

## PROCESS DOCUMENTATION RESEARCH ON PATTERN OF PESTICIDE USE IN WESTERN INDIA

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### ABSTRACT

Gujarat stands fourth in quantity of pesticide use. Rich farmers with large land holdings, do farming with the notion that heavy use of pesticides can prevent pests. Pesticides are used in high doses and it is often the dealer who advises farmers on which pesticide to use. Several policies were made for trade of pesticide but till date 16% of the pest control practices relies on organochlorine pesticides. Various factors influencing such use of chemicals were correlated with the user groups in the present study. A thorough documentation was done with scientific approach incorporating social and economical aspects. The present study was an attempt to understand pesticide use in a district in Gujarat and to motivate farmers to use pesticides judiciously. We conducted a questionnaire survey to understand if age and education of farmers has any influence on the use of pesticides. We found that maximum amount of pesticide was utilized by the middle age group farmers (2526g/ha) and those (60%) having secondary level of education. To validate the importance of extension workers and their duties we found that the majority of farmers had medium level of extension contact (80.0%) and 16.67% paddy growers had a high level of extension contact. Economically sound farmers with larger land holdings used more pesticides and the economic characteristics of the farmers played an important role in choosing pesticide and its quantity. Our findings suggest that pesticide utilization was negatively related with scientific orientation and the knowledge of the farmers. Reduction in pesticide use can be achieved by adopting the IPM approach.

### KEYWORDS

Agriculture, awareness, education, farmer, Gujarat, Integrated Pest Management, pesticide

The production of pesticides started in India in 1952 with the establishment of a plant for the production of BHC near Calcutta. India is now the second largest manufacturer of pesticides in Asia after China and ranks twelfth globally. In India 76% of the pesticide used are insecticides, as against 44% globally (Mathur, 1999; Saiyed *et al.*, 1999). Residues of chlorinated persistent pesticides have been identified in various components of the environment in India, but the residual effect and its impact on the population at large is still not known (Kashyap & Bhatnagar, 1996)

Researchers at the New Delhi based Centre for Science and Environment have found alarmingly high levels of pesticides in blood samples of villagers in Punjab, the showpiece state of India's green revolution. India needs to urgently take a tough look at the indiscriminate and careless use of pesticides, writes Menon (2005). Pesticides are used in high doses and it is often the dealer who advises farmers on which pesticide to use. When the farmers find the pest control procedure is not effective with

the recommended dose, they tend to use three times more.

The utilization of various inputs for crop production mainly depends on our national policies and strategies for agricultural development and these are rooted in our Five Year Plans (FYP) for the development. The first FYP emphasized agricultural sector to be developed by increasing area under cultivation through increased irrigation, the next FYP aimed to improve crop productivity by massive introduction of chemical fertilizers. This led to crops becoming more vulnerable to pest attack. Resultantly, the third FYP also emphasised importance on pesticides in crop production thus encouraging several policies related to pesticide trade and special government organization were formed to promote the use of pesticide in the country (NCAER, 1967). As a result pesticide use not only increased in the country but over use of pesticides has become a global problem (U.S. Environmental Protection Agency, 1978; U.S.D.I. Fish and Wildlife Studies, 1963).

The pesticide utilization in the country was 2350tons during the first FYP, which reached to 75000tons by the end of the 90s, 32 times higher than its introductory phase (Singhal, 1999; Fig. 1). In the 1980s the growth rate of pesticide use lowered compared to the 60s and the 70s mainly due to the introduction of new pesticide compounds. These required low doses but importantly these compounds were highly toxic to targeted pests and non-targeted organisms.

During the DDT era about 85% of the Indian farmers utilized the organochlorine pesticides at the rate of 0.39kg/ha, applied nearly over an area of 282 million hectares of agricultural land of the country (NCAER, 1967). This trend remained until the 1970s when in subsequent years were slowly replaced by new organophosphate compounds, even though today's pest control practices still rely on the organochlorine pesticides (16%; Singhal, 1999).

