005-06, PEACE Institute Charitable Trust, Delhi (www.peaceinst.org) established an Ecological Monitoring and Research Station at the Kuno Wildlife Sanctuary in Madhya Pradesh. This was done under an MOU with the wildlife wing of the MP Forest Department to provide requisite research support to the Sanctuary.

**Activities** (Table 1)

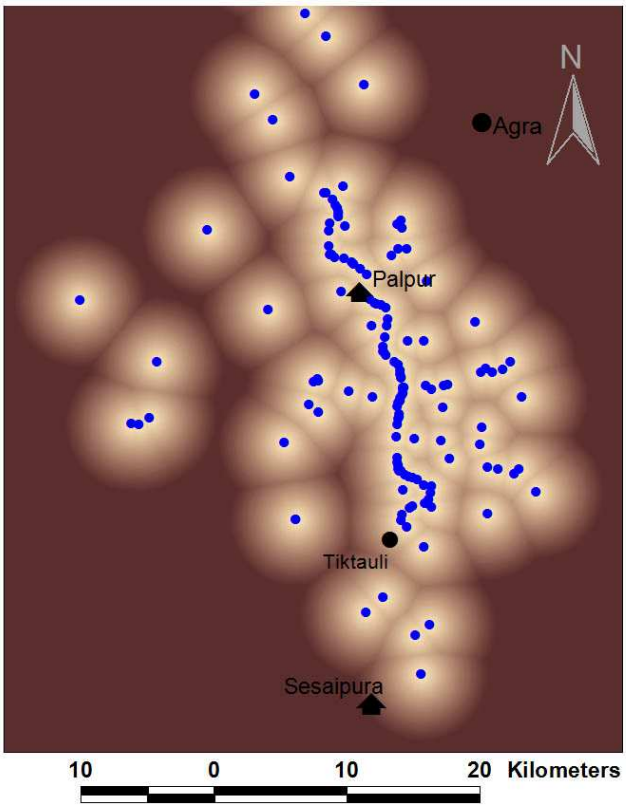
***1. GIS MAPPING***

***Water Map***

An initial round of training about using a GPS and filling up of the relevant datasheet was given to the staff of the forest department. A systematic round of ground truthing was done in the whole Sanctuary area where forest guards, range officers and our field staff combed the whole Sanctuary searching and recording location and status of each waterbody. Coordinates of each waterhole were recorded apart from information about their status in the month of June when the survey was done. Additional information was also recorded stating whether these waterholes were manmade or natural. The water availability map of Kuno Wildlife Sanctuary was prepared by creating 100m buffers around the waterbodies. These buffers were used to identify water deficient areas in the Sanctuary. Data is being used to propose water management in the Park (Raman, *In prep.*)

**Table 1. Activities**

| Head | Activity | Qtr 1 | | | Qtr 2 | | | Qtr 3 | | | Qtr 4 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Expected outcomes |
| GIS mapping | Map download & analysis | ■ | | | | | | | | | | | | GIS maps with relevant layer for efficient |
| Habitat evaluation | Habitat Plots | | ■ | | | | | | | | | | | Vegetation mapping and forest status |
| | Species richness survey | | | | ■ | ■ | ■ | | | | ■ | | ■ | Floral species richness map at shrub and tree levels |
| Relocated village sites & control plots | Control Plots (effect of relocation) | | | | | | | ■ | ■ | | | | | Regeneration status at sites with recent relocation |
| Prey base and predator populations | Road Transects | | | | ■ | | | | | | | | ■ | Population estimates of prey populations |
| | Cattle & Wild Prey age classification | | | ■ | | | | | | ■ | | ■ | | Population modelling for assessing the need of |
| | Cattle population estimation | | | | ■ | | | | ■ | ■ | | ■ | ■ | Population estimates of feral cattle |
| | Site occupancy surveys (predators) | | | ■ | | | | | | | ■ | | | Site occupancy of predators within the area of interest |
| Support to Park management | Capacity Development of the Field Staff | | | ■ | | ■ | | ■ | | | | | | Various sub-topics |
| Desktop research | Literature review | ■ | | | ■ | ■ | | | ■ | | ■ | ■ | ■ | Review of all relevant citations |




***Water availability in/around Kuno WLS. Dark zones define greater distance from nearest water source***

**GIS work in progress**

**Habitat:** In the first phase, baseline maps were prepared with the help of satellite imagery and its various band combinations. In the second phase, to assess the habitat types before classifying them on the map, a number of habitat evaluation plots need to be laid in the field for ground truthing.

