Research in common parlance refers to a search conducted for seeking knowledge. We can say that it is logical and systematic approach conducted on a particular topic of field for seeking knowledge or for finding solution of a problem (Ref. Chauhan, J., 2002). According to the Oxford dictionary- Research is a “careful investigation or inquiry especially through search for new facts in any branch of knowledge”.

This chapter describes about the scientific methodology of the study adopted in the study area. The methodology in the present study was made to include three major categories of stakeholders namely visitors (tourists), local population (host community) and experts. In addition to it the study also relied on the application of ecological techniques for floral study, noise level monitoring and various observations both practical and subjective directly from the field.

Most of the data for tourism analysis have been obtained from many different sources and collected on three basic parameters: Observation, Secondary data and Primary data. Observation refers to the structured collection of information through the systematic observation and measurement of empirical phenomenon on the field. Observations have the potential to provide the valuable data that are grounded in real behaviour rather than opinion or official records (Stephen 1995). It is also important to mention here that every single source in this research work is relied on the survey research.
5.1. Data Collection

All the required data for this study were collected keeping in view the problems and objectives in mind. Primary data were collected from the respondent villagers, travel agents, Forest Officials and visitors visiting the destination points. The data were collected from these respondents through face to face interview with the help of pre-tested survey questionnaires and overcome contest was performed in the study area in order to identify and verify the requirements of survey schedules and questionnaires. Survey schedules and questionnaires were well structured with open ended and close-ended questions. This was done to congregate the existing data of the study area. The identified respondent groups include (a) owners of the shopping establishments at the sites, (b) Local residents / villagers (Sampled), (c) Visitors visiting the site, and (d) Forest officials (of wildlife sanctuary).

The primary and secondary data were used. Primary data of the study area were collected through the survey method. Primary data were collected from all the identified stakeholders, viz. villagers, travel agents, shopping owners, experts, hoteliers, visitors etc. around the destination spots. For the different groups, separate sets of questionnaires were prepared and were pre-tested. The data were collected in between February 04 to March 05. The secondary data were collected from different concerned Departments of Government of India, M.P. and various concerned websites. In this course, the data were collected from the Tourism Department (Bhopal), Archeological Survey of India (Bhopal Circle), Census Office (Bhopal), and Divisional Forest Office Obedullahgunj, District State Gazetteers and concerned books and websites.
5.1.1. Tourist Survey

In order to determine the tourist characteristics, their economic status and perception and experience about their visit a detailed questionnaire was developed. The questionnaire was divided into the different sections dealing with the different domains of research purpose. A survey of visitors concerning their perceptions of the importance of tourism in a local community and on the environment was based on a simple random sample viz., convenient sampling. As no authentic records of the total number of visitors arriving at the most of the destination sites of the study area are available, therefore the appropriate sampling frame is not possible in this case. The usual technique adopted in this case is to survey of the onsite visitors on monthly basis. The visitors were selected randomly on site i.e., everyone in the sampling frame has a known and equal opportunity to be selected. But the common criterion that is fixed during the survey is to select only those individuals who are 18 years and above and have taken a pleasure of the trip of a minimum duration. However, it is also to be mentioned that each respondent was selected at random in a group / family and each member was requested to give the information about the number of members in group / family.

Contingent valuation was carried out by asking consumers (visitors in this case) directly about their willingness-to-pay to obtain an environmental good. The actual valuation can be obtained in a number of ways, such as asking respondents to name a figure, having them choosing from a number of options, or asking them whether they would pay a specific amount (in which case, follow-up questions with higher or lower amounts were often used). In the present case, researcher used the WTP by asking the respondents to name a figure from a number of options given. From the literature survey it has been found that the two basic measures of the value place on the good exist are Willingness to Pay (WTP) to obtain it, and willingness to accept
compensation (WTA) for loosing it. As many analysts use WTP for convenience or on the grounds that it is ‘conservative’. In the case of the discussion here, in which the interest focuses on investment, which will increase the benefits, WTP is the theoretical correct measure.

5.1.2. Survey of Local Population

The definition adopted to separate the residents from the visitors is that the person who stays in a place for more than 12 months is not considered a visitor but a resident. Also a person who has spent less than the 12 months in a place but intends to return within 12 months to live there is not considered to be a visitor here. The local survey was administered to identify the environmental impacts on the local community due to the tourism development in the area or the future development of tourism in the area. The perceptions of the local people is also important as they are the real witness of the tourism scenario, both as a spectator and as an actor, and eventually they are the one who are directly (or indirectly) affected by tourism (Singh 1989). So, their views should be more realistic than the observers subjective observations collected from a few visits of the area. This study directly examines the views of local residents concerning their personal activities with regard to tourism and their perceptions of impacts on various issues generated due to tourism activities at each destination sites or might occur in the near future.