At present, the consumption of chemical pesticides is highest in Andhra Pradesh (33%), followed by Punjab (14%), Karnataka (11%), Tamil Nadu (9%), Maharashtra (7%), Haryana (6%), Gujarat (5%), Uttar Pradesh (5%) and the remaining states account for 9.5% of the total (Singhal, 1999). Nearly 70% of the pesticides consumed in India were utilized for cotton (45%) and rice (22%) and this proportion of pesticide has remained almost unchanged over the last five decades (Vyas, 1998). This indicates that the pesticide use in the country is heavily skewed towards a few export crops and thus targeted policies for such

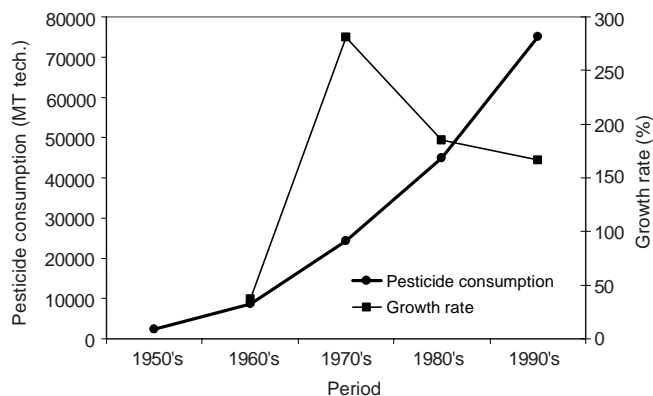


Figure 1. Trend in pesticide use in India

crops need strict enforcement of Integrated Pest Management (IPM) and further research on alternative pest control.

The total cultivated area of Paddy (*Oryza sativa* Lin) is 42 million ha with a production of 75 to 105 million tons. India produces three-fifth to two-fifth of the world's paddy (Anon, 1994). Paddy cultivation is very high in Gujarat occupying about 5% of the gross cropped area (7.5 to 8.0 lakh ha). About 80% of the area is confined to south and central Gujarat, comprising the districts of Kheda, Surat, Valsad, Panchmahal, Ahmedabad and Vadodara with an average production of 2.5 tons/ha of transplanted paddy (Korat & Mehta, 1996).

On one hand high yielding varieties were introduced while on the other these also increased the susceptibility to insects, diseases, weeds, rodents and nematodes leading to yield loss of 35-40%. Low levels of education and awareness added to the indiscriminant use of pesticides which resulted in the resurgence of pests and an increased load of toxic hazards and residues in the environment. According to NCAER (1967) Gujarat stood fourth in the quantity of pesticide use (1.479/ha). Rich farmers with large land holdings are of the notion that heavy use of pesticides can prevent pest attacks and increase crop yield. The present study was taken up in Gujarat (Kheda district; 22°30'-22°51'N & 72°32'-72°49'E) to estimate the amount of pesticides presently being used for controlling pests and to find out the factors motivating farmers to use pesticides judiciously.

**METHODS**

The study is principally divided and described in detail: (i) Study plan; (ii) Sampling techniques; (iii) Study area; (iv) Tools used; (v) Pre-testing of interview schedule; (vi) Data collection; (vii) Selection of variables; and (viii) Measurement of variables.

**Study plan:** Understanding the individual farmer's background, knowledge, socio-economic status, quantity of pesticides used, participatory approach and attitude towards the adoption of IPM.

**Sampling technique:** From a list of farmers under Panchayat record, randomly 10 cultivators per village were selected making a total of 60 respondents. The study was carried out in six

villages (Devataj, Lingda, Matar, Davda, Rudel and Gobrapura) in Kheda district, Gujarat, based on the land under paddy and crop yield.

**Tools used:** The interview schedule (questionnaire), after referring the available literature, integrated management approach and popular articles, was made. Suggestion made by the extension workers were also incorporated for accurate collection of responses and information.