As part of the initial exercise, data from a grid of 40 systematic points were collected for various habitat variables. Results of these are being presented separately. These points were earlier used by Khudsar *et. al.* for monitoring purpose, and could provide with the baseline data required for assessment of forest types.

**Management:** The management boundaries including compartments, beats, circles, ranges and protected areas are being digitized from the ammonia sheets available with the forest department. Apart from the boundaries, a thorough map of roads, walkways and firelanes is being developed by traversing the areas with a GPS in the tracking mode. The maps are being converted into line maps of various categories to help the forest department in demarcating areas that need better accessibility to ensure protection.

**Settlements:** In total 24 villages have recently been relocated from Kuno Wildlife Sanctuary. This has changed the location and population structure of most villages situated in and around the area of interest. While the first level of mapping with the help of topographic sheets is being done, to cross validate the data on village names, population, cattle heads, and area under cultivation/irrigation, a revised set of ground truthing is being done. Data from relocated sites of each of the village is being collected apart from actual coordinates.

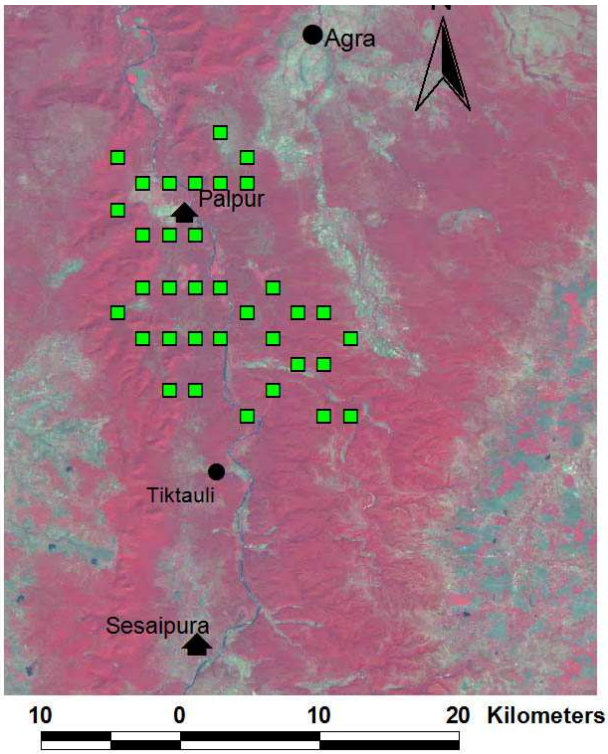
***2. HABITAT EVALUATION***

**Methods:**

Systematic Sampling Grid: Existing plots laid initially by Khudsar *et. al.* were surveyed to understand the overall habitat recovery pattern, relationship of wild and feral animals to various ecological parameters, and broad demarcation of niches occupied by various species. These plots are systematically positioned at every second minute of latitude and longitude. Data were collected for tree and shrub density, relative abundance of different plant species and biodiversity indices of trees and saplings at each of the sampled plots. Visibility being a critical factor for animals in the wild, especially for their predatory and antipredatory strategies, it was estimated at each of these points. Ground cover was estimated as relative frequency of presence of grass, herb and rocks on the forest floor. The information is useful to determine the potential of primary regeneration in the sampled areas, and the overall terrain type. Overhead canopy is important for thermoregulation by animals and was quantified at each of the sampled points. Animal usage of the sampled area was estimated by systematically collecting & identifying their dung/droppings.