The household questionnaire is the perhaps the ‘standard’ research vehicle in leisure and tourism research: most of the quantified data in the field come from this type of research. The advantage of the household questionnaire is that it is generally representative of the community; the sample drawn tends to include all age and occupational groups and represents a complete geographical area, whether that is a country, a region, a local government area or a neighbourhood. Household Surveys, therefore, provide information on
the reported leisure or tourism behaviour of the community as a whole (Veal, 1994).

Altogether 41 villages were selected for conducting the survey. The villages near each destination spot were selected by purposive sampling i.e., taking some consideration factors like distance from the spot (mostly within 5 km radius), their dependency with the destination site, their occupational patterns etc. The households were selected randomly and an attempt was made to include 20% households from the villages. The survey included questions based on general information like age, occupation, and income etc., perception of visitation, socio-cultural domain and impact on economy soliciting residents’ perceptions on tourism’s negative / positive impacts. The responses were ascertained through the interview method from the sampled local villagers regarding their assessment of changes that have taken place or might take place in future. Most of their observations were based on subjective analysis, as it was difficult for them to measure the impacts objectively.

Responses to questions were rated on a scale of 4 to 0. ‘4’ marks were assigned for major impact, ‘3’ for moderate impact, ‘2’ for marginal impact, ‘1’ for negligible impact and ‘0’ for No impact. Those who did not register responses or did not know how to answer the questions were ignored. Thus, the negative and positive effects were ranked in order of intensity of impacts (Singh 1989).

It must be noted that though the questions were addressed to the heads of the groups/ households, conscious efforts were made to obtain responses from all group members, to ensure a participatory approach. Also, the basic schedule was designed in English/ Hindi and the investigators were trained to translate and make the respondents understand the questions in their language/ local dialect to elicit the
correct information from them. The study also used the secondary data, but in many cases the reliability of secondary sources is not very high.

5.1.3. ‘Delphi technique’ – Experts’ Opinion Survey

The most important concept for tourism analysis is forecasting. Forecasting, of course, refers to making predictions. Virtually all policy analysis and planning problems require forecasts of future conditions (Smith, 1995). Forecasting can provide with an assessment of the possible outcomes of alternative courses of action. The third categories of the stakeholders of the present study were the experts who were basically botanists, zoologists, foresters and NGOs working on environmental issues. The opinion of experts was mainly taken to identify and assess the possible negative impacts of tourism on environment and on the local communities. This technique popularly known as ‘Delphi technique’ is the best-known qualitative technique for instituting to anticipate the future development. This procedure involves the formal and structured soliciting of experts’ opinion from a panel of knowledgeable individuals concerning a given forecasting problem (Smith, 1995). The Delphi technique (Dietz, 1987; Green et al, 1990; Rowe et al, 1991; Rowe and Wright, 1999) was used which is considered as a potentially valuable technique for identification and assessment of the impacts of tourism. The technique coined in our study followed the technique adopted by Mitra et al, 2003 in their study on Environmental conservation and demand for nature-based tourism in Arunachal Pradesh sponsored by the Environmental Economics Research Committee (EERC). The technique used in the study by Mitra (2003) was further followed in the method of Green et al., in their assessment of environmental impacts stemming from a tourism project in England.
The Delphi technique was preceded in three distinct stages. First, a Delphi panel was formed consisting of 40 members and most of them were specialists in ecology and environmental conservation.

The list of members of different category is given in table 4.

**Table 4: Category wise Panel members of Experts**

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. NGOs working on environmental issues</td>
<td>06</td>
</tr>
<tr>
<td>2. Zoologists</td>
<td>15</td>
</tr>
<tr>
<td>3. Botanists</td>
<td>05</td>
</tr>
<tr>
<td>4. Experts of Ecology and Environmental Sciences.</td>
<td>06</td>
</tr>
<tr>
<td>5. Tourism Department officials</td>
<td>03</td>
</tr>
<tr>
<td>6. Forest officials</td>
<td>05</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>40</strong></td>
</tr>
</tbody>
</table>

Further the experts were requested to identify the possible negative impacts on the environment and on the local impacts. Having completed the preliminary survey, the first round questionnaires were drawn up. The basis for the questionnaire was an extensive checklist of negative impacts of tourism on environment derived from a comprehensive literature survey. The list was also supplemented by the new impacts identified by the experts. They were requested to rank them on the five-point scale.