**Pre testing of interview schedule:** To test the suitability of the formatted questionnaire with respect to the understandability of the respondents, a pilot study was done involving five farmers. The data, however, was not incorporated for further analysis. Before initiating the survey, the farmers were explained the purpose of the study; with further discussions the ambiguity of words and language were resolved to the extent possible in the final questionnaire.

**Collection of data:** During November and December 1999; the respondents were interviewed either at their home, at community places or at their farms and their responses were recorded on the spot. Every possible care was taken to maintain congenial atmosphere for getting unbiased answers from the respondents.

**Selection of the variables:** The variables under study were selected on the basis of extensive review of literature and after consultation with experts. Only those characteristics, which were found most relevant were kept for the investigation, and were as follows:

- a) Personal Characteristics - 1. Age, 2. Education;
- b) Social Characteristics - 3. Social participation, 4. Extension contact;
- c) Economic Characteristics - 5. Size of land holding, 6. Area under paddy crop;
- d) Psychological Characteristics - 7. Scientific orientation, 8. Awareness about IPM, 9. Adoption of IPM.

**Measurement of the variables:** The personal, social, economic and psychological characteristics were grouped into various categories on the basis of information available and are described below:

a) Personal characteristics:

1. Age: It refers to chronological age of the respondents at the time of interview, which was recorded and later categorized into three groups: A. Young (up to 30 years); B. Middle (31 to 50 years); C. Old (above 50 years)
2. Education: Formal education obtained by the respondents was classified into four groups and a measured score was assigned. For example, educated respondents were assigned one score for every class they had studied up to.
 

|  |          |
|--|----------|
| a. Illiterate                                  | 0        |
| b. Primary (up to 7 <sup>th</sup> std.)        | 1 to 7   |
| c. Secondary (8 to 12 <sup>th</sup> std.)      | 8 to 12  |
| d. College and above (above 12 <sup>th</sup> ) | above 12 |

**b) Social Characteristics:**

3. Social participation: Information regarding membership in formal organization/s was collected and categorized into four groups and score was assigned as per scale developed by Pareek and Trivedi (1965).

|   |       |
|---|-------|
| Social Participation                        | Score |
| a. No membership                            | 0     |
| b. Membership in one organization           | 1     |
| c. Membership in more than one organization | 2     |
| d. Position held in any organization        | 3     |

**4. Extension Contact:**

| Extension Worker            | Name       |      | Head quarter Yes/No | Number of Time Contact |          |            |
|-----------------------------|------------|------|---------------------|------------------------|----------|------------|
|                             | Don't Know | Know |                     | Fort-night             | Mon-thly | Occasional |
| Score                       | 0          | 2    | 1/0                 | 3                      | 2        | 1          |
| VLW                         |            |      |                     |                        |          |            |
| Agri. Ext. Office           |            |      |                     |                        |          |            |
| Asst. Dire. Agri. Ext.      |            |      |                     |                        |          |            |
| Dy. Director of Agri.. Ext. |            |      |                     |                        |          |            |
| University Scientists       |            |      |                     |                        |          |            |

The pooled score expressed the extent of contact of respondents with the extension agency. The respondents were grouped into three categories on the basis of their mean and standard deviation as under.

Low extension contact: < X - S.D.; Medium: X ± S.D.; High: > X + S.D.

**c) Economic characteristics:**

5. Size of Land Holding: The actual land holding (ha) possessed by the cultivators was considered and were categorized as follows: up to 1ha (marginal farmer), 1.01 to 2ha (small farmer), above 2ha (big farmer).

6. Area under Paddy Crop: The actual area under paddy out of total land holding was considered and paddy growers were categorized as follows: up to 1ha, 1.01 to 2ha, above 2ha.

Productivity: In accordance to the responses the total paddy production was recorded in kg/ha considering the area under paddy crop. The respondents were grouped into three categories on the basis of their mean and standard deviation.

Low yield: < X - S.D.; Medium yield: X ± S.D.; High yield: > X + S.D.

