Contingent Valuation of Forest Produce in High Altitude Zone of Andhra Pradesh

ABSTRACT

The present study aims at estimating compound annual growth rate of forest areain the high altitude zone of Andhra Pradesh state. The study was based on secondary data, which were collected from various published and unpublished sources. The data related to forest area was collected for the period of 1990-91 to 2020-21. For detailed analysis, the whole period was divided into two sub-periods i.e., period I (1990-91 to 2004-05), period II (2006-07 to 2020-21) and overall period III (1990-91 to 2005-06). The overall compound growth rate of forest area under high altitude zone of Andhra Pradesh was positive (0.54 per cent). But negative growth rate (-0.0048 per cent) was found in area for the HAT Zone in period-I (1990-91 to 2005-06) and positive growth rate (1.74 per cent) was found in area for the HAT Zone in period-II (2006-07 to 2020-21). Compound annual growth rate of forest area was found positive in overall period for the high altitude zone.

Contingent Valuation (CV) and its two arms like Willingness To Pay (WTP) and Willingness To Accept (WTA) are survey methods that weresupposed to measure the value of non-market goodsmainly for minor forest products. WTA usually consists of getting the information from the producers on how much they are willing to accept to avoid a negative or to accept a positive outcome.The results showed that willingness to accept was significant for all minorforest products like beedi leaves, soap nut, honey, bamboo, tamarind, firewood, vegetables, mushroom, fruits and cashew nut.The empirical results revealed that producers were willing to accept a premium for these forest products but lack of store availability, lack of credit facilities and middlemen exploitation were the major problems faced by the producers for which a reliable regulatory system is necessary to mitigate the quality constraint problem of forest products.

Key words: Forest Products, Contingent Valuation and Willingness to Accept

Introduction

The total area covered by forests in India is 7,13,789 sq.km, covering 21.71 per cent of the country's total geographical area. Of this, about 1,62,968 sq.km of forest land cover which accounted for 17.88 per cent of the state's total geographical area was observed in Andhra Pradesh. The high altitude zone of Andhra Pradesh, comprising parts of East Godavari, West Godavari, Visakhapatnam, Vizianagaram, and Srikakulam districts, is estimated to have a forest cover of 44,849 sq.km, which accounts for 27.52 per cent of the state's total forest area.

Majority of the scheduled tribes live in the forest areas and depend to a large extent for their livelihood and income generation on minor forest produce (MFP), which forms a major source of food consumption, subsistence and cash income for the tribal community. Minor forest produce includes all non-timber forest produce of plant origin *viz.*, bamboo, brush wood, stumps, cane, tussar, cocoons, honey, beedi leaves, soap nut, wax, lac, tendu or kendu leaves, herbs, roots and tubers, *etc*. (Ticktin, 2004).

The Government of India initiated a scheme, "Mechanism for marketing of Minor Forest Produce (MFP) through Minimum Support Price (MSP) and Development of Value Chain for MFP" aimed to guarantee equitable returns to forest-dwelling Scheduled Tribes and other traditional forest dwellers, as well as to provide a solution to the problems such as the perishable nature of the produce, lack of holding capacity, lack of marketing infrastructure, exploitation by middlemen, and low government intervention.

Under these circumsentences, the present research paper aims is to investigate the degree to which the high-altitude residents of Andhra Pradesh are willing to accept the minor forest products.

Methodology

Sample selection

Multistagerandomsamplingprocedure was followed for selection of sample.Firstly,Andhra Pradesh state was purposively selected, consequently out of six agro-climatic zones in Andhra Pradesh, high altitude zone, which is constituted by parts of

five districts*viz.*,East Godavari, West Godavari, Visakhapatnam, Vizianagaram, and Srikakulam districts was selected in view of the availability of major agro forestry systems in the zone. From each selected district, the top two mandals with the highest forest area, totalling to ten mandals and from each selected mandal, two villages with the highest area under forest cover, thus constituting twenty villages were selected for the study. A total of 335 respondents practicing atleast any one of the major agroforestry systems identified in the zone (*Viz.*,(i) Silver oak +Coffee + Pepper, (ii) Rubber, (iii) Jafra, (iv) Mango + Turmeric, (v) Cashew + Pulses and (vi) eucalyptus) and also dealing with the minor forest produce were selected on proportionate basis.

A household survey was carried out and primary data on give details of data type collected forest minor produce were obtained from the respondentsfor the year 2020-2021 with the help of a pre-testedinterview scheduletotoanalyse the willingness to accept the minor forest products.

Analysis of data

Compound growth rates

1. **Growth rates**

For estimating Compound Growth Rates, the time period was divided into two sub periods like pre FRA and post FRA. It will bedoneto compare the performance of the forest area in Andhra Pradesh. The study period will be divided into two sub periods for the purpose of analysis of growth rates *viz.*, 1990- 91to -2004-2005 and 2006-2007 to 2020-21. Growth rates will be used to measure the past performance of the economic variables. The growth of area in hectares will be analysed by using the exponential growth function of the form

$Y = a\, b^t\, e_t$

Where,

Y = Dependent variable (area in hectares)

t = time variable

e_t= Error term

a and b are unknown constants to be estimated

Contingent Valuation Method (CVM)

CVM was used to estimate the Willingness to Accept (WTA) for the selected MFPs. Under CVM, the Double Bounded Dichotomous Choice (DBDC) is the most commonly used and statistically efficient technique for the valuation of a novel good (Hanemann *et al.*, 1991 and Bateman *et al.*, 2002).