**Vegetation Abundance and Composition**

Using plotless method of 11th tree/plant count, a total of 360 trees were recorded in the 34 surveyed plots. Tree density varied between 0 in one of the relocated village sites to 1102 per hectare in dense forest




***Distribution of the habitat evaluation plots marked at every minute on the map of Kuno WLS.***

patches such as Tongra. *Khair Acacia* catechu was found to be the most abundant tree followed by Kardhai *Anogeissus pendula*. These two species constituted 52% of the total tree population in Kuno. All other species were found at a relative abundance of less than 10%. The relative abundance of saplings shows that Kardhai has a high regeneration rate, followed by that of Dhava Anogeissus latifolia. Despite high abundance at the tree level, regeneration of Khair seems to be poorer than many other species. Among shrub species, *Grewia flavescens* dominated the forest floor with over 50% relative abundance followed by Ber *Zyziphus mauritiana*

### *3. RELOCATED VILLAGE SITES AND CONTROL PLOTS*

As part of the proactive management of a protected area, need of weed control was envisaged in Kuno Wildlife Sanctuary. However for assessment of success of any such exercise, baseline data is required to ensure monitoring for impact and effect in the long run. Since there are a variety of reasons that may potentially introduce and reintroduce weeds in an area, specific practices need to be evaluated and tested before investing heavily. The purpose of this exercise was to obtain baseline data on the existing weed cover. Located in the previously inhabited village of Palpur, a weed control plot 50 ha in size and less than a kilometre from the river Kuno was chosen for preliminary analysis. Information on relative abundance of grass and other native vegetation is also required to gauge the regeneration in the area after the weed removal exercise is conducted.

**Methods:**

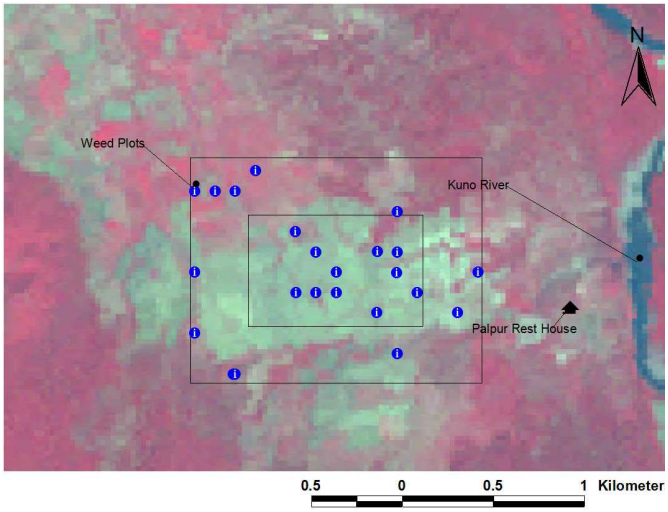
Location of Palpur weed control plot was marked on the GIS maps of Kuno Wildlife Sanctuary. Total 25 random points were generated using a random point generator. Data on vegetation and animal usage were collected from 23 of these points in October and November 2007. Two points were discarded as they were found to be too close to assume spatial independence.

***Ground vegetation Composition*** was estimated with the data collected from the 23 points. A total of 11 shrub species could be identified during the exercise. While Ber *Zyziphus numularia* was found to be the most abundant, jungle methi *Trigonella indica*, a widely prevalent weed, was found second in abundance. Other known weeds were Kureta *(*scientific name unknown*)*, Gurkhru *Tribulus terrestris*, Chirchita *Achyranthus aspara*, Pawar *Cassia tora* and Chilbatana, but their individual relative abundances were lower than 5% in the overall sampled area. Weeds constituted about 62% of total vegetation in sampled area (chart 1).

### 4. PREY BASE AND PREDATOR POPULATIONS

**Prey base**

Method of road transect was used to estimate basic information about the population structure and heterogeneity of animal distribution. In total, 171 sightings of




***Location of the 25 weed monitoring plots laid in Palpur weed management control site.***

803 animals were made during the preliminary exercise. While Chital *Axis axis* was the most encountered species in groups, Chinkara *Gazella bennettii* was the second most encountered wild species. Cattle were seen in abundance, whereas common langur, nilgai *Boselaphus tragocamelus* and wild pig *Sus scrofa* were less common.

Cattle were seen in the largest group sizes, with a mean group size of 12.6 followed by langur (9.3). Chital are still found in small herd sizes with a mean of 3.7. This is not significantly different from the group size of Chital as reported from many other areas (Karanth and Sunquist, 1992; Chundawat, 2001; Biswas & Sankar, 2002; Jathanna *et. al*., 2003; Bagchi *et. al*., 2003).