**d) Psychological characteristic:**

7. Scientific orientation: It was measured with a scale developed by Supe (1969) with due modifications. The responses were noted as per their agreement or disagreement with the statement. Positive and negative statements were scored as follows:

| Statement | Strongly agree | Agree | Unclear | Disagree | Strongly disagree |
|-----------|----------------|-------|---------|----------|-------------------|
| Positive  | 5              | 4     | 3       | 2        | 1                 |
| Negative  | 1              | 2     | 3       | 4        | 5                 |

The scientific orientation score of an individual respondent was the sum of the total score of all the statements and were categorized on the basis of mean and standard deviation:

Low scientific orientation: < X - S.D; Medium scientific orientation: X ± S.D; High scientific orientation: > X + S.D

8. Awareness about IPM program: To measure the awareness of respondents about IPM, a few questions were developed. The scoring system followed '0' and '1' for incorrect and correct answers respectively. An Awareness Index was calculated

$$AI = \frac{X1 + X2 + \dots + Xn}{N} \times 100$$

Where, AI = Awareness Index, X1 + X2 + ..... + Xn = Total number of correct answer; N = Total number of items in the test

The respondent were grouped into three levels by using mean and standard deviation

Low awareness: < X - S.D., Medium awareness: X ± S.D.,

High awareness: > X + S.D.

Measurement of Knowledge: A scale developed by Jha and Singh (1970) was used to measure respondents' understanding about the recommended IPM strategy, and the knowledge index was calculated for each respondent with the help of the formula given below.

$$KI = \frac{X1 + X2 + \dots + Xn}{N} \times 100$$

Where, KI = Knowledge Index, X1 + X2 + ..... + Xn = Total number of correct answer; N = Total number of items in the test

The respondents were grouped into three knowledge levels by mean and standard deviation

Low level of knowledge: < X - S.D., Medium level of knowledge: X ± S.D., High level of knowledge: > X ± S.D.

**9. Adoption of IPM:**

To measure the extent of adoption, the adoption quotient developed by Chattopadhyay (1974) was used to summarize the extent of adoption of each of the selected practices and potentiality. The adoption quotient of each respondent was worked out as:

$$\sum_{p1}^{e1} w1 + \sum_{p2}^{e2} w2 + \dots + \sum_{pn}^{en} wn$$

$$A.Q = \frac{\dots}{W \times N} \times 100$$

Where, A.Q = Adoption quotient; e1, e2, —, e3 = Extent of adoption towards a particular practices (viz., not adopted, below recommendation, above recommendation and as per recommendation 0, 1, 2 and 3 score were given respectively); p1, p2, —, p3 = Potential capacity of respondent in terms of score obtained for the particular practices; N = Number of year for which adoption quotient is calculated.

The weightage of the particular practice was determined by seeking the opinion from 30 experts who gave value to each practice from 100 marks considering the existing technologies and its importance in IPM strategy for paddy. The weightage of particular practice was collected and calculated as an arithmetic mean.

**RESULTS AND DISCUSSION**

The data collected were processed for statistical analysis and are presented as per specific intention of the study.

The pesticide load in the environment can be reduced by modifying the innovative farming practices and pattern of pest control methods. The adoption of an agricultural innovation is viewed as a complex process, which is influenced by various characteristics of the farmer like education; land holding, knowledge etc. and our findings are as below:

**Personal characteristics**

Age is a factor with some influence on taking decisions on farm operations (Table 1). The majority (60%) of paddy growers were in the age group of 31 to 50 years followed by 17% of farmers who were about 50 years and only 7% paddy growers were of 30 years. From our study, maximum amount of pesticide was utilized by the middle age group farmers (2526g/ha) followed by the young age group farmers (1504g/ha).