It is important to mention here that the Delphi Techniques adopted by the researcher for the research in hand gets collapsed in the second round. The main reasons identified by which the decision has been taken to abort the method are as follows:

- The low response by the respondents- During First Round more than 55 questionnaires were initially circulated, out of which only 28 respondents responded to the questionnaires. This approximates 50% of response rate, while in the second round of study, 41 experts were given the questionnaires and only five respondents responded to it.
• The low response rate was also accompanied with the high cost of the technique led the researcher to end the technique, inspite of all the requests and efforts made.

The reasons mentioned above have already been mentioned in various literature on this technique in the category of limitations and disadvantages of Delphi Technique. It is obvious in the implementation of this technique. The technique although cancelled in the half of the way, but the responses received by the experts (those who responded) are of great value and can be considered as valuable opinions given by them and can be used in drawing some conclusion for the research work, as the opinions have been given by the experts of their field having immense knowledge and experiences.

The details of the Delphi technique are shown below:

**Fig 2: Delphi technique (Three stages)**
[From Mitra and Chattopadhyay, 2003]
5.1.4. Entrepreneur Survey
To determine the increased dependence of local people on tourism for livelihood, increased earning from tourism, percentage of jobs supported by tourism and locals involved, the local establishment survey has been performed. The entrepreneur survey includes: local shopping establishments, accommodation establishments and tour operators and the traveling agencies at the destination spots.

5.1.5. Floral Study
Vegetation survey method was drawn and required data on species and their composition were collected from the tourist activity point and also the same was implemented at the other spots of the selected destination point where tourist activity is not prevalent. Then these were compared in terms of the simple average. The methodology used in the present study has been adopted from the ITTO- NTFP Project Maharashtra executed by IIFM. The inventory Design for Resource Assessment was done in the randomly distributed clusters. Each cluster had nine plots arranged around a central plot in such a way that each of the four directions- North, South, East and west- had two plots in a row. Each plot was square 10-meter plot (10 X 10 mt.) separated from the adjoining plots by 10 mt. All the trees woody climbers (liana) and saplings were counted in these 10 x 10 mt. plots. The saplings at least 1.37 mt. in height but less than 15 cm GBH (Girth at Breast Height) were counted and shown in the column for 0- 15 cm girth class. The tree count was tabulated in 15 cm GBH classes. Trees above 150 cm GBH were grouped in one category “>150 cm” GBH. The plot lay out with the central 10 mt. base line and 5 mt. offsets on both sites of the base line works faster.

In addition, a line at 2.50 mt. parallel to the baseline defines a subplot of 25 square mt. for measurement of shrubs, climbers, rhizomes and tubers. Ocular estimation of average height of each species should be
entered into the inventory forms. 1 x 1 mt plots in the center of each half are laid down for counting of herbs and grasses. A species need not be counted if the number of individual plant is more than 20. It should be recorded as “>20”. If more 10% area of the plot is occupied by a single species, its occurrence should be estimated to the nearest five % and recorded as such in the inventory forms. It may be possible that some of the shrubs, herbs and other species may not be recorded because of the plot lay out. In addition to the quantitative data, it is required that all the remaining species should be listed out and appended to the inventory form. Besides it the general site characteristics such as slope, aspect, topography, soil conditions etc., had been described in the inventory forms.

{Note: The vegetation declines in rough proportion to the trampling pressure both in terms of its structure (high), and frequency of species.}

The data so collected from the field through the resource inventory form (Annexure- I) is then used to describe it into the quantitative manner. The parameter that is used to calculate the intensity of the disturbance is Importance Value Index (IVI). The distance methods yield three quantitative parameters- density, abundance and frequency. Any one of these parameters can be interpreted as an ‘Importance Value’. This depends on which of the values the investigator considers most important for a particular species, group of species of community. This ‘importance value’ also known as ‘Importance Value Index (IVI)’, is defined as the sum of relative density, relative frequency and relative abundance. These are calculated as:

Relative Density = \[\frac{\text{Number of individuals of a species}}{\text{Total No. Of all Individuals}}\] \times 100

Relative Dominance = \[\frac{\text{Dominance of a species}}{\text{Dominance of all species}}\] \times 100

Relative Frequency = \[\frac{\text{Frequency of species}}{\text{Frequency of all species}}\] \times 100

\[
\text{IVI} = \text{Relative density} + \text{Relative Dominance} + \text{Relative Frequency}
\]
Comparing the values of IVI of important species from different sites, the differing intensity of biotic disturbance can be calculated (Misra, 1968). Although the IVI gives no idea of species biomass or cover, but still for comparing the impact at two sites, IVI is a suitable method because the value so obtained gives the intensity of biotic disturbances, which is the major objective of implementing this study. Also, only GBH of tree species have been taken into account.