Although more data is being collected from the field, preliminary analysis suggests that there is a healthy recruitment of all prey species other than the Chinkara, whose female to fawn ratio was 100:13 against 100:83 of that of the Wild Pig. One may not infer much due to unavailability of large sample size from this data, and it should be considered only as preliminary information. More data is required to substantially establish the recruitment and survival rates of different age groups of the various prey species.

**Predator populations:**

Records of indirect evidences of predators found in Kuno Wildlife Sanctuary were collected jointly by the forest department and the research team. The whole sanctuary is divided into various administrative units such as compartments, beats and ranges. Location, status and type of each evidence of a predator was recorded during multiple visits made in the same administrative unit i.e. beats. Data is being compiled for analysis from the whole of the study area. A preliminary survey for this was conducted by the Wildlife Institute of India, Dehradun in the year 2006. Subsequent data was collected in the year 2007

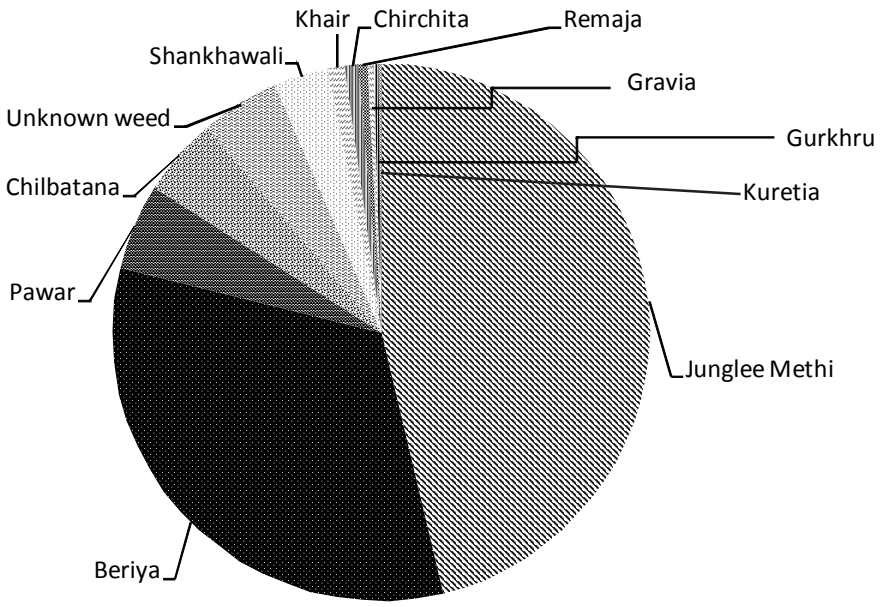



**Chart 1. Ground vegetation composition**

with the help of the staff of the forest department. Once compiled, it will be subjected to rigorous analyses using the software Presence (MacKenzie *et. al.*, 2006) for estimating site occupancy (MacKenzie *et. al*., 2002). These parameters will then be used to monitor the predator populations. Information about these populations will be of great value in helping develop a suitability model for the reintroduced lions in due course of time.

**5. SUPPORT TO PARK MANAGEMENT**

**Capacity development of the field staff**

It is important for the field staff of the forest department to be trained for conducting field exercises systematically and properly. This is to avoid possibilities where the data will have to be discarded as unusable affected by its poor quality.

Following the schedule of the forest department, a line transect exercise was done in the month of March and April. Training was provided to the field staff of Kuno Wildlife Sanctuary with the help of personnel from Wildlife Institute of India. The exercise was followed by field work where the forest staff had to traverse the line transects and collect data on prey base population to be used for distance sampling. Unfortunately due to an event of fire, the exercise was postponed for a few months. Distance sampling using road transect is now proposed in the month of May 2008 where the trained forest staff will assist in conducting the exercise.

Since Kuno Wildlife Sanctuary already has recorded the presence of tigers, and because it is expected to host lions in the future, it is important that the field staff is well versed with the differences and similarities between the two. Visits to protected areas with a commendable history of management practices is proposed in the coming season after monsoon for the field staff.

Training was also given to the field staff to use GPS and conduct habitat evaluation plots using the standard methods. Post training, the forest guards helped in collecting data from the weed control plots in Palpur, presented separately in this report.

Kuno has a history of being exploited extensively by poachers. On most occasions, poachers get away despite being caught, usually due to improper handling of the cases. Training is scheduled for the field staff to handle cases pertaining to poaching and forest offence with the help of professional organizations.