In the Double Bounded Dichotomous Choice (DBDC), every respondent is confronted with two bids. First, a respondent is asked whether he is willing to accept a certain amount for a given good. Then, according to his response to the first question, a second bid will be offered. If he says yes, then a second bid with a higher amount than the initial one will beoffered and if the respondent answers no, then a second bid with a lower amount than the initial one will be offered (Hanemann, 1985 and Hanemann *et al.*, 1991).

This initial price bid is denoted as P^I. The higher and lower bids are referred as P^P and P^D respectively. From the applied CVM, the four possible outcomes (responses) are as follows:

- R_1: the respondent says YES for both the bids P^I and second higher bid P^P, in this case the WTA $\geq P^P$: (YES – YES)
- R_2: the respondent says YES for the first bid P^I and NO for the second higher bid P^P, in this case $\leq$ WTA $\leq P^P$: (YES – NO)
- R_3: the respondent says NO for the first bid P^I and YES for the second lower bid P^D, in this case $P^D \leq$ WTA $< P^I$: (NO – YES)
- R_4: the respondent says NO for both the bids P^I and second lower bid in this case the WTA $< P^D$: (NO – NO)

In the present case, the bids were considered for the forest produce prices. For the estimation of WTA from the DBDC data, Cameron (1988) recommended censored interval regression by using the maximum likelihood estimation technique.For estimation of the mean WTA, the log likelihood function given by Cameron (1988) was used.

$$LnL = \sum_{R1} Ln\left[1 - \Phi\left(\frac{P^P - \beta X}{\sigma}\right)\right]$$

LnL= logarithm of the likelihood function

β= the vector of the coefficients to be estimated

X = the vector of the explanatory variable

σ = variance

P = unknown Parameter

The mean WTA was estimated by using the following formula:

$$E(WTA) = \hat{\beta}\overline{X}$$

E (WTA)= Estimation of WTA of product

β = was the vector of the coefficients to be estimated

X^- =was the vector of the explanatory variable

The analysis was accomplished with the help of the Stata SE 13 programme.

Results and Discussion

Growth rates of forest area in high altitude zone of Andhra Pradesh

The annual compound growth rates of forest area for high altitude zone of Andhra Pradesh were analyzed, considering the secondary data for two periods viz., period I : 1990-91 to 2004-2005 and period II : 2005-06 to 2020-2021, in addition to the overall period of 1990-91 to 2020-21 and the results are presented in Table 1.

Table 1. District wise growth rates of forest area in high altitude zone of Andhra Pradesh

District	Growth rates of forest area		
	Period I	Period II	Over all period
West Godavari	-0.01637NS	5.054761***	1.949376***
East Godavari	-0.00016NS	3.736492***	1.448435***
Visakhapatnam	-0.05832NS	0.22686***	-0.25149***

Vizianagaram	0.18209*	0.01645***	0.396024***
Srikakulam	-0.01752NS	0.123192***	-0.09422***
Total Zone	-0.00481NS	1.743305***	0.545514***

***Significantat1% level, **Significant at 5% level, *Significant at 10% level, NS- Non Significant

It is evident from the Table 1 that, growth rates during the periodI was found to be non significant level (-0.016per cent) as compared to period II (5.054761 per cent) and overall performance of West Godavari district was positively significant at one per cent level of significance (1.9493).Paul et.al (2022)

In East Godavari district, growth rate during period I was found to be non significant (0.00016) whereas during period II (3.736492) and overall performance of East Godavari was positively significant (1.4484) at one percent level. Nithin et.al (2017)

The growth of Vishakhapatnam forest area during I (-0.05832) was non significantas compared to period II (0.22686) significant at one per cent level and over all period of Vishakhapatnam (-0.25149) was negatively growth rate but positively significant at one percent level. In Vizianagaram district growth rate was positively significant during period I (0.18209) at five per cent level as compared to period II was positively significant (0.01645) at one percent level.Nayak et.al (2018). The overall performance of Vizianagaram was positively significant (0.3960) at one per cent level of significance. The growth rates during the period I was found to be non significant in area(-0.01752) whereas during period II was significant (0.123192) at one percent level and overall performance of Srikakulam district was positively significant (-0.09422) but negatively growth rate.Georgeet.al (2014)

The total forest area of high altitude zone of Andhra Pradesh for period I (-0.00481) was negatively growth rate and non-significant as compared to period II (1.7433) positively significant at one percent level. It is obvious from the table that overall performance was found positively significant (0.5455) at one per cent level in area for high altitude zone of Andhra Pradesh.Patil *et.al* (2018)

Willingness to accept of MFPs

The estimated WTA values through CVM for selected MFPs are presented in the Table.2. The P value of 0.00 for all minor forest products indicates the proper fit of the model. As the coefficient values were positive for all the variables, the positive influence for WTA was observed on all the variables.