**Table 1. Distribution of respondents according to their age (n = 60)**

| Age group (Years) | Number | Percentage | Pesticide used (g/ha) |
|-------------------|--------|------------|-----------------------|
| Up to 30          | 7      | 11.67      | 1504 ± 42.07          |
| 31 to 50          | 36     | 60.00      | 2526 ± 30.12          |
| More than 50      | 17     | 28.3       | 512 ± 10.23           |

Education: None of the respondents were illiterates. Pesticide utilization was higher (2367g/ha) among the farmers having secondary level of education as compared to farmers from the rest-identified categories (Table 2). Nearly 60% of cultivators having middle level education and age used pesticides in excess. The age indirectly reflects the years of farming experience and education reflects their ability to understand and adopt the different farming technology. Interestingly, farmers from higher age and education category used minimum pesticide which reflects their knowledge about pest control practices.

**Table 2. Distribution of respondents according to their level of education (n = 60)**

| Category        | Number | Percentage | Pesticide used (g/ha) |
|-----------------|--------|------------|-----------------------|
| Illiterate      | 0.00   | 0.00       | -                     |
| Primary level   | 16     | 26.67      | 1004 ± 72.05          |
| Secondary level | 33     | 55.00      | 2367 ± 55.32          |
| College level   | 11     | 18.33      | 1454 ± 80.00          |

**Social characteristics**

The paddy growers were asked about their enrollment or membership in different formal village organizations. Table 3 shows that majority of paddy growers (63.33%) were members of one or more organizations and 16.67% of them were holding responsible positions in various organizations. However, pesticide utilization was higher amongst farmers who were members of one or more organizations and/or held higher posts.

**Table 3. Distribution of respondents according to their degree of social participation (n = 60)**

| Degree of social participation | Number | Percentage | Pesticide used (g/ha) |
|--------------------------------|--------|------------|-----------------------|
| No membership                  | 12     | 20.00      | 904 ± 60.35           |
| Membership in 1 organization   | 17     | 28.33      | 2272 ± 62.15          |
| Membership in >2 organization  | 21     | 35.00      | 2175 ± 90.12          |
| Holding position               | 10     | 16.67      | 1502 ± 112.01         |

The distribution of paddy growers according to their extension contact is presented in Table 4. It reveals that majority of the farmers had medium level of extension contact (80.0%), followed by 16.67% paddy grower having high level of extension contact. The amount of pesticide utilization was higher (3125g/ha) amongst farmers having low level of extension contact, followed by 1917g/ha of pesticides in the medium level of extension contact. The farmers having membership in one or more organizations utilized higher amounts of pesticides as membership in various organizations (like *Seva Sahkari Mandali*, Milk Co-operative Society) enabled them to seek the required finance for agricultural inputs and therefore access to more pesticides compared to farmers from rest of the categories. On the other hand the extension machinery provided right and regular guidance to the farming community as reflected by comparatively less amounts of pesticide utilization. While those having low levels of extension contact failed to perform farm operations to combat pests and ultimately became solely dependent on pesticides and their high use as guided by pesticide dealers.

**Table 4. Distribution of respondents according to their level of extension contact (n = 60).**

| Category | Number | Percentage | Pesticide used (g/ha) |
|----------|--------|------------|-----------------------|
| Low      | 02     | 3.33       | 3125 ± 302.02         |
| Medium   | 48     | 80.00      | 1917 ± 82.10          |
| High     | 10     | 16.67      | 1502 ± 91.13          |

**Economic characteristics**

The paddy growers, on the basis of their actual size of land holdings, were classified into three groups (Table 5). A majority (65.50%) of paddy growers had land holdings above 2ha, followed by 21.67% who had 1.01-2ha. The amount of pesticides used was higher by farmers having larger land holding as compared to small and marginal farmers. It seems like the farmers with paddy crop may have some knowledge and adoption of the IPM strategy. Table 6 reveals that the 41% farmers with large land holdings grow paddy. Pesticide utilization was higher amongst the middle category of farmers (1.1-2ha of paddy land)

**Table 5. Distribution of respondents according to their size of land holding (n = 60)**

| Category | Number | Percentage | Pesticide used (g/ha) |
|----------|--------|------------|-----------------------|
| Marginal | 8      | 13.33      | 928 ± 131.52          |
| Small    | 13     | 21.67      | 14.02 ± 68.21         |
| Big      | 39     | 65.50      | 2167 ± 30.22          |

compared to other farmers.