**Shannon-Wiener Diversity Index**: This method is used to compare diversity between different community and habitats. Both the species richness and equitability of the data set may be summarized with a single number— a diversity index. The value of Shannon-Wiener Index usually falls between 1.5 and 3.5 and rarely surpasses 4.5.

\[
H = -\sum_{i=1}^{S_{obs}} [P_i \log_e (P)]
\]

Where \( P_i = (n_i/N) \) = Proportion of individuals in the \( i \)th species;

\( H \) = Shannon Wiener Diversity Index.

‘\( H \)’ tends to increase with the number of species in the sample so it often gives little more insight than the species number.

**5.1.6. Noise level determination**

In the context of the baseline noise assessment, there is no need of looking all the sources in isolation, rather one can measure total ambient noise levels at different and carefully selected locations through appropriate noise meters (Barathwal, 2002). For the determination of noise level at the tourism activity spot various locations are selected, viz., maximum tourist activity point, destination point, nearby village, nearby forest area etc. The noise is measured at the destination points on the peak days and on the lean days on the hourly basis. Also the noise generating point sources of the noise were
identified at the destination area. The main purpose of this was to compare the noise levels at the peak and lean periods.

The noise level is measured on the dB (A) scale. Noise on hourly basis at the randomly selected locations was monitored at the time of peak day’s tourism activity and the lean day’s tourism activity of the year with the help of sound level meter with the collaboration of M. P. Pollution Control Board. A comparison was carried out between the noise generated in peak tourist period and lean period of tourist. For conveniently determining the noise level due to tourism activities the following areas are selected for estimating the noise level at dB (A) scale:

1. Bhojpur (Archeological and Religious tourism spot)
2. Delawari Destination site- Ratapani WLS (Protected Area)
3. Salkanpur (Rehti) (Pilgrimage tourist spot)

Table 5: The Measures of significance of tourism impacts (Morris and Therivel, 1995):

<table>
<thead>
<tr>
<th>IMPACT</th>
<th>MEASURES AND SIGNIFICANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOISE</td>
<td>Have noise level changed?</td>
</tr>
<tr>
<td></td>
<td>- Increase or decrease of &lt; 3 dB (A) – No Impact</td>
</tr>
<tr>
<td></td>
<td>- 3 – 5 dB (A) -----------Minor Impact</td>
</tr>
<tr>
<td></td>
<td>- 5- 10 dB (A) -----------Moderate Impact</td>
</tr>
<tr>
<td></td>
<td>- 10- 15 dB (A) -----------Major Impact</td>
</tr>
<tr>
<td></td>
<td>- &gt; 15 dB (A) -----------Severe</td>
</tr>
</tbody>
</table>

The noise levels so determined are compared with the Standard noise level in the air developed by the Central Pollution Control Board (CPCB) in India. (Table 6)
Table 6: Standard Noise level in the air. (Developed by CPCB)

<table>
<thead>
<tr>
<th>Area Code</th>
<th>Category of Area</th>
<th>Limits in dBA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Day Time*</td>
</tr>
<tr>
<td>A</td>
<td>Industrial area</td>
<td>75</td>
</tr>
<tr>
<td>B</td>
<td>Commercial Area</td>
<td>65</td>
</tr>
<tr>
<td>C</td>
<td>Residential Area</td>
<td>55</td>
</tr>
<tr>
<td>D</td>
<td>Silence Area</td>
<td>50</td>
</tr>
</tbody>
</table>

*Daytime: 6 a.m. to 9 p.m.
Night Time: 9 p.m. to 6 a.m.

5.1.7. Visual Impact Assessment

The methodology adopted for the visual impact assessment has been from the Morris and Threivel (eds.) (1995), *Environmental Impact Assessment*. The six-step methodology given in it has been modified for the convenience of conducting the study. The methodology used is given below:

1. Identification of types of visual impacts from tourism.
2. Preparation of description of existing visual resources for the study area.
3. Prediction of the impacts of tourism activity on existing visual resources.
4. Assessment of significance of the predicted impacts.
5. Identification and incorporation of mitigation measures.