For any translocation program, it is mandatory to closely monitor the animals. Radio telemetry is the most efficient and non-intrusive method to ensure close monitoring of animals, but it needs thorough training for the monitoring team. Training program for the staff to perform homing and triangulation in the field is scheduled in the coming months.

**Management and Research**

Since Kuno Wildlife Sanctuary has attained worldwide attention for the proposed relocation of Asiatic lions, need for research based management was found important and hence the Ecological Monitoring Research Centre came into existence. In the two years of its functioning, the Centre has proven to be of great value since it catered to the requirements of the management by providing research based answers to many of its management issues such as water availability, prey-base density, weed prevalence and impact of feral cattle on habitat. It is envisaged that the research centre will continue to provide answers to queries that will be important for management of Kuno WLS & reintroduced lions.

Recently, in the month of April 2008, a workshop was held in Gwalior to help preparation of the management
plan of Kuno Wildlife Sanctuary and Forest Division.

Four broad topics important for developing the management plan of Kuno were discussed in greater detail, and it was found that the Ecological Monitoring and Research Centre in Kuno had a significant role to play in order to facilitate a research based management. The four major topics discussed at length were reintroduction of Asiatic lions, habitat and prey management, relocated villages, and ecotourism. Various aspects within these broad topics needed research support, which is where the EMRS was found as a useful support. The following subheads required immediate intervention from the EMRS, to which, a systematic research plan has been prepared and timelines have been set:

1. Survey of reptiles, small mammals and birds to help prepare the management plan.

2. Analysis of the fire regime in Kuno WLS to prepare a fire protocol ensuring that the area does not loose its characteristic species.

3. Estimation of the feral cattle population and their demography so that a population model could be developed predicting their status and hence impact in the future.

4. Identification, estimation of extent and abundance of the weeds in relocated village sites with and without heavy impact of feral cattle, so that a natural species composition of grass and shrubs is achieved in areas with extensive weed and feral cattle impact.

5. Developing the buffer map of the road network and model it with data on disturbance, hunting and fire to identify areas where a better network of forest roads is required to be built.

6. Support to the Park Management in developing the protocol and other prerequisites for reintroduction of the Asiatic Lion initially from captive stock.

## EIA Resource and Response Centre (ERC)

The "EIA Resource and Response Centre" (ERC) which has been set up as a joint initiative of the "Legal Initiative for Forest and Environment" (LIFE), "the Environics Trust" and the "PEACE Institute Charitable Trust".

The Centre is in response to a felt need to provide third party assistance to government agencies like the Expert Appraisal Committee (For Environmental issues) and Forest Advisory Committee (for Forest issues), to keep a watch and to challenge, as per the need, EIA reports which may be based on inadequate and improper assessment of the impact of the proposed developmental activities on natural India including wild flora and fauna, rivers and other wetlands etc. Our aim will be to create a national level database on EIA reports as well as other related documents so that groups, individuals across the country could access the same. We intend to make the same available electronically too. This will enable groups and interested parties to compare EIA reports and to also ensure compliance with the approval conditions.

We plan to undertake the following activities as an ongoing effort to build the ERC:

• Create a panel of experts to critique EIAs report in terms of accepted standards which could be used at the time of Public hearings, presentations made to the Expert Appraisal Committee / Forest Advisory Committee / National Coastal Zone Management Authorities/ National and State Board for Wildlife and other such bodies of MOEF and other agencies who grant approval to such projects.

• ERC would also be open to providing expert assistance to various government bodies like EAC, FAC and NCZMA etc in assessing the EIA reports submitted to them by various project proponents.

• Conduct alternative Environmental Impact Assessment for certain proposed projects in order to ground truth and to highlight the shortcomings if any, of the existing studies carried out by the project proponents.

• To provide strategic support to NGO's and communities to challenge faulty EIA's before appropriate forums where project proposals are presumably based on inadequate assessments, lack of public consultation or lack of participation and information provided if any to the affected communities.

• It is our endeavor that through a focused and dedicated effort we will be able to act as an expert third party advocacy and action group which is in a position to scientifically critique and challenge faulty approvals granted to many projects. These range from mining, hydro and thermal power to roads, highways and ports among others which today threaten our forests, rivers, coasts, mountains and the communities which depend on these vital natural heritage.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