**Table 6. Distribution of respondents according to their land under paddy cultivation (n = 60)**

| Category     | Number | Percentage | Pesticide used (g/ha) |
|--------------|--------|------------|-----------------------|
| Up to 1 ha   | 15     | 25.00      | 1098 ± 100.18         |
| 1.01 to 2 ha | 20     | 33.33      | 3216 ± 95.30          |

Another important objective of this study was to ascertain the impact of pesticide and adoption of IPM strategy in terms of yield difference between the farmers. Pesticide utilization was higher where the yield per hectare was low. Majority of the farmers (70.0%) used comparatively lower percentages of pesticides and got higher yield of paddy per hectare (Table 7). Economic characteristic of the farmers played an important role in choosing the pesticides and the quantity. Important to note that pesticides do secure production but do not improve productivity, rather a curatives measure was of value.

**Table 7. Distribution of respondents according to productivity of land for paddy (n = 60)**

| Yield  | Number | Percentage | Pesticide used (g/ha) |
|--------|--------|------------|-----------------------|
| Low    | 3      | 5.00       | 4068 ± 213.20         |
| Medium | 42     | 70.00      | 1666 ± 81.17          |
| High   | 15     | 25.00      | 1866 ± 110.00         |

**Psychological characteristic**

The data presented in Table 8 indicates that majority of the paddy growers had medium level, while 15% had low level and only 5% of the paddy growers had a high level of scientific orientation. Table 9 reveals that awareness about IPM program amongst the paddy growers is very low (61.67%) while 36% of the paddy growers had a medium knowledge and only one percent belonged to high level of awareness category. Table 10 indicates that knowledge was very low among the large group of farmers (75%), and only 11% had better knowledge.

Major decisions like choice of seeds, pesticides, and operation timings were influenced by the psychology of the individuals.

**Table 8. Distribution of respondents according to their degree of scientific orientation (n = 60).**

| Category | Number | Percentage | Pesticide used (g/ha) |
|----------|--------|------------|-----------------------|
| Low      | 7      | 15.00      | 2413 ± 72.16          |
| Medium   | 48     | 80.00      | 1812 ± 55.55          |
| High     | 3      | 5.00       | 2100 ± 152.28         |

**Table 9. Distribution of respondents according to their awareness about IPM program (n = 60).**

| Category | Number | Percentage | Pesticide used (g/ha) |
|----------|--------|------------|-----------------------|
| Low      | 37     | 61.67      | 2306 ± 25.31          |
| Medium   | 22     | 36.67      | 1000 ± 51.20          |
| High     | 1      | 1.66       | 846 ± 0.00            |

Our findings suggest that pesticide utilization was negatively related with scientific orientation and the knowledge of the farmers. Farmers with higher level of knowledge did not prefer the overuse of pesticides. We advocate strengthening knowledge and scientific facts about pest control practices amongst the farming community.

**Table 10. Distribution of respondents according to their level of knowledge (n = 60).**

| Category | Number | Percentage | Pesticide used (g/ha) |
|----------|--------|------------|-----------------------|
| Low      | 45     | 75.00      | 2872 ± 28.12          |
| Medium   | 8      | 13.33      | 1815 ± 71.20          |
| High     | 7      | 11.67      | 1217 ± 92.01          |

**Adoption of IPM**

Several factors influence the adoption of this strategy. To understand such this, the relationship between personal, social, economic and psychological characteristics of paddy growers and their extent of adoption of IPM strategy were checked and a correlation coefficient against each characteristic was worked out (Table 11). We found that education, social participation, area under paddy crop and its productivity, scientific orientation and awareness about IPM were highly correlated with the extent of adoption of the IPM strategy. Although reduction in pesticide use can be achieved by adopting the IPM approach, there are