In addition to the visual assessment methodology as stated above, the Biotic Assessment Forms (Annexure II) are also filled up by the extensive visits to the site and observations in consultations with the local staff and residents. The Biotic assessment forms after giving more evaluative and real but qualitative insight into the type of changes that might occur in the site along with the characteristic of the site, which plays an important role from the point of visual assessment and further comparisons of the destination sites in near future if so.
5.1.8. BIOTIC ASSESSMENT FORM

It is possible to anticipate or predict ecological changes that will result from the activities or the interference in the area with some degree of accuracy, which necessitates a survey of the site, and its natural resources before any alternations occur on or near the site. The information collected by this can lead to useful predictions of biotic impact as well as to the establishment of baseline conditions and population numbers (Rau & Wooten, 1980). The major advantage of this instrument of survey is that this standard of impact assessment should be used whenever possible. The site features that relate to the biota and that may be impacted by the activities should be noted. This may be accomplished quickly with the aid of a site features checklist assessment form. It must be important to mention here that not all variables will occur in every study site, but neither can be overlooked. Although in this case an attempt has been made to prepare a separate inventory assessment form for each site in the study area so as to have a clear knowledge about the biotic resources of the area and that might be impacted from the activities in the area in near future.

The Biotic Assessment Forms have been used to assess the present condition and the resources available at the site for the tourism. These forms also help in the preliminary assessment of the site as well as record of researcher’s first hand observation from the field, as it describes about the natural assets of the place. This form gives the insight into the present status of the place that might help the planners, policy makers and the researchers to know about the site.

5.1.9. SOLID WASTE ANALYSIS

The major problem in the study for the waste management was the quantification of the various wastes from the different sites. The study in the present context dealt upon the qualitative analysis by interviewing the onsite staff, investigation covering collecting
mechanism, primary constituents of the wastes by general observation
directly at the site, periods of waste generation (lean seasons and peak
seasons), measures taken for the collection and disposal of waste,
method used for disposal. Apart from these, the litter generated in
vegetative has not been taken into account for the convenient study.
Finally the management strategy and the measures to be taken in future
to meet the challenging task of waste management from the visitor's
influx are elaborated, which might be of importance for the managers
and the planners of tourism.

5.2. STATISTICAL TOOLS OF ANALYSIS

Besides the usual tabular and percentage analyses, ranking techniques
of analysis, Shannon Wiener Diversity Index, Importance Value Index
(IVI) and other statistical tools like standard deviations, means, T- test
etc, were used to analyze the composition of various types of
stakeholders and set of data. Simultaneously an attempt has also been
made to convert the qualitative data into graphical pictorial format
wherever it was feasible.

5.3. HYPOTHESIS FORMULATION

Generally, a researcher, investigator or experimenter has some fixed
ideas about certain population as well as population parameters based
upon earlier experiments, surveys or experiences. Many a times these
ideas might have been fixed in the mind vicariously. There is a need to
ascertain whether these ideas or claims are correct or not by collecting
information in the form of data. Hence, we come across two types of
situations, one is to draw inferences about the population on the basis
of sample data and the second is to decide whether our sample
observations have come from a population or not. Concept of
hypothesis is applicable in later situation. In the context of present
study we did not have any earlier such experience or ideas about the
population and or its related parameters. Hence, the possibility of hypothesis formulation could not be exercised along with the fact of practical impossibility.

5.4. Limitations of the Study

1. The most important limitation of this study is that most of the literature reviewed was from the non-environmental research, since limited applied work has been done.
2. The educational level in general and also about the environment and its impact in the areas selected for study is very low.
3. This study is mainly based upon the primary data as well as secondary data. Hence, limitations regarding primary data were obviously applicable.
4. The study was very extensive within limited time and energy in terms of money and manpower.
5. Being the investigative nature of the present study as well as lack of earlier experiences and data either through survey or experiment in the study area, hypothesis formulation was not possible. Hence, the study does not confirm any earlier set norms or facts.
6. All the areas in the ecology are very difficult to quantify, often being almost impossible to present in familiar terms to scientists of other disciplines. Thus, many of the impacts predicted cannot be absolutely verified.
Overall Sampling Design of the Study

Schematic presentation of sampling of respondents in the study area

- Total Households = 559
- Total visitors = 230
- Total establishment owners = 62
- Total Accommodation = 05
- Local taxi/auto drivers = 08
- On site Officials/Staff = 17
- Panel of 40 Members from different Disciplines

Total Number of Sampled respondents from the study area = 881