Table 2. Willingness to accept of minor forest products

Product	Unit	Coef.	Actual price	Std. Err.	Z	P>|z|	95% Conf.	Interval	Maxium likelihood
Beedi leaves	Kg	14.58	10	0.76	19.06	0.000	13.08	16.08	-441.18
Honey	Lit	121.78	100	1.78	68.31	0.000	118.29	125.28	-495.55
Soap nut	Kg	64.45	50	1.174	54.86	0.000	62.15	66.75	-475.90
Bambo	Kg	125.79	110	1.54	81.42	0.000	122.76	128.82	-467.42
Tamarind	Kg	94.01	80	1.22	77.01	0.000	91.61	96.40	-464.90
Fire wood	Kg	123.21	100	1.39	88.33	0.000	120.48	125.95	-462.72
Vegetables	Kg	17.40	15	0.75	23.12	0.000	15.92	18.87	-455.75
Mushroom	Kg	106.53	80	1.58	67.10	0.000	103.41	109.64	-471.71
Fruits	Kg	27.20	20	1.37	19.77	0.000	24.50	29.89	-475.44
Cashew Nut	Kg	65.61	60	1.62	40.28	0.000	62.44	68.83	-481.74

From table 2, it is noticed that the mean willingness to accept for beedi leaves was 14.58 +/- 0.76 at 95 % confidence interval. The mean WTA was 14.58 indicating that the producer loss was R.s 4.58 , the farmers were receiving R.s 10 for beedi leaves at present. From the results it was observed that the mean willingness to accept for honey was 121.78 +/- 1.78 at 95 % confidence interval. Since the mean WTA was 121.78, the producer loss was 21.78 rupees, at present as farmers were receiving rupees 100 for honey at present.

Similarly the mean willingness to accept for soap nut was 64.45+/- 1.171. (95 % confidence interval). The mean WTA was 64.45, the producer loss was 14.45 rupees and the farmers receiving rupees 50 for soap nut presently. At 95% confidence interval the mean willingness to acceptance for bamboo was 125.79+/- 1.54. From table 2, the mean WTA was 125.79, the producer loss was rupees 15.79, at presently farmers were receiving rupees 110 for bamboo.

From the results it was declared at 95% confidence interval that the mean willingness to accept for tamarind was 94.01 +/- 1.22. Since the mean WTA was 94.01, the producer loss was rupees 14.01, as farmers are actually receiving rupees 80 for tamarind at present. From the table 2 it was stated that at 95% confidence interval the mean willingness to accept for firewood was 123.21 +/- 1.39. Since the mean WTA was 123.21, the producer loss was rupees 23.21, as farmers are receiving rupees 100 for fire wood at present.

The results it was found that 17.40 +/ 1.39 mean willingness has been observed at 95 % confidence interval. Since the mean WTA was 17.40, the producer loss was rupees 2.40, the farmer receiving rupees 15 for vegetables at present. The mean willingness to accept for mushroom was 106.53 +/- 1.58 at 95 % confidence interval. Since the mean WTA was 106.53, the producer loss was rupees 26.53, as farmers were actually receiving rupees 80 for mushroom at present.

It is further observed that the mean willingness to accept for fruits was 27.20 +/- 1.37 at 95 % confidence interval. From the table 2, the mean WTA was 27.20, the producer loss was rupees 7.20, as farmers were receiving rupees 20 at market.From the results noticed that the mean willingness to accept for cashew nut was 65.61 +/- 1.62 at 95 % confidence interval. Since the mean WTA was 65.61, the producer loss was rupees 5.61, as farmers are actually receiving rupees 60 for cashew nut at present.

The majority people in high altitude zone were receiving low prices on forest minor produce due to the lack of road facilities, transportation facilities. Lack of credit facilities by the Gov and other bodies for credit the farmers purely depends up on the middlemen, so the farmers must sale the produce to him only. Less quantity of the MFP produce there by the

farmers cannot go to the long way cities. Less numbers of buyers for MFPs, lack of awareness on market value of the produce, lack of knowledge on storage of MFP, Unavailability of transport to for away cities, where the demand is more for MFPs.Additionally, the government has not provided adequate support to tribal people regarding forest minor produce.

Conclusion

From the above tables it was clear that the overall compound annual growth rate of forestry area for high altitude zone of Andhra Pradesh was positive. The compound growth rates for the area of forestry in high altitude zone of Andhra Pradesh during the period 1990 –91 to 2020-21 have been computed as 0.54percent. The results showed that the farmers' willingness to accept the prevailing price for the MFPs was significant for all MFPs. Though this seems to reflect a tinge of positivity, their willingness to accept stems from their inevitability of not being able to realize a better price for their produce. The MFPs are currently being sold at low prices due to unstable markets, leading to their unsustainability. Therefore,it isrecommendedthatfarmer,thelocalgovernment,businesssector,andresearchersshouldand worktogetherindevelopingproper market framework for MFPs, which would realize satisfactory prices for the produce. A reliable regulatory system is considered necessary to mitigate quality constraint of forestry products in this high altitude zone of Andhra Pradesh.

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