**Table 11. Relationship between personal, social, economic and psychological characteristic of respondents and their extent of adoption of IPM strategy on paddy.**

|   | Character                       | Correlation | Correlation coefficient |
|---|---------------------------------|-------------|-------------------------|
| 1 | Personal characteristics        |             |                         |
|   | 1. Age                          | NS          | 0.42                    |
| 2 | 2. Education                    | **          | 0.91                    |
|   | Social                          |             |                         |
| 3 | 3. Social participation         | *           | 0.62                    |
|   | 4. Extension contact            | **          | 0.87                    |
| 4 | Economic characteristics        |             |                         |
|   | 5. Size of land holding         | NS          | 0.38                    |
| 5 | 6. Area under paddy cultivation | **          | 0.72                    |
|   | 7. Productivity                 | **          | 0.89                    |
| 6 | Psychological characteristics   | NS          |                         |
|   | 8. Scientific orientation       | **          | 0.77                    |
| 7 | 9. Awareness                    | **          | 0.81                    |
|   | 10. Knowledge                   | *           | 0.65                    |

NS - Not significant; \* - Significant at < p = 0.01; \*\* - Significant at < p = 0.001

several limitations to put IPM into practice. One such limitation was the resistance from the user groups, and secondly inadequate resources in terms of cost of yield. The present study indicates that to increase the familiarity of IPM practices requires an extensive responsibility of the extension agencies, and to aid the farmers with necessary information well in time. The selection of trainees should be more from farmers having smaller land holdings. At the same time, special agricultural policies are required to diversify the cropping pattern instead of only export oriented policies.

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## BOMBAY NATURAL HISTORY SOCIETY

## Requires

**1. RESEARCH FELLOW FOR BIRD FLU PROJECT**

**Educational Qualifications:** The candidate should be I class M.Sc., preferably in Wildlife Biology/Zoology/Ornithology.

**Experience:** Should have minimum 2 years experience in field research work and proven interest in avian bird life / wildlife research and should have the knowledge of computer programmes like MS Office.

**Age limit:** Up to 30 years. **Salary:** Negotiable.

**2. ADVOCACY OFFICER FOR IMPORTANT BIRD AREAS IN INDIA (IBA)**

**Responsibilities for Advocacy Officer:** The Advocacy Officer must be able to effectively analyze and prepare oral and written analyses of national environmental legislation and policy for IBA conservation. She/he will collaborate with BNHS's other programmes, regional and country programmes to identify and provide their requirements for legal analysis related to IBAs, and also help Project Manager to develop and prepare environmental law-related publications and materials, papers, cultivate and maintain appropriate collaboration and partnership with key organizations working on conservation issues, represent in various meetings and processes, and be involved in fundraising for the implementation. The position also require travelling widely and frequently for field surveys. She/he will also have to work closely with the team of the IBA-IBACN in project-related development work.

**Selection criteria for Advocacy Officer:**

- Masters in any Science subject with strong academic record
- Excellent research, writing and analytical skills; cooperative attitude, with ability to work in team, and as part of fundraising activity where necessary
- Readiness to work long and potentially irregular hours and the capacity to effectively deliver even under stress and tight deadlines
- Strong networking skills and the ability to guide encourage and support the work of Indian Bird Conservation Network (IBCN)
- Excellent speaking and writing skills in English

**Age limit:** Up to 35 years. **Salary:** Salary will be commensurate with qualification and experience.

**Duration:** The initial contract will be for a period of 1 year and later for 2 more years.

**Reporting to:** Assistant Director, IBA-IBCN

Candidates fulfilling the above requirements may send their applications with detailed bio-data and expected salary within 10 days to:

**Director, Bombay Natural History Society**  
**Hornbill House, Shaheed Bhagat Singh Road, Mumbai, Maharashtra 400023, India**  
**Website: [www.bnhs.org](http://www.bnhs.org)**